Kentucky
Cancer Consortium
A partnership for life.

Resource Plan

Executive Summary

Kentucky has a cancer problem.

- Kentucky has both the highest rate of new cancers as well as the highest death rate for all cancers combined in the U.S.[1]

If Kentucky were to spend money on cancer prevention and early detection, lives and money would be saved.

- An investment of **$10 per person** annually in proven, community-based public health (prevention) programs could save the U.S. more than $16 billion within 5 years – **$5.60 return for every $1.00 invested**.[2]

Since Kentucky does not invest enough in cancer prevention and early detection, we spend a lot of money on cancer treatment and related costs.

- In 2010, **cancer care in Kentucky** cost approximately $2,228,000,000. In 2020, it is estimated to **increase by 69%**, which would be approximately $3,775,000,000.[3]
- Cancer causes tremendous **productivity losses** in the U.S. estimating 33.4 million days of disability among 3.3 million people each year. This loss **equates to almost 20%** of the amount spent in **overall health care expenditures** in the U.S.[4]

Even after implementation of the Affordable Care Act, not all Kentuckians will have access to healthcare.

- After the enactment of the Affordable Care Act, the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) expects the need for their program to remain despite the increase in insured and preventive screening covered with no cost sharing.
  - The number of uninsured low income level women is projected to be 3 to 5 times higher than the amount of women that currently receive screening services from the NBCCEDP (approximately 20% of eligible women).[5]
  - Additionally, other services that may not be covered without cost sharing may be provided by the program. The Kentucky Women's Cancer Screening Program of the Department for Public Health is funded in part by the NBCCEDP.

Purpose of Resource Plan

Kentucky's *Cancer Action Plan* (CAP) serves as a blueprint for cancer prevention and control throughout Kentucky. The purpose is to provide statewide coordination of public and private cancer control efforts that are ongoing or needed within our state. It is intended for use by individuals and organizations in all areas of cancer control statewide. Visit www.kycancerc.org to find the latest Cancer Action Plan.

In order to implement the CAP and ensure its success, **defining the resources needed** is essential.

Executive Summary

The *Resource Plan* provides the best available estimates of the additional funding needed to reasonably implement some of the priority areas of the CAP. Additional benefits of having a resource plan are to plan ahead and focus on long-term sustainability for CAP priorities. It provides information on the resources needed for the priority areas, which currently include:

- Lung Cancer Prevention and Early Detection
- Colon Cancer Prevention and Early Detection
- Breast Cancer Prevention and Early Detection
- Cervical Cancer Prevention and Early Detection

The Kentucky Cancer Consortium Resource Plan Team retrieved information about existing resources based on available evidence and partner suggestions. The Resource Plan Committee acknowledges that there are limitations to the information available.

Thank you to Resource Plan Team members, including:

- **Paula Arnett, MBA, DrPH, KY Rural Health Association, UK Rural Physicians Program**
- **Irene Centers, BA, Kentucky Tobacco Prevention and Cessation Program, KDPH**
- **Angela Criswell, MA, CPS, Kentucky Tobacco Prevention and Cessation Program, KDPH**
- **Bobbye Gray, RN, BS, Kentucky Tobacco Prevention and Cessation Program, KDPH**
- **Jack Hillard, B.A., Kentucky Cancer Foundation**
- **Jessica Jones, MSW, Kentucky Cancer Consortium**
- **Whitney Jones, MD, Colon Cancer Prevention Project, Kentucky Cancer Foundation**
- **Kelly Kelly, RN, KY Department of Insurance**
- **Dan Kenady, MD, FACS, UK Dept. of Surgery, American College of Surgeons**
- **Goetz Kloecker, MD, MBA, MSPH, FACP, University of Louisville**
- **Bryan Loy, MD, MBA, Humana – KY**
- **Janet Luttrell, Colon Cancer Prevention Program, KDPH**
- **Sivaram Maratha, MS, MPA, Kentucky Women's Cancer Screening Program**
- **Colette McCoy, MBA, Lung Cancer Alliance**
- **Mark Milburn, RPh, Kentucky One Health**
- **Jaclyn Nee, MPH, Kentucky Cancer Registry**
- **Jennifer Redmond, DrPH, Kentucky Cancer Consortium**
- **David Richwine, RN, BSN, Health Care Alliance Liaison, Bristol Myers-Squibb**
- **Robert Shaw, MS, FACHE, Norton Cancer Institute**
- **Andrea Shepherd, Colon Cancer Prevention Project**
- **Melody Stafford, RN, Kentucky Women's Cancer Screening Program, KDPH**
- **Sue Thomas-Cox, RN, BA, MAC, Chronic Disease Prevention, KDPH**
- **Ashli Watts, MA, Kentucky Chamber of Commerce**

Table of Contents

Cancer Burden in Kentucky **5-7**

Opportunity for Kentuckians **8**

Lost Opportunity for Kentuckians **9**

Treatment Costs **10**

Impact of Cancer on Employers and Businesses **11-12**

Greatest Need for Prevention and Screening in Kentucky **13**

Cost of Smoking in Kentucky and **Underpricing Cigarettes in Kentucky** **13-14**

What Can You Do for Kentucky? **15**

Appendices **16-29**
Appendix A: Cancer Burden 16-21
Appendix B: Prevention and Screening Costs 22-24
Appendix C: Prevention and Screening Guidelines 25
Appendix D: Treatment Costs 26
Appendix E: Greatest Need Estimates 27-28
Appendix F: Smoking Related Costs 29

References **30-33**

Cancer Burden in Kentucky

2005-2009, U.S. Cancer Statistics[1]			
Type of Cancer	Where does Kentucky rank in the U.S. for rate of new cases?	Where does Kentucky rank in the U.S. for rate of deaths?	What is the difference between Kentucky and the U.S. death rate?
Lung	1	1	46% ↑
Colon	1	4	19% ↑
Breast	31	21	2% ↑
Cervical	9	6	21% ↑*

* Note, the rates are very low, so any change in the number can appear significant (KY death rate is 2.9 per 100,000 females and U.S. rate is 2.4 per 100,000 females).

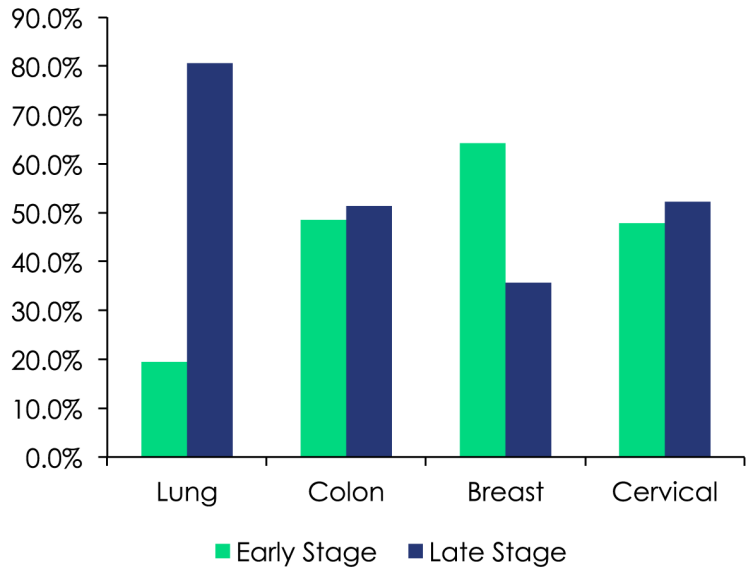
- Kentucky has a higher death rate from lung, colon and cervical cancer than the U.S.[1]
- Kentucky's lung cancer death rate is almost 50% higher than the U.S. rate. Kentucky is first in the nation for new cases and deaths from lung cancer.[1]
- Cigarette smoking is the number one risk factor for lung cancer.[6,7] In the United States, cigarette smoking causes about 90% of lung cancers.[6]
- Cancer was the leading cause of death for working age Kentuckians (ages 35-64) from 2006-2010.[8] (See Appendix A for chart)
- The most common cancer deaths among Kentuckians age 35-64[9] from 2005-2009 were:

    1. Lung – 55 per 100,000 people
    2. Colon – 14 per 100,000 people
    3. Breast (female) – 13.3 per 100,000 people

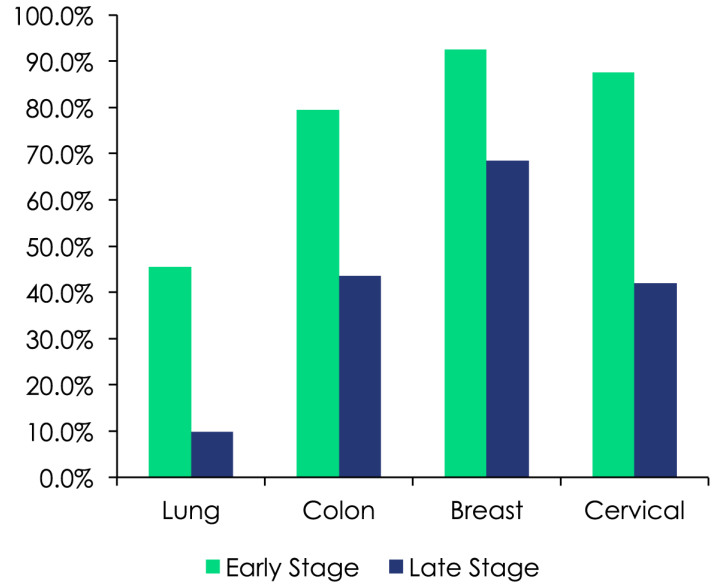
- **All three leading causes of cancer deaths among those ages 35-64 have evidence-based prevention or early detection strategies.**

- "Early Stage" means that the cancer has not spread beyond the original body organ.
- "Late Stage" means that the cancer has spread to lymph nodes or other organs in the body.
- Lung cancer was significantly more likely to be diagnosed at a late stage than colon, breast or cervical cancers.
- Colon and cervical cancers had similar numbers of cancers diagnosed at an early versus late stage with late stage being more common.
- Breast cancer is the only cancer that was more commonly diagnosed at an early stage than a late stage among these cancers.

Average % of Kentuckians diagnosed at early vs. late stage, 2005-2009[10]

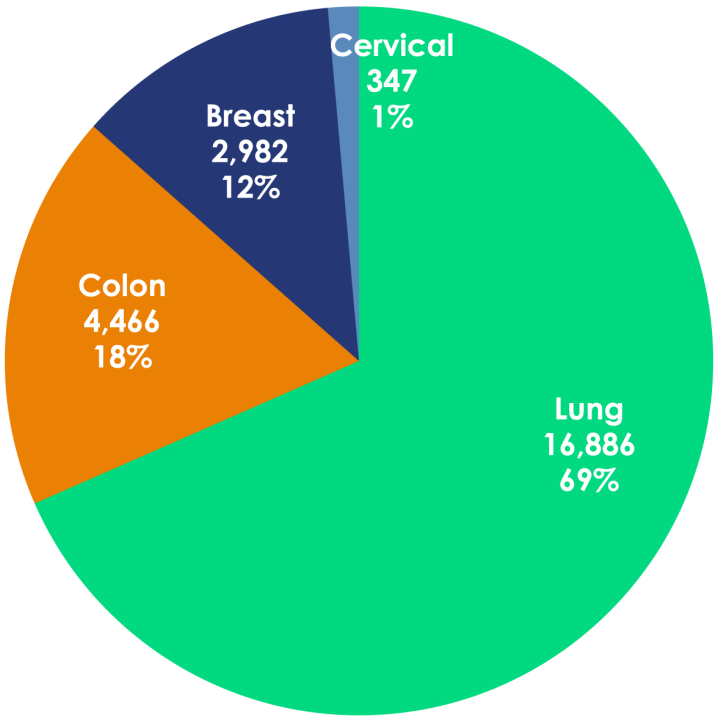


Average % of Kentuckians who survive 5 years by stage (observed survival), 2005-2009[11]



- Kentuckians who were diagnosed at an early stage of cancer were more likely to survive 5 years than Kentuckians who were diagnosed at a late stage.
- Lung cancer had the greatest difference between 5 year survival at early stage vs. late stage (45.6% vs 9.8%).
- Colon and cervical cancer had approximately twice the rate of 5 year survival for early stage vs. late stage (79.4% vs 43.6% for colon and 87.5% vs. 42% for cervical).
- Breast cancer had the best survival rates comparison between early stage compared to the other three cancers. They also had the highest survival for late stage compared to the other cancers.

Hundreds of Kentuckians die each year from cancers that might have been prevented or found early through screening



- This chart shows the deaths from cancers with evidence-based prevention/early detection methods in Kentucky, 2005-2009.[9]

- Many lung cancers can be prevented through not smoking or being exposed to second-hand smoke. Low dose CT scanning is a recent addition to detecting early stage lung cancer that can reduce the risk of death of lung cancer for those who are between ages 55-74 and have been heavy smokers. 9,554 of those deaths occurred in Kentuckians who were 55-74.

- Most cervical and colorectal cancers can be caught before they become life threatening.

  - 239 cervical cancer deaths occurred in women ages 20-64
  - 2,108 colon cancer deaths occurred in men and women ages 50-74

- Breast cancer can be detected early enough to be treated through screening.

  - 1,529 breast cancer deaths occurred in women ages 50-74

Opportunity for Kentuckians[12-15]

For every $100,000 invested in cancer prevention and screening...

- **666** Kentuckians can become non-smokers through reducing out-of-pocket costs
- **135** Kentuckians at high risk for lung cancer can be screened for the first time. OR...
- **246** Kentuckians can be screened for colon cancer. OR...
- **403** Kentuckians can be screened for breast cancer. OR...
- **450** Kentuckians can be screened for cervical cancer.

For every $500,000 invested in cancer prevention and screening...

- **3,333** Kentuckians can become non-smokers through reducing out-of-pocket costs to evidence-based cessation services. OR...
- **675** Kentuckians at high risk for lung cancer can be screened for the first time. OR...
- **1,229** Kentuckians can be screened for colon cancer. OR...
- **2,016** Kentuckians can be screened for breast cancer. OR...
- **2,102** Kentuckians can be screened for cervical cancer.

For every $1,000,000 invested in cancer prevention and screening...

- **6,666** Kentuckians can become non-smokers through reducing out-of-pocket costs to evidence-based cessation services. OR...
- **1,350** Kentuckians at high risk for lung cancer can be screened for the first time. OR...
- **2,457** Kentuckians can be screened for colon cancer. OR...
- **4,032** Kentuckians can be screened for breast cancer. OR...
- **4,504** Kentuckians can be screened for cervical cancer.

Lost opportunity for Kentuckians[16]

For every $100,000 invested in cancer treatment...

0 Kentuckians can be treated for late stage lung cancer. OR...

1 Kentuckian can be treated for late stage colon cancer. OR...

1 Kentuckian can be treated for late stage breast cancer. OR...

1 Kentuckian can be treated for late stage cervical cancer.

For every $500,000 invested in cancer treatment...

4 Kentuckians can be treated for late stage lung cancer. OR...

5 Kentuckians can be treated for late stage colon cancer. OR...

8 Kentuckians can be treated for late stage breast cancer. OR...

5 Kentuckians can be treated for late stage cervical cancer.

For every $1,000,000 invested in cancer treatment...

9 Kentuckians can be treated for late stage lung cancer. OR...

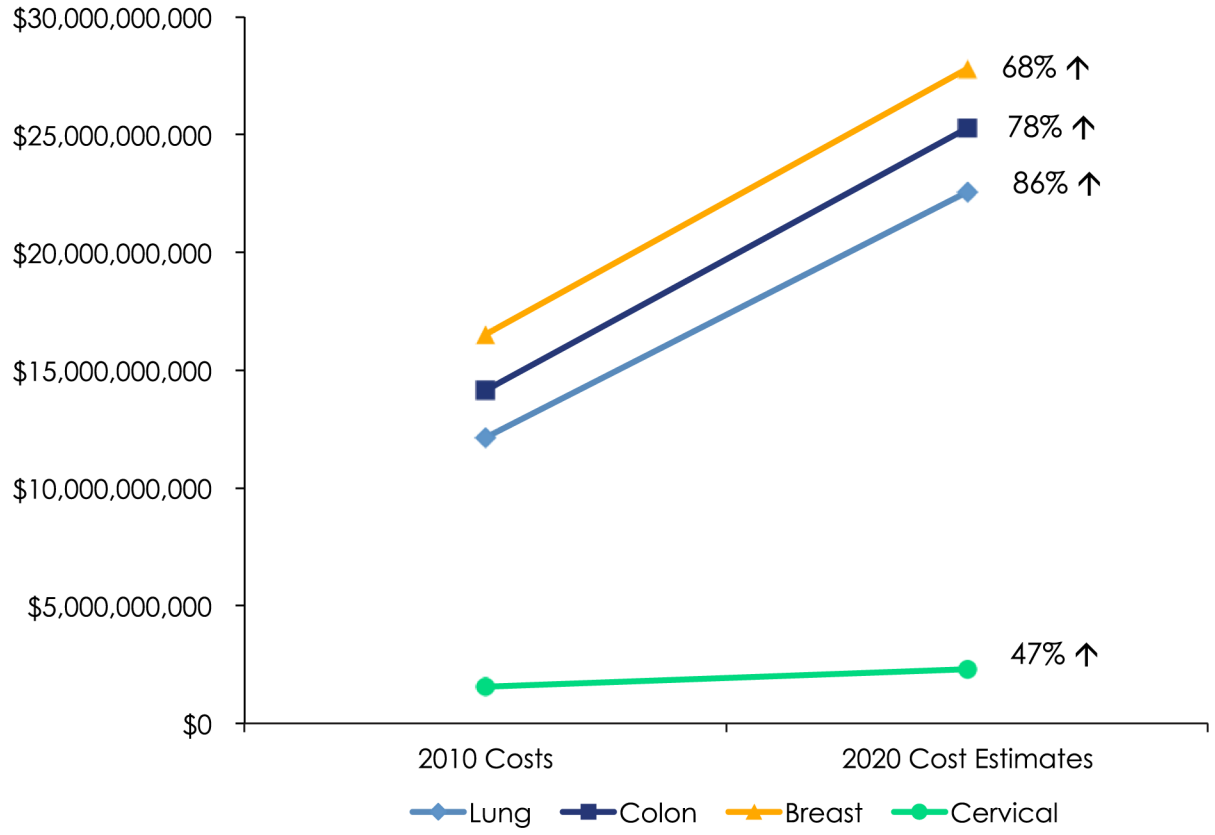
11 Kentuckians can be treated for late stage colon cancer. OR...

16 Kentuckians can be treated for late stage breast cancer. OR...

11 Kentuckians can be treated for late stage cervical cancer.

Treatment Costs

U.S. Cancer Treatment Costs 2010 and Estimated Change in 2020[17]



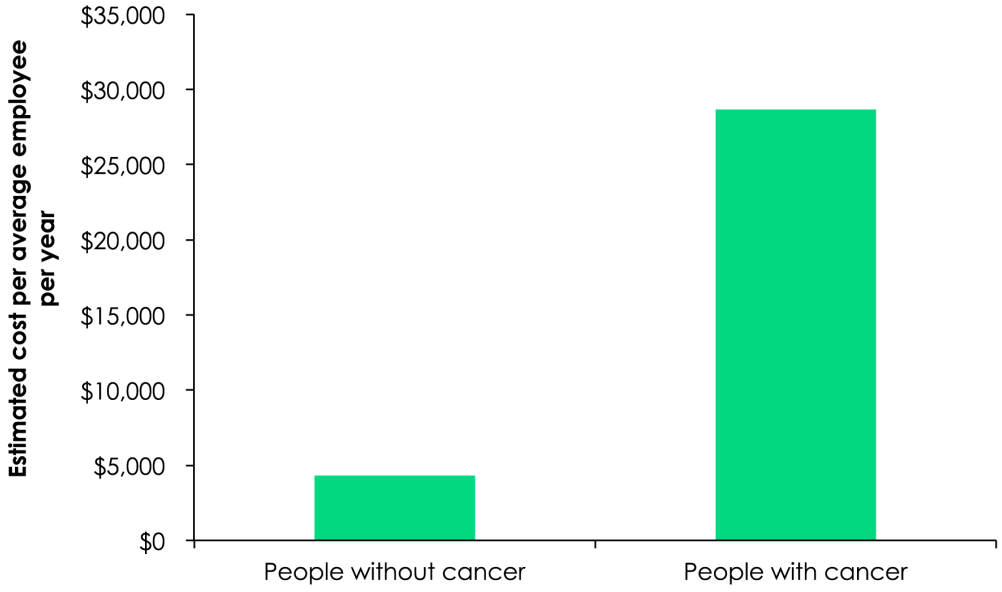
* This assumes no change in incidence or survival. Estimates have been made for a 5% change in medical costs.[17]

- Health Care spending in the U.S. is expected to grow at 4.2% in 2012, 3.8% in 2013 and 6.2% per year from 2015 – 2021 as a result of the aging population.[18]
- The cost of lung cancer care will have the highest percent increase from 2010-2020 (86%), while the cost of breast cancer care will cost the most at $27.8 billion.
- Lung, colon, breast and cervical cancer care combined will account for approximately $77.9 billion each year in the U.S. in 2020 (See Appendix D for table).
- Each year, cancer treatment in Kentucky cost Medicaid $132 million, private insurance companies $836 million and cost Medicare $718 million from 2004-2008.[19]
- In 2010, cancer care in Kentucky costs approximately $2.2 billion. In 2020, it is estimated to increase by 69% which would be approximately $3.8 billion.[3]
- The typical new cancer drug coming on the market in 2000 cost approximately $4,500/month of treatment. As of 2010, the price is around $10,000/month of treatment. Two of the new cancer drugs cost more than $35,000 per month of treatment.[20]

Impact of Cancer on Employers and Businesses

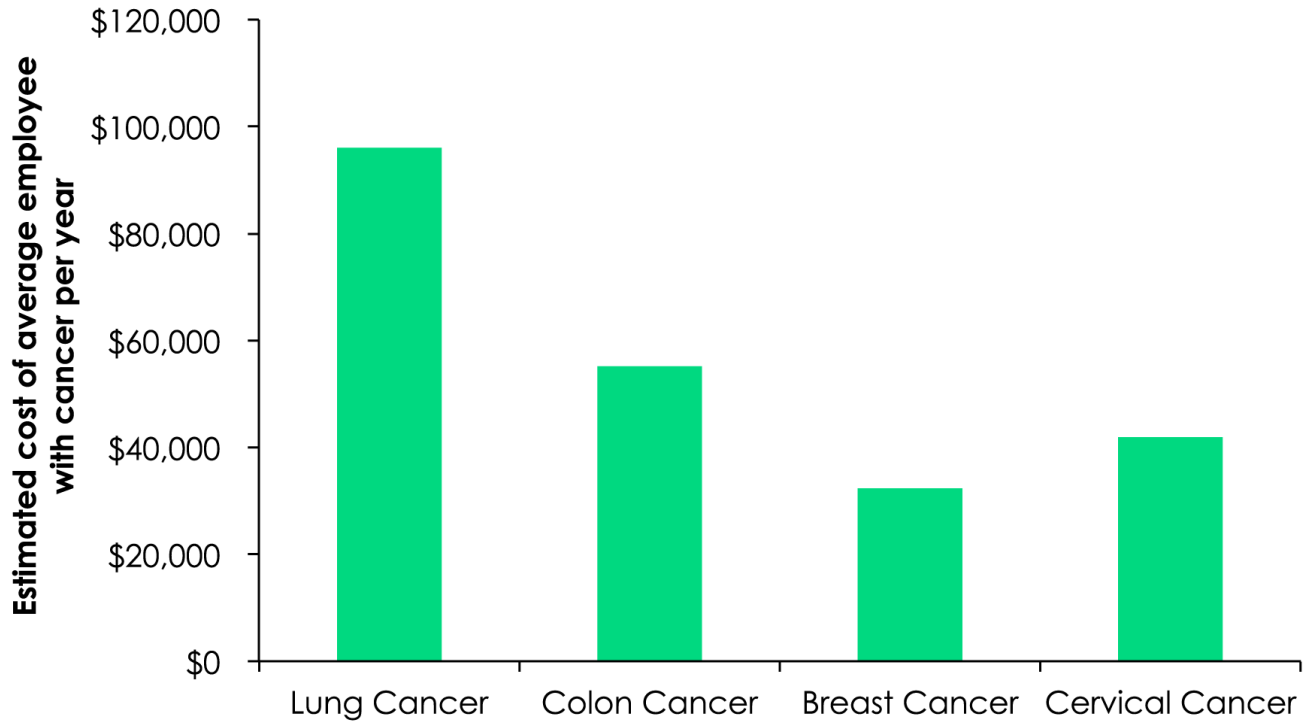
- In a typical commercial population, only 0.68% of members have claims for cancer in a year, yet these claims account for about 10% of all medical costs.[21]
- In 2009, cancer was the leading cause of long-term disability for the ninth consecutive year, accounting for 11.8% of all claims.[22]
- Investing $35.40 per average employee per year to cover colon, breast and cervical cancer screening may result in additional savings of up to $45 per average employee per year.[23]
- Investing $2.16 to $9.45 per average employee per year for a tobacco cessation program can generate a cumulative savings of $20.40 to $26.40 per average employee per year.[23]
- The $15,745 average family premium in 2012 is 30% higher than the average family premium in 2007 and 97% higher than the average family premium in 2002.[24]
- Members with lung, colon, breast and cervical cancer have higher health care costs and hospitalizations than with other types of cancer. Members with colon, breast and cervical cancers have a higher likelihood of missing work due to illness.[4]
- Indirect costs may include the following:[22]
  - **Absenteeism** – doctor's visits, sickness due to side effects, etc.
  - **Presenteeism** – diminished ability to complete normal job duties while at work
  - **Reduced productivity** – workday interruptions for caregivers; workflow disruption for co-workers covering others' duties
  - Potential **loss and replacement of intellectual capital**

Comparing costs of People with Cancer to People without Cancer, 2006[25]



- The estimated cost per year of people with cancer in 2006 was $26,680. The estimated cost per year of people without cancer in 2006 was $4,320.[25]

Costs per member per year for people with cancer in 2006[25]



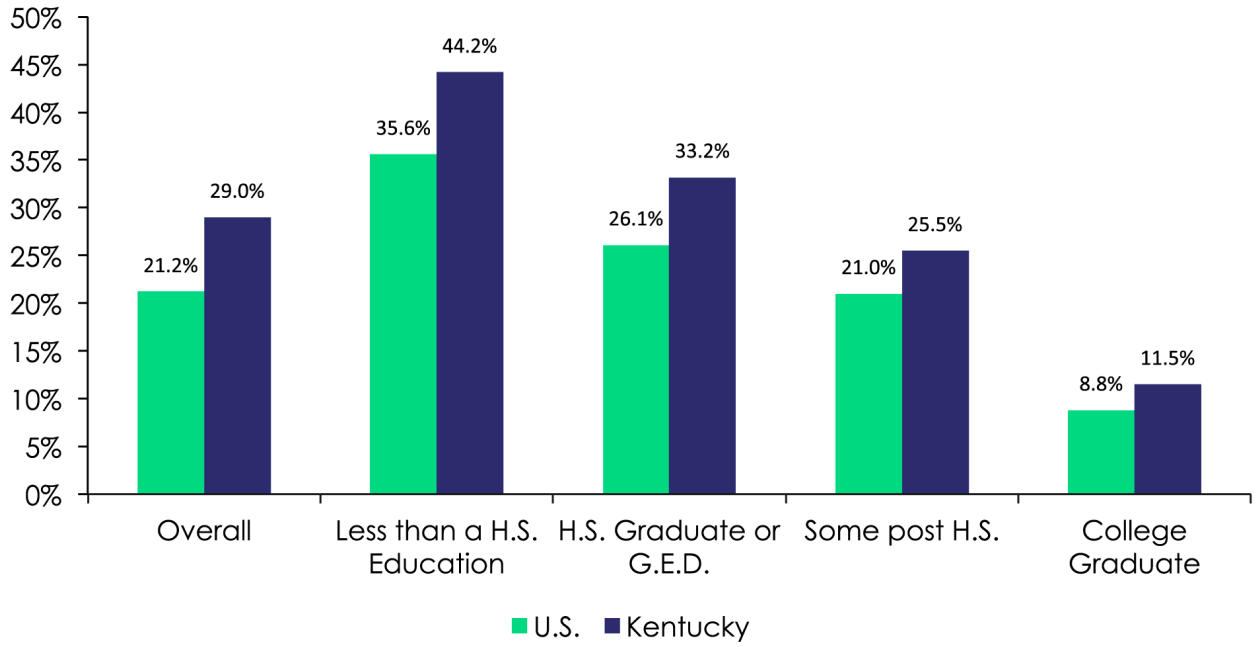
- Those with lung cancer had the highest estimated cost in 2006 at $96,000 per average employee with cancer per year. Colon had approximately $55,200; breast $32,400; and cervical $42,000 per average employee with cancer per year.[25]

Greatest Need for Prevention and Screening in Kentucky

- Kentuckians who have not graduated from high school have the highest smoking rates and the lowest screening rates for colon, breast and cervical cancer. The greatest need for prevention and screening in Kentucky is among this population (See Appendix E for detailed information).

Prevention/Screening Method	# of Kentuckians who need services
Smoking cessation	162,660
Lung cancer screening	69,436
Colon cancer screening	75,333
Breast cancer screening	16,464
Cervical cancer screening	73,431

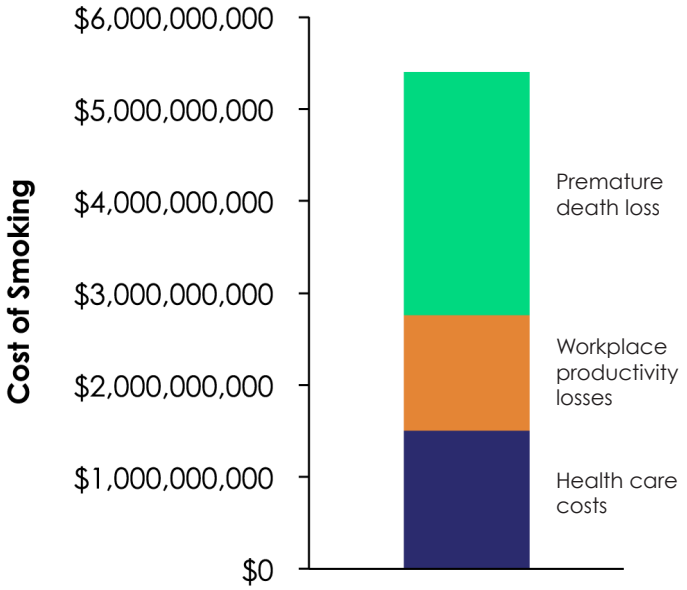
Adult smoking rates in the U.S. and Kentucky by education status, 2011[26]



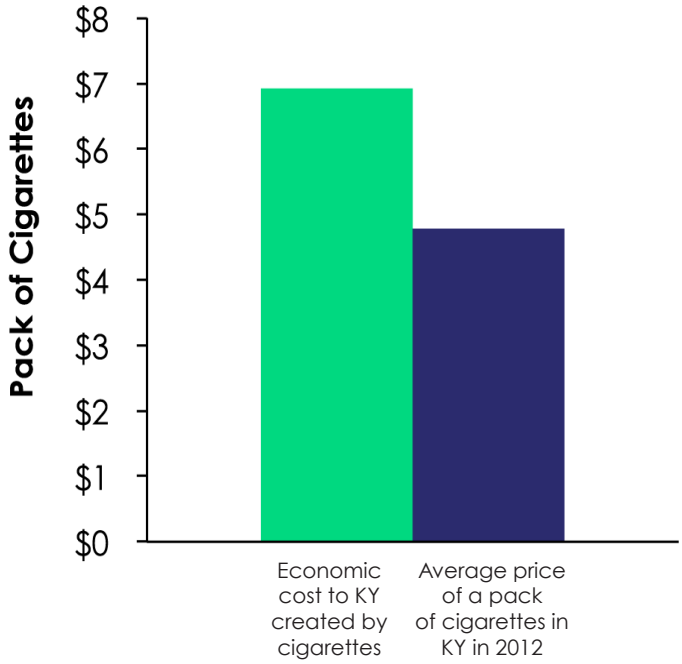
- Kentucky has the highest overall rate of smoking in the U.S.
- Those with less than a high school education have the highest smoking rates of all education categories in both the U.S. and Kentucky. In Kentucky, that rate is 44.2%, while it is 35.6% in the U.S.
- Those with a college education have the lowest rates of smoking with 8.8% in the U.S. and 11.5% in Kentucky.
- In April 2012, The Community Preventive Services Task Force recommended reducing out-of-pocket costs for evidence-based tobacco cessation treatments.[27]
- Nicotine replacement for a 10-week period has an average cost of $150 per person.[12]

Cost of Smoking in Kentucky[28,29]

- Each year, health care costs (cancer, coronary heart disease, stroke, chronic obstructive pulmonary disease and others) account for $1.5 billion, workplace productivity losses account for $1.26 billion, and premature death accounts for $2.6 billion totaling **$5.4 billion dollars each year**.[28,29]
- In 2011, Kentucky's gross domestic product was $164.8 billion.[30]
- Smoking related costs account for approximately 3.3% of Kentucky's gross domestic product.
- Cancer has the highest smoking-attributable mortality rate when compared with cardiovascular disease and respiratory disease.[29]



Underpricing Cigarettes in Kentucky



- In order to meet the economic gap created by costs related to lost productivity and premature death, the price would have to be increased from $4.78 to $6.92.[29,31]
- A 10% increase in price reduces adult smoking by approximately 4% and reduces youth smoking by 7%.[32-34]
- Increasing the price of a pack of cigarettes to $6.92/pack would be a 44% increase, resulting in a 17.6% decrease in adult smoking and a 30.8% decrease in youth smoking.
- Kentucky would save at least **$665,821,012 each year** by increasing the price of cigarettes to $6.92 per pack (increase of $2.14/pack). (See table in Appendix F for details.)

What can we do for Kentucky?

Invest $100,000 in cancer prevention and screening in order to help...

666 Kentuckians can become non-smokers through reducing out-of-pocket costs

135 Kentuckians at high risk for lung cancer can be screened for the first time. OR...

246 Kentuckians can be screened for colon cancer. OR...

403 Kentuckians can be screened for breast cancer. OR...

450 Kentuckians can be screened for cervical cancer.

Invest $500,000 in cancer prevention and screening in order to help...

3,333 Kentuckians can become non-smokers through reducing out-of-pocket costs to evidence-based cessation services. OR...

675 Kentuckians at high risk for lung cancer can be screened for the first time. OR...

1,229 Kentuckians can be screened for colon cancer. OR...

2,016 Kentuckians can be screened for breast cancer. OR...

2,102 Kentuckians can be screened for cervical cancer.

Invest $1,000,000 in cancer prevention and screening in order to help...

6,666 Kentuckians can become non-smokers through reducing out-of-pocket costs to evidence-based cessation services. OR...

1,350 Kentuckians at high risk for lung cancer can be screened for the first time. OR...

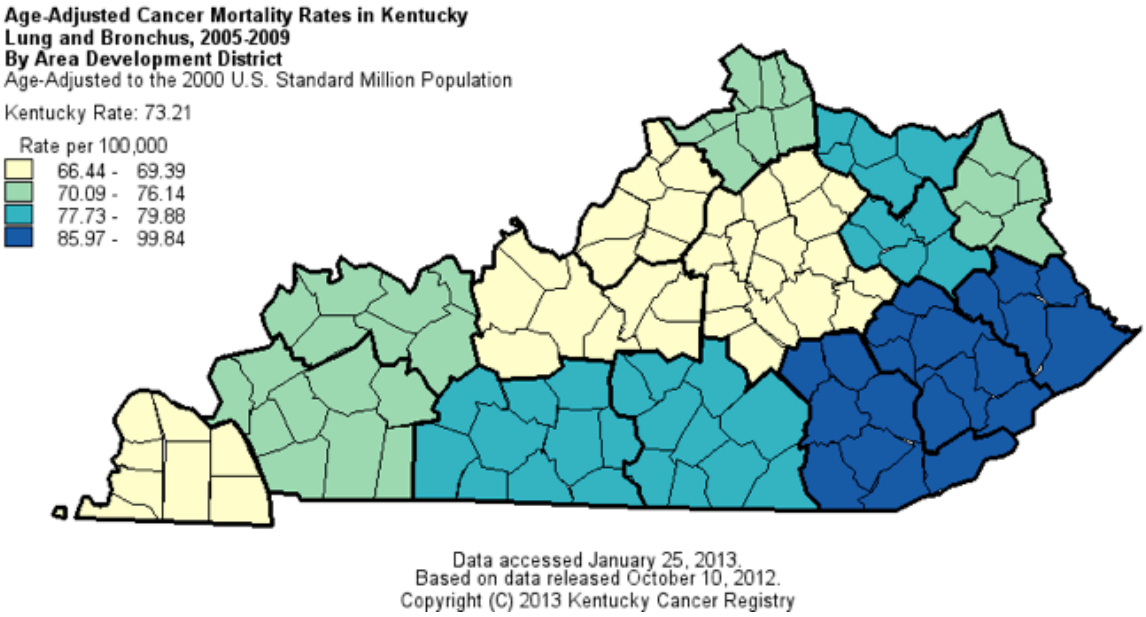
2,457 Kentuckians can be screened for colon cancer. OR...

4,032 Kentuckians can be screened for breast cancer. OR...

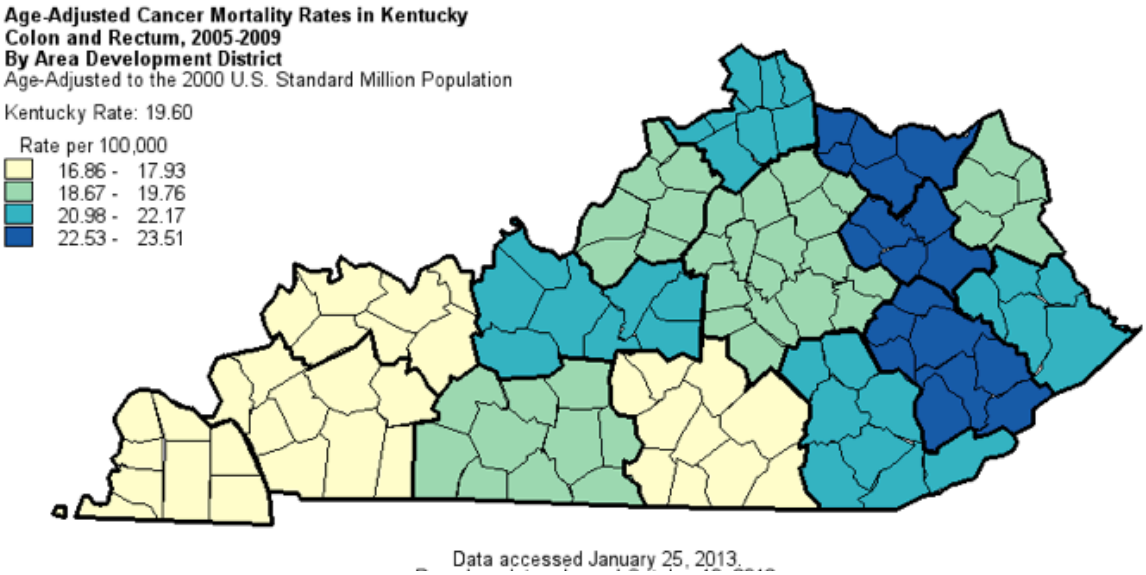
4,504 Kentuckians can be screened for cervical cancer.

Appendix A: Cancer Burden

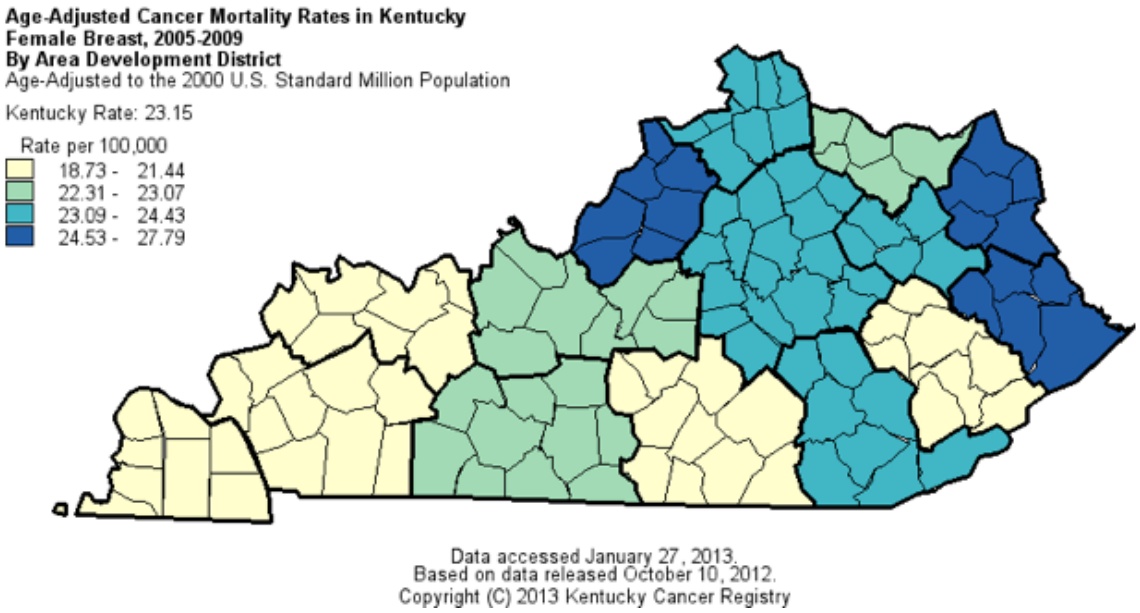
- **Lung Cancer:** The highest lung cancer death rates are found in the Southeastern part of the state, which is also part of the Appalachian region. The highest death rates from 2005-2009 were in the following Area Development Districts: 1) Kentucky River, 2) Big Sandy, and 3) Cumberland Valley.[9]



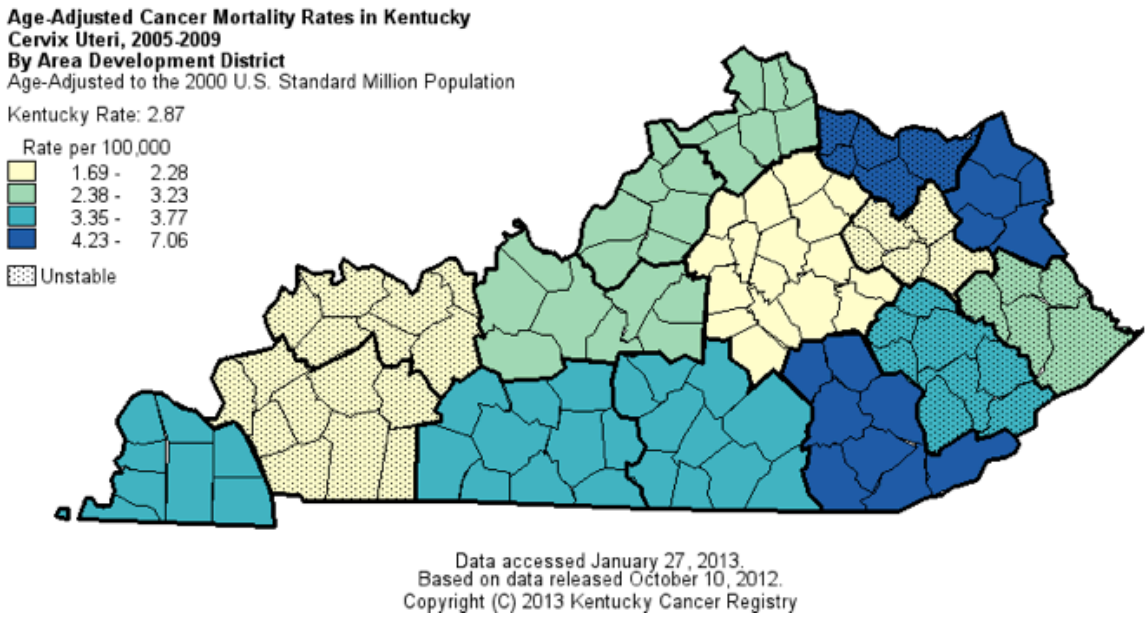
- **Colon Cancer:** The highest colon cancer death rates in Kentucky from 2005-2009 were in Eastern Kentucky with the following Area Development Districts being the highest: 1) Gateway, 2) Buffalo Trace, and 3) Kentucky River.[9]



- **Breast Cancer:** The highest female breast cancer death rates from 2005-2009 were in the following Area Development Districts: 1) Big Sandy, 2) FIVCO, 3) KIPDA.[9]



- **Cervical Cancer:** The highest cervical cancer death rates in Kentucky occurred in the following Area Development Districts from 2005-2009: 1) Buffalo Trace, 2) FIVCO and 3) Cumberland Valley. Caution should be used for the Buffalo Trace rate because there were not enough cervical cancer deaths in the population to make the rate stable.[9]



Ten Leading Causes of Death by Age Groups (years), Number and Age-Specific Death Rate in Kentucky, 2006-2010 (by residence)[8] †*

	35-44 Years		45-54 Years		55-64 Years		Combined Age Group 35-64 Years	
Leading Cause of Death	Number of Deaths	Death Rate*	Number of Deaths	Death Rate*	Number of Deaths	Death Rate*	Number of Deaths	Death Rate*
ALL CAUSES OF DEATH	7,225	244.10	16,768	531.57	27,010	1,070.71	51,003	590.52
Malignant neoplasms **CANCER**	1,123	37.94	4,508	142.91	9,916	393.08	15,547	180.01
Diseases of heart	1,334	45.07	3,874	122.81	6,272	248.63	11,480	132.92
Accidents (unintentional injuries)	1,893	63.96	2,027	64.26	1,079	42.77	4,999	57.88
Chronic lower respiratory diseases	115	3.89	654	20.73	1,759	69.73	2,528	29.27
Diabetes mellitus	175	5.91	524	16.61	1,014	40.20	1,713	19.83
Intentional self-harm (suicide)	624	21.08	674	21.37	413	16.37	1,711	19.81
Cerebrovascular diseases (ex. stroke)	150	5.07	474	15.03	900	35.68	1,524	17.65
Chronic liver disease and cirrhosis	169	5.71	498	15.79	570	22.60	1,237	14.32
Kidney diseases ‡	75	2.53	242	7.67	480	19.03	797	9.23
Septicemia	86	2.91	246	7.80	451	17.88	783	9.07

† Rate per 100,000 population in specified group

* Death data for the years of 2009 and 2010 are preliminary

‡ Nephritis, nephrotic syndrome and nephrosis

Data source: Office of Vital Statistics, Frankfort, KY. Created March 2013; http://chfs.ky.gov/dph/vital/

For working-age Kentuckians (combined age groups 35-64 years old), malignant neoplasms (i.e., cancer) account for the leading cause of death: 180 deaths per 100,000 people.

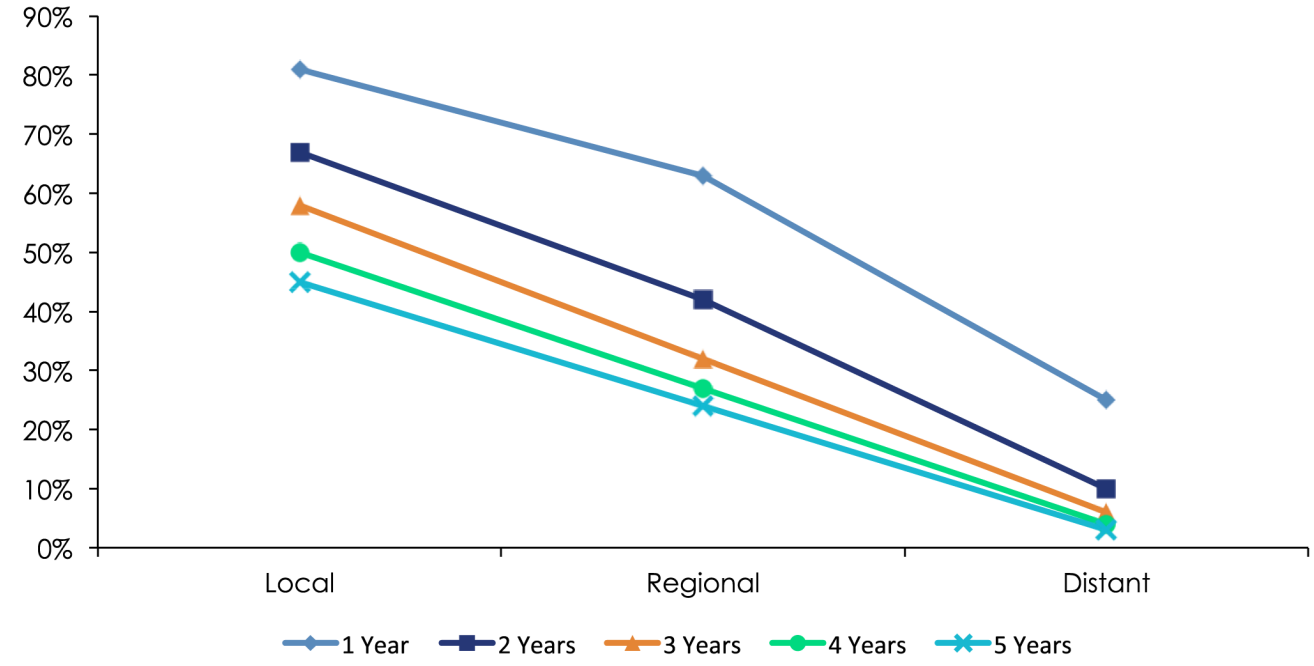
Average % survival in Kentucky by stage (observed survival)[11] 5-Year Observed Survival by Stage at Diagnosis, 2005-2009					
Type of Cancer	Year 1	Year 2	Year 3	Year 4	Year 5
Lung					
Early	81.3%	67.4%	58.0%	50.8%	45.6%
Late	37.1%	20.4%	14.4%	11.5%	9.8%
Colon					
Early	94.0%	90.5%	87.0%	83.4%	79.4%
Late	75.0%	62.0%	54.2%	48.5%	43.6%
Breast					
Early	99.1%	97.8%	96.3%	94.3%	92.5%
Late	91.4%	84.3%	78.2%	73.3%	68.5%
Cervical					
Early	99.5%	94.2%	91.2%	889.2%	87.5%
Late	71.7%	52.8%	45.4%	43.6%	42.0%

KY Causes of Death by Age Group, 2005-2009[9]	
35-64	Rate
Lung and bronchus	55.9
Colon and rectum	14.0
Breast	13.3
35-44	
Lung and bronchus	8.0
Breast	5.7
Colon and rectum	4.5
45-64	
Lung and bronchus	91.0
Colon and rectum	20.9
Breast	18.8

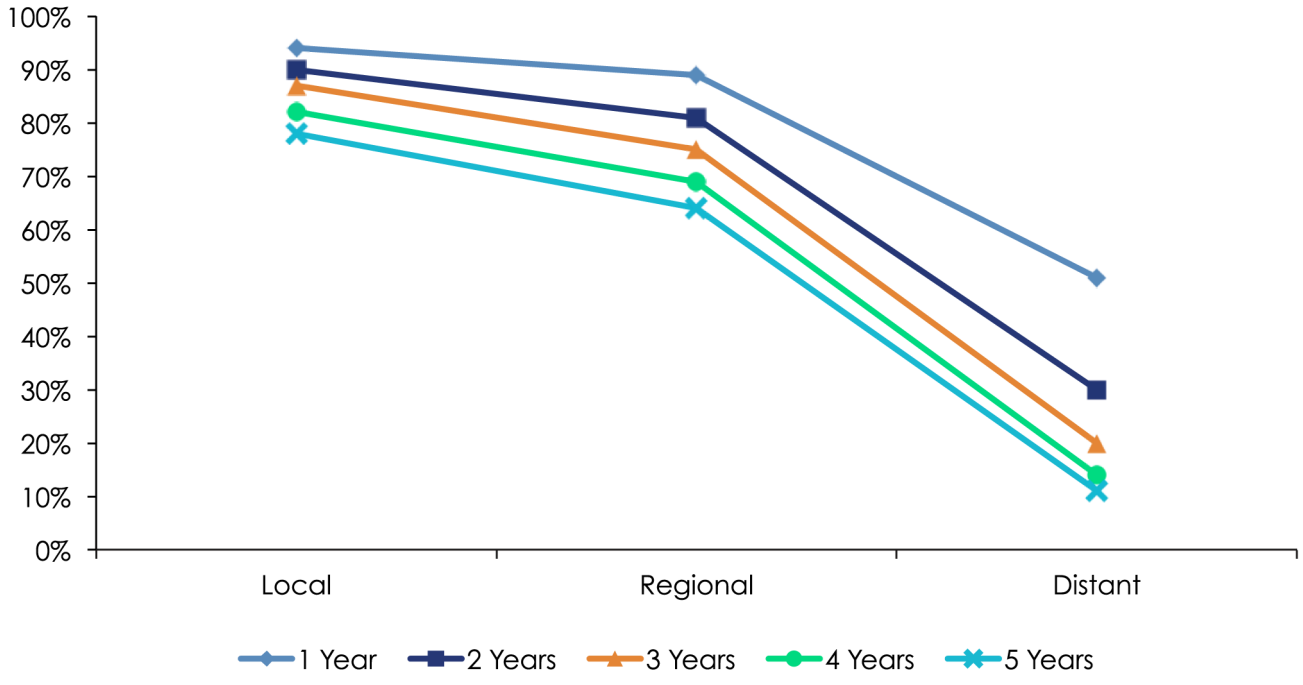
Rates are age-adjusted and per 100,000

Average % of diagnosis at each stage in Kentucky, 2005-2009[10]			
Type of Cancer	Local Stage	Regional Stage	Distant Stage
Lung	19%	26%	55%
Colon	45%	35%	20%
Breast	64%	30%	6%
Cervical	48%	38%	14%

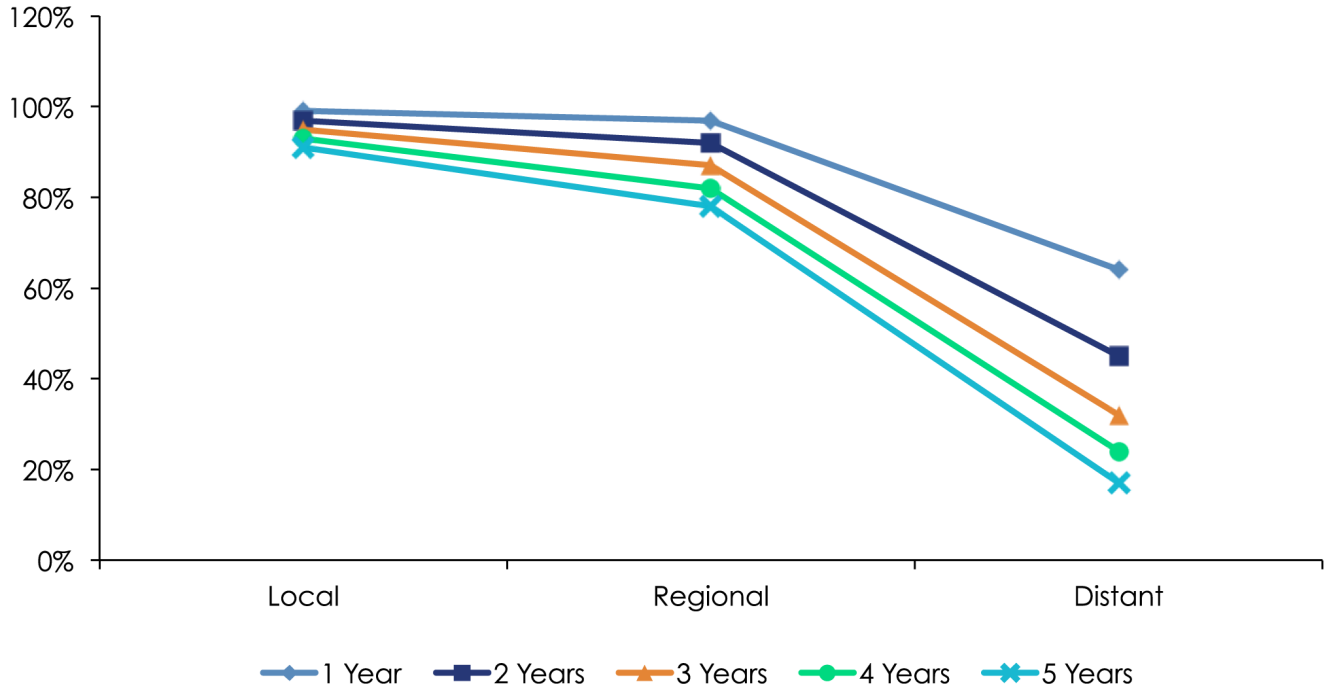
Average % survival for lung cancer by stage (observed survival), 2005-2009[11]



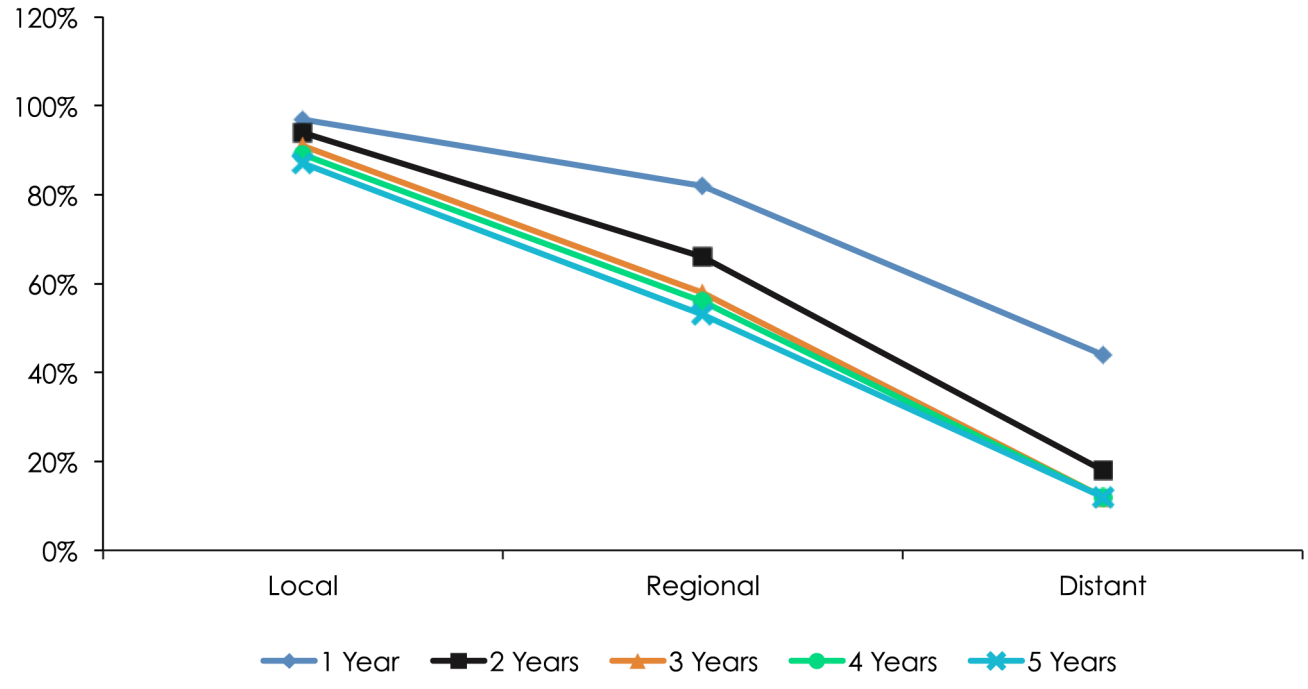
Average % survival for colon cancer by stage (observed survival), 2005-2009[11]



Average % survival for breast cancer by stage (observed survival), 2005-2009[11]



Average % survival for cervical cancer by stage (observed survival), 2005-2009[11]



Appendix B: Prevention and Screening Costs

Average Cost of Prevention and Screening	
Prevention/Screening Method	Cost per person
Smoking cessation[12]	$150/smoker
Lung cancer screening[13]	$741 initially, then $247/screening follow-up
Colon cancer screening[14]	$407/screening
Breast cancer screening[15]	$248/screening
Cervical cancer screening[15]	$222/screening

Smoking Cessation

- Nicotine Replacement Therapy (cost per quit attempt in 2013) = $150[12]

- Kentucky Quitline Average Cost per Quit (successful quit at 6-month follow-up) = $363.36/smoker. At this point, the quitline is currently funded by CDC and the Tobacco Master Settlement funding through the Kentucky Department for Public Health.[35]

  - Operational 7 days a week, 8 a.m. to 1 a.m. EST or 7 a.m. to midnight CST, IVR 24/7, available in English and Spanish at time of call or on web, and 191 languages through language line, plus American and Mexican sign language and TTY for hard of hearing.
  - Available FREE to all Kentuckians age 15 and older.
  - Telephone coaching, web-based service (English and Spanish), text messaging, e/messaging, expanded text and mobile app coming July 2013, works with all forms of pharmacotherapy (retains a Medical Director) and tobacco types.
  - Referral system: phone, email through web-based service, fax, e/referral
  - Special protocols for LGBT, pregnancy, youth, African Americans, American Indians, Asian Americans, Latinos.

Lung Cancer Screening

- The cost of life-year saved for lung cancer screening would be below $19,000, which fits with current screening for cervical, breast and colorectal cancers.[13]

- Average cost of lung cancer screening is $247 per person screened, assuming 75% of those will be repeat procedures. Cost of initial screening and follow-up is approximately $741.[13]

- If we were able to screen 75% of the eligible U.S. population, more than 8,000 people would not die from lung cancer each year.[36]

Colon Cancer Screening

Using Kentucky Colon Cancer Screening Program model (FY 2012-2013)[14]			
Number of Screens	Clinical (Includes lease of FIT analyser, FIT test and costs of processing, navigation, and all inclusive colonoscopy charge of $1,000. No treatment costs are included).	Non-Clinical (Includes one FT staff at KDPH; costs for LHD fiscal agent at 10 sites; outreach and education by Kentucky Cancer Program at 10 sites; and database).	Total Costs
Annually: Assumes 1,846 FIT tests and 613 colonoscopies as written in current proposals for 10 sites and based on risk and need.	$747,213	$252,787	$1,000,000
Average cost per screen = $406.70	**$303.90**	**$102.80**	**$406.70**
Total	**75% of costs**	**25% of costs**	**100%**

Breast Cancer Screening: Cost of Early Detection

- Kentucky received approximately $6,000,000 from CDC, the state, and local tax dollars combined to screen low-income women (<250% of the Federal Poverty Level) for Breast and Cervical Cancer Screening from July 1, 2011 to June 30, 2012.[15]
  - $2,730,066 of these funds were from CDC with $1,900,000 going to direct services.
- 15,933 women in Kentucky between ages 18-64 received a clinical breast exam and/or a mammogram. (This number may also include pap smears because they often happened at the same visit as the clinical breast exam.)[15]
- In 2004, the average cost of a mammography was $51.[37] An office visit with the KWCSP, which includes a clinical breast exam and other clinical preventive services, costs approximately $140 for a total cost of **$191 per screening**.[15]
- **Non-clinical costs**, such as training, navigation, data collection and management, outreach and program management cost approximately 30% of overall costs. **If these costs are included**, the total cost per screening is approximately **$248.30 per screening**.[15]

Cervical Cancer Screening: Cost of Early Detection

- Kentucky received approximately $6,000,000 from CDC, the state, and local tax dollars combined to screen low-income women (<250% of the Federal Poverty Level) for Breast and Cervical Cancer Screening from July 1, 2011 to June 30, 2012.[15]
  - $2,730,066 of these funds were from CDC with $1,900,000 going to direct services.
- 8,295 women in Kentucky between ages 18-64 received a pap test (cervical cancer screening).[15]
- In 2004, the average cost of a pap test was $31 for women under 65.[37] An office visit with the KWCSP (which will usually include a clinical breast exam as well as other preventive clinical services), costs approximately $140 for a total cost of **$171 per screening**.[15]
- **Non-clinical costs**, such as training, navigation, data collection and management, outreach and program management cost approximately 30% of overall costs. **If these costs are included**, the total cost per screening is approximately **$222.30 per screening**.[15]
- If a screening comes back positive, additional test and follow-up will cost approximately $1,500 per patient. In order to allow for resources to address the positive screens, an estimate of **$250 per screening** may be more accurate.[15]

Appendix C: Prevention and Screening Guidelines

Smoking Cessation

- In April 2012, The Community Preventive Services Task Force recommended reducing out-of-pocket costs for evidence-based tobacco cessation treatments.[27]

Lung Cancer Screening

- The National Lung Cancer Screening Trial, which showed a 20% reduction in lung cancer mortality compared with three annual chest x-rays has the following criteria for screening, which is also now recommended by the American Cancer Society: Age 55-74; cigarette smoking histories of 30 or more pack-years; if former smokers, have quit within the last 15 years.[38,39]

  – The American Cancer Society emphasizes that screening is not a substitute for quitting smoking. The most effective way to lower lung cancer risk is to avoid tobacco use.[39]

Colon Cancer Screening

- The U.S. Preventive Services Task Force (USPSTF) recommends screening for colorectal cancer (CRC) using fecal occult blood testing, sigmoidoscopy, or colonoscopy, in adults, beginning at age 50 years and continuing until age 75 years. The risks and benefits of these screening methods vary.[40]

Breast Cancer Screening

- The American Cancer Society and the American College of Radiology recommend annual screening for women beginning at age 40 and should continue as long as a woman is in good health.[41,42]

- The U.S. Preventive Services Task Force (USPSTF) recommends a biennial screening mammography for women aged 50 to 74 years.[43]

Cervical Cancer Screening

- The U.S. Preventive Services Task Force (USPSTF) recommends screening for cervical cancer in women ages 21 to 65 years with cytology (Pap smear) every 3 years or, for women ages 30 to 65 years who want to lengthen the screening interval, screening with a combination of cytology and human papillomavirus (HPV) testing every 5 years.[44]

Appendix D: Treatment Costs

Average cost per person considering stage at diagnosis, 2004		
Type of Cancer	Early Stage	Late Stage
Lung[16]	$69,987*	$100,723**
Colon[16]	$53,179*	$89,690**
Breast[16]	$36,170*	$61,078**
Cervical[16]	$46,492*	$85,525**

* This is Medicare data and includes adding together initial costs (first 12 months) with last year of life (last 12 months). This does not include continuing costs each year in between which average $3,926 for men with lung cancer and $3,862 for women; $2,254 for men with colon cancer and $1,595 for women; $1,201/year for breast cancer and $831/year for cervical cancer.
** This is Medicare data and includes averaging regional and distant costs and adding together the initial costs (first 12 months) with the last year of life (last 12 months). This does not include continuing costs each year in between which average $3,926/year for men with lung cancer and $3,862/year for women; $2,254/year for men with colon cancer and $1,595/year for women; $1,201/year for breast cancer and $831/year for cervical cancer.

Estimated increase in cancer treatment cost from 2010-2020[17]			
Type of Cancer	Cost in U.S., 2010	Estimated Cost in U.S., 2020	% Change*
Lung	$12,121,000,000	$22,584,000,000	86% ↑
Colon	$14,141,000,000	$25,270,000,000	78% ↑
Breast	$16,500,000,000	$27,788,000,000	68% ↑
Cervical	$1,545,000,000	$2,285,000,000	47% ↑
Total	**$44,207,000,000**	**$77,927,000,000**	**76% ↑**

* This assumes a 5% increase in medical care costs per year and no change in incidence or survival.

Appendix E: Greatest Need Estimates

Smoking Cessation	
Kentucky Population Estimate, 2010[45]	4,339,357
Kentucky Adult Population (18+)[45]	3,323,947
Kentucky population w/out H.S. Education (over 25)[45]	18.3%
Number of Kentucky w/out a H.S. Education	608,282
Kentucky Current Smoking Population in those w/out H.S. Education (%)[26]	44.2%
Kentucky Current Smoking Population without a H.S. Education	268,861
Those who want to quit = Quit Self Efficacy (%)[46]	60.5%
Estimated number of Kentucky smokers without a H.S. Education needing smoking cessation services	**162,660**

Lung Cancer Screening	
Kentucky Population Estimate, 2010[45]	4,339,357
Kentucky Adult Population (50-64*)[47]	858,448
KY population w/out H.S. Education (over 25)[45]	18.3%
Number of KY Adults between 50-64 w/out a H.S. Education	157,096
Kentucky Current Smoking Population in those w/out H.S. Education (%)[26]	44.2%
Estimated number of Kentucky smokers age 50-64 without a H.S. Education who may be eligible for lung cancer screening	**69,436**

* Lung cancer screening is estimated for those starting at age 55; however the census data only breaks down ages from 50-64 and then 65+. This estimate will assume that Medicare will eventually begin to cover screening…

Colon Cancer Screening	
Kentucky Population Estimate, 2010[45]	4,339,357
Kentucky Adult Population (50-64)[47]	858,448
KY population w/out H.S. Education (over 25)[45]	18.3%
Number of KY Adults between 50-64 w/out a H.S. Education	157,096
% of Kentucky Population w/out H.S. Education who have Never had a Colonoscopy or Sigmoidoscopy[48]	50.5%
Kentucky Population w/out H.S. Education who have never had a Colonoscopy or Sigmoidoscopy	79,333
Current Kentucky Colon Cancer Screening Program Target Screens (2012-2013)[14]	4,000
Estimated number of Kentuckians ages 50-64 without a H.S. Education who need to be screened for colon cancer	**75,333**

- One of the most common characteristics of those women who will remain uninsured after the implementation of the Affordable Care Act is not having a high school education (28.5% in 2009 vs. 32.6% in 2014).[5]

Breast Cancer Screening	
Kentucky Population Estimate, 2010[45]	4,339,357
Kentucky Female population ages 40-64[49]	752,755
KY population w/out H.S. Education (over 25)[45]	18.3%
Number of KY females ages 40-64 w/out a H.S. Education	137,754
% of Kentucky females ages 40-64 w/out H.S. Education who have not had a mammogram in the past 2 years[48]	30.1%
Kentucky females ages 40-64 w/out H.S. Education who have not had a mammogram in the past 2 years	41,464
Current Kentucky Women's Cancer Screening Program Screening Estimates/ year (2011-2012)[15]	25,000
Estimated number of Kentucky females age 40-64 without a H.S. Education who need to be screened for breast cancer (mammography)	**16,464**

- One of the most common characteristics of those women who will remain uninsured after the implementation of the Affordable Care Act is not having a high school education (28.5% in 2009 vs. 32.6% in 2014).[5]

Cervical Cancer Screening	
Kentucky Population Estimate, 2010[45]	4,339,357
Kentucky Adult Population (18-64)[47]	2,737,769
% Kentucky who are female[45]	50.8%
Kentucky Female Adult Population	1,390,787
KY population w/out H.S. Education (over 25)[45]	18.3%
Number of KY Females w/out a H.S. Education	254,514
% of Kentucky Population w/out H.S. Education who have not had a pap test in the past 3 years[48]	38.7%
Kentucky Population w/out H.S. Education who have not had a pap test in the past 3 years	98,497
Current Kentucky Women's Cancer Screening Program Pap test screening Estimates/year (2007-2009 combined) since the screening guidelines is every 3 years*	25,066
Estimated number of Kentucky females age 18-64 without a H.S. Education who need to be screened for cervical cancer (Pap test)	**73,431**

* Between 2007-2009, 25,066 women were screened for cervical cancer through the Kentucky Women's Cancer Screening Program, which equals approximately 8,355 women each year.[5] Between July 2011 – June 2012, 8,295 women received cervical cancer screening in the KWCSP.[15]

Appendix F: Smoking Related Costs

Kentucky would save at least $665,821,012 each year by increasing the price of cigarettes to $6.92 per pack (increase of $2.14/pack).

Smoking Related Costs	
Kentucky Population Estimate, 2010[45]	4,339,357
Kentucky Adult Population (18+)[45]	3,323,947
Kentucky Current Adult Smoking Percentage[26]	29%
Kentucky Current Adult Smoking Population	963,945
Current Economic impact related to lost productivity and premature death[29]	$3,860,000,000
Cost per smoker	$4,004/smoker
Future Smoking Percentage (with a reduction in adult smoking by 17.6%)	24%
Future adult smoking population	797,747
Future economic impact (# smokers x cost per smoker)	$3,194,178,988
Economic savings to Kentucky by increasing the price of cigarettes by $2.14/pack*	**$665,821,012**

* Only includes savings related to productivity and premature death. Does not include the health care savings, which would increase this number even more.

Adult Smoking Rates in the U.S. and Kentucky by Education Status, 2011 (BRFSS)[26]		
Adult Smoking	U.S.	Kentucky
Overall	21.2	29.0
Less than H.S.	35.6	44.2
H.S. or GED	26.1	33.2
Some post-H.S.	21.0	25.5
College graduate	8.8	11.5

References

1. U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999–2009 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2013. Available at: www.cdc.gov/uscs.

2. Trust for America's Health. Prevention for a Healthier America: Investments in Disease Prevention Yield Significant Savings, Stronger Communities.; 2009. Available at: http://healthyamericans.org/reports/prevention08/Prevention08.pdf.

3. Trogdon JG, Tangka FKL, Ekwueme DU, Guy GP Jr, Nwaise I, Orenstein D. State-level projections of cancer-related medical care costs: 2010 to 2020. Am J Manag Care. 2012;18(9):525–532.

4. Tang DH, Alberts DS, Nevins R, Sullivan S, Skrepnek GH. Health care expenditures, hospitalizations, and productivity associated with cancer in US employer settings. J Occup Environ Med. 2012;54(12):1453–1460. doi:10.1097/JOM.0b013e31827943e0.

5. Levy AR, Bruen BK, Ku L. Health care reform and women's insurance coverage for breast and cervical cancer screening. Prev Chronic Dis. 2012;9:E159. doi:10.5888/pcd9.120069.

6. U.S. Department of Health and Human Services. 2004 Surgeon Generals Report - The Health Consequences of Smoking.; 2004. Available at: http://www.cdc.gov/tobacco/data_statistics/sgr/2004.

7. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Tobacco Smoke and Involuntary Smoking.; 2002. Available at: http://monographs.iarc.fr/ENG/Monographs/vol83/volume83.pdf.

8. Kentucky Office of Vital Statistics. Ten Leading Causes of Death by Age Groups: Number and Age-Specific Death Rate in Kentucky, 2006-2010. 2013. Available at: http://chfs.ky.gov/dph/vital/.

9. Kentucky Cancer Registry. Cancer Mortality Rates.; 2013. Available at: www.kcr.uky.edu.

10. Kentucky Cancer Registry. Cancer Incidence Rates.; 2013. Available at: www.kcr.uky.edu.

11. Kentucky Cancer Registry. Cancer Survival Rates.; 2013.

12. Kentucky Tobacco Prevention and Cessation Program. Cost of Nicotine Replacement Products in Kentucky. 2013.

13. Pyenson BS, Sander MS, Jiang Y, Kahn H, Mulshine JL. An actuarial analysis shows that offering lung cancer screening as an insurance benefit would save lives at relatively low cost. Health Aff (Millwood). 2012;31(4):770–779. doi:10.1377/hlthaff.2011.0814.

14. Kentucky Department for Public Health, Colon Cancer Screening Program. Kentucky Colon Cancer Screening Program Costs. 2013.

15. Maratha S. Kentucky Women's Cancer Screening Program Costs. 2012.

16. Yabroff KR, Lamont EB, Mariotto A, et al. Cost of care for elderly cancer patients in the United States. J Natl Cancer Inst. 2008;100(9):630–641. doi:10.1093/jnci/djn103.

17. National Cancer Institute. Cancer Prevalence and Cost Projections.; 2013. Available at: http://cost-projections.cancer.gov/graph.php.

18. Centers for Medicare & Medicaid Services, Office of the Actuary, National Health Statistics Group. National Health Expenditure Projections 2011-2021.; 2011. Available at: http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/Proj2011PDF.pdf.

19. Tangka FK, Trogdon JG, Ekwueme DU, Guy GP Jr, Nwaise I, Orenstein D. State-level cancer treatment costs: How much and who pays? Cancer. 2013. doi:10.1002/cncr.27992.

20. Brill S. Bitter Pill: How outrageous pricing and egregious profits are destroying our health care. Time Magazine. 2013.

21. National Alliance for Caregiving, AARP. Caregiving in the U.S. 2009.; 2009. Available at: http://assets.aarp.org/rgcenter/il/caregiving_09_fr.pdf.

22. National Business Group on Health. Cancer Continuum of Care: Employer Strategies for Managing the Modern Disease.; 2013. Available at: http://www.businessgrouphealth.org/cancer/index.cfm.

23. C-Change. Making the Business Case: How Engaging Employees in Preventive Care Can reduce Healthcare Costs.; 2008.

24. Kaiser Family Foundation. 2012 Employer Health Benefits Survey. Section 1: Cost of Health Insurance. 2012. Available at: http://kff.org/report-section/ehbs-2012-section-1/. Accessed May 8, 2013.

25. Pyenson B, Zenner PA. Cancer Screening: Payer Cost/Benefit thru Employee Benefit Programs. New York, NY: Milliman; 2005. Available at: http://www.c-changepublications.org/Publications%20Page/Milliman%20Report/index.html#/1/.

26. Centers for Disease Control and Prevention. BRFSS Prevalence and Trends Data.; 2011. Available at: http://apps.nccd.cdc.gov/brfss/.

27. The Community Preventive Services Task Force. Increasing Tobacco-Use Cessation: Reducing Out-of-Pocket Costs for Evidence Based Tobacco Cessation Treatments.; 2012. Available at: http://www.thecommunityguide.org/tobacco/cessation/outofpocketcosts.html.

28. Campaign for Tobacco Free Kids. The Toll of Tobacco in Kentucky - Campaign for Tobacco Free Kids. Available at: http://www.tobaccofreekids.org/facts_issues/toll_us/kentucky. Accessed May 7, 2013.

29. Kentucky Tobacco Prevention and Cessation Program. Tobacco Use in Kentucky 2012.; 2013. Available at: http://chfs.ky.gov/NR/rdonlyres/256B7D99-B157-4C4D-B481-29254B0DDB58/0/TobaccoUseinKentucky2012.pdf.

30. U.S. Department of Commerce, Bureau of Economic Analysis. Widespread Economic Growth Across States in 2011.; 2012. Available at: http://www.bea.gov/newsreleases/regional/gdp_state/2012/pdf/gsp0612.pdf.

31. Campaign for Tobacco Free Kids. State excise and sales taxes per pack of cigarettes total amounts & state ranking.; 2012. Available at: http://www.tobaccofreekids.org/research/factsheets/pdf/0202.pdf.

32. Chaloupka FJ, Cummings KM, Morley CP, Horan JK. Tax, price and cigarette smoking: evidence from the tobacco documents and implications for tobacco company marketing strategies. Tob Control. 2002;11 Suppl 1:I62–72.

33. Chaloupka FJ, Warner KE. The Economics of Smoking. In: Culyer AJ, Newhouse JP, eds. Handbook of Health Economics. Amsterdam: Elsevier; 2000.

34. Grossman M, Chaloupka FJ. Cigarette taxes. The straw to break the camel's back. Public Health Rep. 1997;112(4):290–297.

35. Kentucky Tobacco Prevention and Cessation Program. Quit Line Costs in Kentucky. 2013.

36. Goulart BHL, Bensink ME, Mummy DG, Ramsey SD. Lung cancer screening with low-dose computed tomography: costs, national expenditures, and cost-effectiveness. Journal Of The National Comprehensive Cancer Network: JNCCN. 2012;10(2):267–275.

37. Campbell K, Lanza A, Dixon R, Chattopadhyay S, Molinari N, Finch R, eds. A Purchaser's Guide to Clinical Preventive Services: Moving Science into Coverage. Washington, D.C.: National Business Group on Health; 2006. Available at: http://www.businessgrouphealth.org/pub/f2f59214-2354-d714-5198-3a8968092869.

38. Aberle DR, Adams AM, Berg CD, et al. Reduced lung-cancer mortality with low-dose computed tomographic screening. The New England journal of medicine. 2011;365(5):395.

39. American Cancer Society. New Lung Cancer Screening Guidelines for Heavy Smokers. 2013. Available at: http://www.cancer.org/cancer/news/new-lung-cancer-screening-guidelines-for-heavy-smokers.

40. U.S. Preventive Services Task Force. Screening for Colorectal Cancer.; 2008. Available at: http://www.uspreventiveservicestaskforce.org/uspstf/uspscolo.htm.

41. American Cancer Society. American Cancer Society Guidelines for the Early Detection of Cancer: Breast Cancer. 2013. Available at: http://www.cancer.org/healthy/findcancerearly/cancerscreeningguidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.

42. American College of Radiology. ACR Practice Guideline for the Performance of Screening and Diagnostic Mammography. 2008. Available at: http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/Screening_Mammography.pdf.

43. U.S. Preventive Services Task Force. Screening for Breast Cancer.; 2009. Available at: http://www.uspreventiveservicestaskforce.org/uspstf/uspsbrca.htm.

44. U.S. Preventive Services Task Force. Screening for Cervical Cancer.; 2012. Available at: http://www.uspreventiveservicestaskforce.org/uspstf/uspscerv.htm.

45. U.S. Census. State and County Quick Facts: Kentucky.; 2013. Available at: http://quickfacts.census.gov/qfd/states/21000.html.

46. Kentucky. Kentucky Adult Tobacco Survey: 2010.; Pending Publication.

47. U.S. Census. 2010 Population Finder: Kentucky.; 2010. Available at: http://www.census.gov/popfinder/?fl=21.

48. Centers for Disease Control and Prevention. BRFSS Prevalence and Trends Data.; 2010. Available at: http://apps.nccd.cdc.gov/brfss/.

49. Surveillance, Epidemiology, and End Results (SEER) Program. SEER*Stat Database: Incidence - SEER 18 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2012 Sub (2000-2010) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2011 Counties. National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch; 2012. Available at: www.seer.cancer.gov.

This publication is supported by cooperative agreement number U55/CCU421880-02 from the Centers for Disease Control and Prevention.
Its contents are solely the responsibility of the authors and do not necessarily represent the official view of the Centers for Disease Control and Prevention.