

UNIVERSITI TEKNOLOGI MARA

**MORBIDITY AND MORTALITY
RISKS OF LUNG CANCER
PATIENTS IN MALAYSIA: CANCER
FREE LIFE EXPECTANCY AND
EXTENSION OF FUNCTIONAL
MARKOV MODEL**

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ABSTRACT

The improvement in mortality rates in many countries over the world has a major impact on costs associated with living longer. The trend of life expectancy in Malaysia population has steadily increased. This is due to the advancement of medical technology and people awareness of their health risk. Cancer has been one of the leading causes of death in Malaysia for many years. There are four stages of lung cancer and the treatment for each lung cancer's stages may vary. If cancer were just spread in one place, the doctor may recommend a local treatment to get rid of the cancer completely. Whereas, if the cancer has spread to the other part of the body, more comprehensive treatments maybe needed thus will increase the costs of treatment. Therefore, it is crucial to estimate the transition probabilities between lung cancer stages to measure the accurate cost of treatment according to respective stages. The lack of extensive longitudinal data that trace the progression of cancer from one stage to more severe stages challenges the process of estimating transition probabilities of lung cancer. As an alternative, a specific method needs to be developed in order to make use of the existing cross-sectional data to estimate the probabilities. The objectives of this research are firstly, to analyse Malaysian cancer cases data by performing descriptive analysis using statistical method and secondly to compute the Cancer-free Life Expectancy for Malaysian population and compare with the life expectancy of Malaysian population. The third objective of this research is to develop the six-state transition Functional Markov model for lung cancer patients in order to estimate transition probabilities between stages. Data use for this research include Malaysian lung cancer prevalence rate by cancer stages and gender which collected from the Institute of Public Health and Malaysian mortality rate by gender which obtained from the Department of Statistics Malaysia. In addition, survival lung cancer data were collected from Shieh et al. (2012) and Malaysia expenditure on health were collected from Ministry of Health Malaysia (2021). These study employs the Sullivan method to estimate cancer-free life expectancy and extends the Functional Markov model to estimate transition probabilities between lung cancer stages. Results show that by performing statistical ANOVA test, the type of cancer are significantly different to each other at the significance level of 0.05. This supports my analysis that focus on a specific type of cancer which is lung cancer. Moreover, result from the Sullivan model shows that Malaysian male's cancer-free life expectancy has improve from 2014 to 2016 by 2.36%. However, Malaysian females' cancer free life expectancy has no improvement indicating the cancer morbidity risk among female is constant. Moreover, this study found that the the proposed Functional Markov model is accurately calculate the transition probabilities for stage I, stage II, and stage III with the model error yield to approximately to zero value. However, for stage IV the absolute different between data and model are 1.65% in 2011 and 1.62% in 2016. This study provides information on morbidity risk of cancer disease by stages which is useful to many parties such as health economist and medical practitioner in particular to estimate costs associated to lung cancer treatment and procedure efficiently.

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