Burden of breast and reproductive tract cancers in Kerala is likely to become more acute. In the present thesis various methods for estimating probability of developing cancers on breast and most common reproductive tract cancers such as cervix uteri, ovary and corpus uteri cancers in Thiruvananthapuram Taluk are compared. Further, estimated the burden of these cancers in terms of Disability Adjusted Life Years (or DALY) in Thiruvananthapuram Taluk and compared DALY according to the various social value choices. Various analytic approaches for estimating trends in incidence rates of these cancers for the period 1991 to 2010 are compared and estimated the future burden of these cancers in Thiruvananthapuram and the state of Kerala till the period 2026. Thiruvananthapuram cancer registry data (TCR) data on incidence and mortality rates of the above four cancers are used for illustrating the various methods.

A total of 404 (57.0% of all female cancers in the TCR) new female breast, cervix uteri, ovary and corpus uteri were reported in the TCR among a female population of 600,393 for the year 2006. The ASR (age-standardized to world-standard population) of incidence and mortality rates of the above four cancers together were 58.6 and 10.5 per 10^5 women respectively.
Breast cancer is the 1st leading cancer and it accounted 34.0% of all cancers among women in Thiruvananthapuram. The ASR (incidence) of this disease is 34.0 and the CR is 40.0 per 10^5 women. The corresponding mortality rates are 5.3 and 6.3 per 10^5 women. Cervix cancer is the 3rd leading cancer and this disease accounted for 10.4% of all cancers among women. The ASR of incidence and mortality rates of cervix cancer are 10.7 and 2.2 per 10^5 women respectively. Ovarian cancer is the 6th leading cancer among women. It accounted for 7.4% of all cancers among women. The ASR (incidence) of ovarian cancer is 7.7 and the corresponding mortality rate is 1.6 per 10^5 women. Corpus uteri cancer is the 7th leading cancer among women. It accounted for 6.0% of all cancers among women. The ASR (incidence) of corpus uteri cancer is 6.2 and the corresponding mortality rate is 1.4 per 10^5 women.

Forty one percent of breast cancer is diagnosed under the age of 50 years. The mean age at diagnosis of breast cancer is 52 years (SD=12.4 years). The mean age at death is 56.8 years (SD=12.3 years). Eighty four percent of cervix cancer is diagnosed above the age of 50 years. The mean age at diagnosis is 60 years (SD=12.4 years) and the mean age at death is 57.3 years (SD=11.2 years), 33% of ovarian cancers are diagnosed under the age of 50 years. The mean age at diagnosis is 52 years (SD=11.2 years) and the mean age at death is 58 years (SD=10.4 years). The mean age at diagnosis of corpus uteri cancer is 57.4 years (SD=11.2 years) and the mean age at death is 59.5 years (SD=10.4 years).

During the 20 year period, 1991-2010, breast, ovary and corpus uteri cancers rose substantially in Thiruvananthapuram. The rates increased to 96%, 94% and 125% for breast, ovary and corpus uteri cancers respectively and cervix uteri cancer is decreased to 18% from the period 1991-1995 to 2006-2010. There was a steep increase in breast cancer incidence rates in Thiruvananthapuram from 1991 to 2000, then slightly increased till 2010. The statistically significant estimated annual percent change (EAPC) according to the two segments such as 1991-2000, 2001-2010 were 6.8%, 1.6% per year. Similar to breast cancer, increased incidence rates were observed for ovary and corpus uteri cancers in Thiruvananthapuram. The estimated the annual percent changes were 3.7%, 6.6%, per year for ovary and corpus uteri cancer respectively. Cervix uteri cancer incidence rates were linearly decreasing and the corresponding EAPC was 2.2%.
The probability of developing breast cancer in one’s lifetime is 2.61% in 0-64 years and 3.23% in 0-74 years and the probability of dying in one’s lifetime is 0.32% in 0-64 years and 0.52% in 0-74 years. The probability of developing cervix cancer in one’s lifetime is 0.69% in 0-64 years and 1.08% in 0-74 years and the probability of dying in one’s lifetime is 0.16% in 0-64 years and 0.20% in 0-74 years. The probability of developing ovarian cancer in one’s lifetime is 0.58% in 0-64 years and 0.71% in 0-74 years and the probability of dying in one’s lifetime is 0.11% in 0-64 years and 0.16% in 0-74 years. The probability of developing corpus uteri cancer in one’s lifetime is 0.35% in 0-64 years and 0.65% in 0-74 years and the probability of dying in one’s lifetime is 0.11% in 0-64 years and 0.16% in 0-74 years. The probability of developing any of the four cancers in one’s lifetime is 2.61% in 0-64 years and 3.23% in 0-74 years and the probability of dying due to these cancers in one’s lifetime is 0.32% in 0-64 years and 0.52% in 0-74 years.

The cumulative incidence and the risk are almost similar for all the four cancer sites. The differences between the values according to the age-conditional probability method and cumulative risk method are less than 10% in almost all age intervals. Lifetime risk calculated using age-specific incidence or mortality rate is comparable with the values obtained using age-conditional probability. Even though the cumulative risk method is free from the assumption of competing causes of death, the probabilities for developing or dying due to the above four disease are almost similar.

Estimated values of years of life lost (YLL) due to breast, cervix uteri, corpus uteri and ovary in Thiruvananthapuram taluk for the year 2006 were compared using three different approaches such as no discounting and uniform age-weighting [YLL (0,0)], 3% discounting rate and uniform age weighting [YLL (3,0)], and non-uniform age-weighting and 3% discounting [YLL(3,1)]. The life years lost were the highest for all the four cancer sites when uniform age-weighting and no discounting rate is used and the lowest when non-uniform age-weighting and 3% discounting rate is used. YLL (0,0) and YLL (3,0) values were 86% and 22% higher than YLL (3,1) for breast cancer, 86% and 22% higher for cervix cancer, 92%, 35% higher for corpus uteri cancer and 90% and 31% higher for ovarian cancer respectively.

Similar to YLL, values of YLD were the highest for all the four cancer under uniform age-weighting and no discounting rate condition when data of both all-cause
mortality and the case-fatality ratios are used. Values corresponding to YLD (3,1) and YLD (3,0) are almost similar for breast and ovarian cancers when all-cause mortality and case-fatality data were used.

Estimated values of disability adjusted life years (DALY) were compared using data of case-fatality ratio and all-cause mortality under the above three approaches such as DALY (0,0), DALY (3,0), and DALY (3,1). DALY were the highest for all the four cancer sites when uniform age-weighting and no discounting rate is used and the lowest when non-uniform age-weighting and 3% discounting rate was used when both all-cause mortality and case-fatality data were used.

It is estimated that a total of 1216.5 women years of life are lost in 2011 due to cancers of the breast, cervix uteri, corpus uteri and ovary in Thiruvananthapuram. Among these, 53%, 19%, 15.6% and 12.4% are due to breast, cervix uteri, ovary and corpus uteri respectively. Compared to the year 2011, the burden of these four cancers is likely to be increased to 1450.4 (19.2% increase) in 2016; 1716.1 (41.1% increase) in 2021; 2031.5 (67% increase) in 2026 if the current trend continues. A total of 285 women years are lived with disability in 2011 due to the four cancers in Thiruvananthapuram in 2011. Among these, 53.6%, 14.0%, 13.2% and 19.2% are due to breast, cervix uteri, ovary and corpus uteri respectively. Compared to the year 2011, the burden of these four cancers is likely to be increased to 327.3 (15% increase) in 2016; 385 (35.2% increase) in 2021; 451 (58.3% increase) in 2026 if the current trend continues. Burden of disability-adjusted life-years are a total of 1501.4 women years of life in 2011 due to the above four cancers in Thiruvananthapuram. Among these, 53.1%, 18.0%, 15.2% and 13.7% are due to breast, cervix uteri, ovary and corpus uteri respectively. The burden of these four cancers is likely to be increased to 1777.7 (18.4% increase) in 2016; 2101.2 (40.0% increase) in 2021; 2482.6 (65.4% increase) in 2026 if the current trend continues.

It is estimated that a total of 33,320 women years of life are lost in 2011 due to cancers of the breast, cervix uteri, corpus uteri and ovary in Kerala. Among these, 53%, 20%, 15% and 13% are due to breast, cervix uteri, ovary and corpus uteri respectively. The burden of these four cancers is increased to 39,562 (18.7% increase)
in 2016; 46,663 (40.0% increase) in 2021; 53,820 (61.5% increase) in 2026 compared to the year 2011.

A total of 7126 women years are lived with disability in 2011 due to the four cancers in Kerala. Among these, 62%, 12%, 15% and 11% are due to breast, cervix uteri, ovary and corpus uteri respectively. The burden of these four cancers is increased to 8762 (23.0% increase) in 2016; 10,737 (50.7% increase) in 2021; 11,668 (63.7% increase) in 2026 compared to the year 2011.

Burden of disability-adjusted life-years are a total of 40,446 women years of life in 2011 due to the above four cancers in Kerala. Among these, 54.2%, 18.4%, 15.2% and 12.2% are due to breast, cervix uteri, ovary and corpus uteri respectively. The burden of these four cancers is likely to be increased to 48326 (19.5% increase) in 2016; 57398 (41.9% increase) in 2021; 65488 (61.9% increase) in 2026 compared to the year 2011 if the current trend continues.

In conclusion, the thesis deals with a number of findings such as estimation of burden of female breast and reproductive tract cancers, probability of developing or dying due to these cancers, time trends in incidence rates of these cancers in Thiruvananthapuram and projection of burden of these cancers in Kerala. The results of this thesis are published in 16 research papers in international journals which are listed in the references. A few papers are communicated for publication.