

2009

STATE HEALTH REGISTRY OF IOWA

Cancer in Iowa



DATA SOURCES



In 2009, an estimated 6,300 Iowans will die from cancer, 14 times the number caused by auto fatalities. Cancer and heart disease are the two leading causes of death in Iowa. The cancer projections in this report are based upon mortality data the State Health Registry of Iowa receives from the Iowa Department of Public Health. The Registry has been recording the occurrence of cancer in Iowa since 1973, and is one of fourteen population-based registries and three supplementary registries nationwide providing data to the National Cancer Institute. With *2009 Cancer in Iowa* the Registry makes a general report to the public on the status of cancer. This report will focus on:

- a description of the Registry and its goals;
- cancer estimates for 2009;
- a special section on sources for cancer data;
- brief summaries of recent/ongoing research projects;
- a selected list of publications from 2008.



CANCER IS A REPORTABLE DISEASE AS STATED

in the Iowa Administrative Code. Cancer data are collected by the State Health Registry of Iowa, located at The University of Iowa in the College of Public Health's Department of Epidemiology. The staff includes more than 50 people. Half of them, situated throughout the state, regularly visit hospitals, clinics, and medical laboratories in Iowa and neighboring states to collect cancer data. A follow-up program tracks more than 99 percent of the cancer survivors diagnosed since 1973. This program provides regular updates for follow-up and survival. The Registry maintains the confidentiality of the patients, physicians, and hospitals providing data.

In 2009 data will be collected on an estimated 16,000 new cancers among Iowa residents. In situ cases of bladder cancer are included in the estimates for bladder cancer, to be in agreement with the definition of reportable cases of the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute.

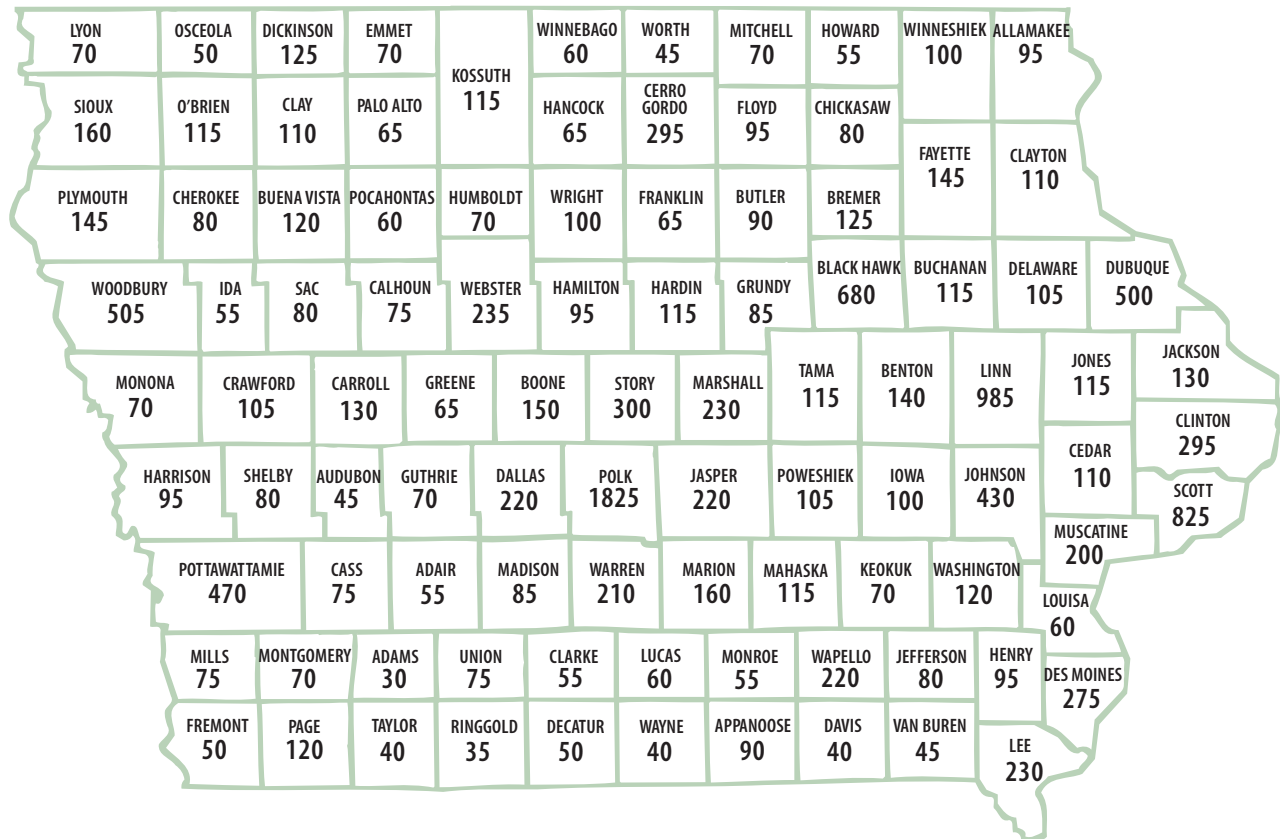
Since 1973 the Iowa Registry has been funded primarily by the SEER Program of the National Cancer Institute. Iowa represents rural and Midwestern populations and provides data included in many National Cancer Institute publications. Beginning in 1990 between 5 and 10 percent of the Registry's annual operating budget has been provided by the state of Iowa. Beginning in 2003, the University of Iowa has been providing cost-sharing funds. The Registry also receives funding through grants and contracts with university, state, and national researchers investigating cancer-related topics.

The Goals of the Registry are to:

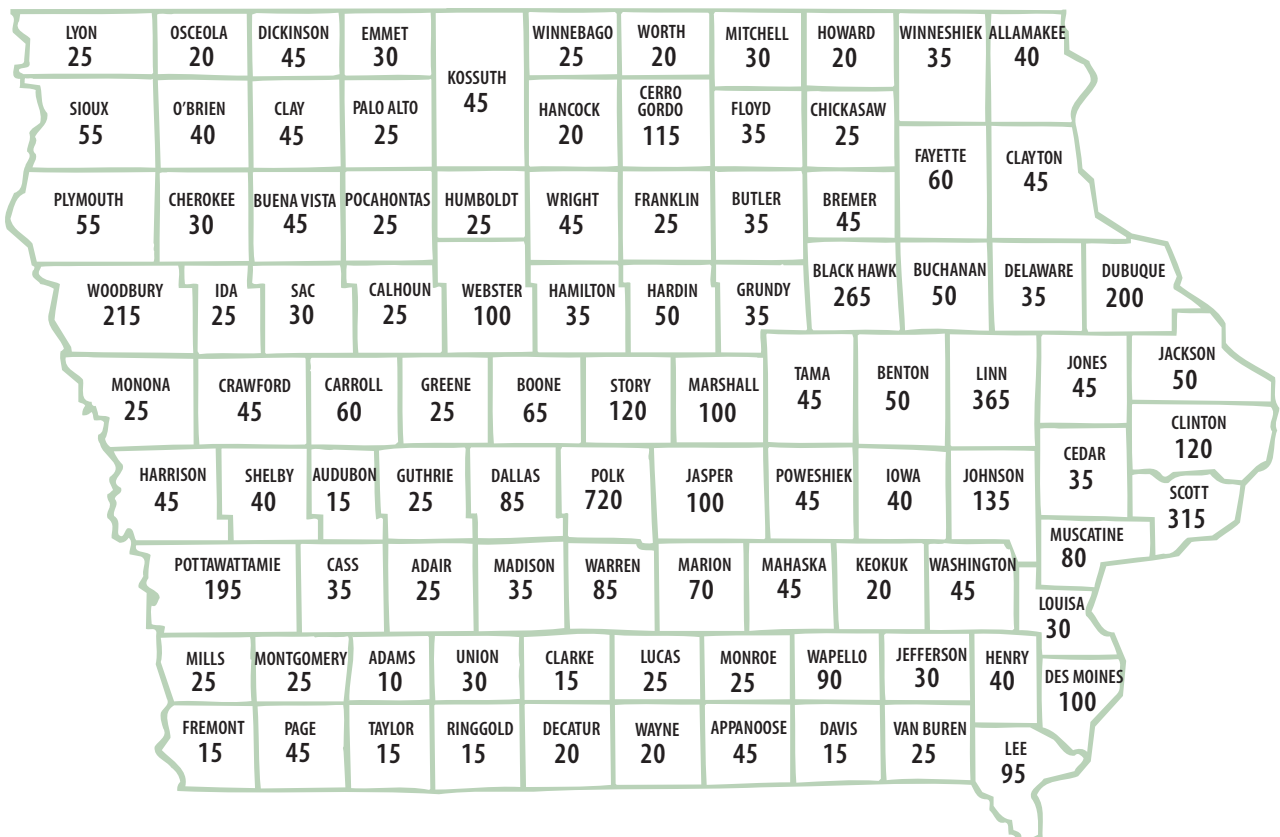
- assemble and report measurements of cancer incidence, survival and mortality among Iowans;
- provide information on changes over time in the extent of disease at diagnosis, therapy, and patient survival;
- promote and conduct studies designed to identify factors relating to cancer etiology, prevention and control;
- respond to requests from individuals and organizations in the state of Iowa for cancer data and analyses;
- provide data and expertise for cancer research activities and educational opportunities.

Cancer Projections for 2009

Estimated Number of New Cancers in Iowa for 2009



Estimated Number of Cancer Deaths in Iowa for 2009



Top 10 Types of Cancer in Iowa Estimated for 2009

Cancer Deaths in Females

Type	# of Cancers	% of Total
Lung	800	25.8
Breast	420	13.5
Colon & Rectum	350	11.3
Pancreas	180	5.8
Ovary	180	5.8
Non-Hodgkin's Lymphoma	120	3.9
Leukemia	120	3.9
Uterus	100	3.2
Brain	70	2.3
Kidney & Renal pelvis	70	2.3
All Others	690	22.2
Total	3100	

New Cancers in Females

Type	# of Cancers	% of Total
Breast	2150	27.6
Lung	980	12.6
Colon & Rectum	960	12.3
Uterus	480	6.1
Non-Hodgkin's Lymphoma	340	4.4
Skin Melanoma	300	3.8
Ovary	240	3.1
Thyroid	220	2.8
Kidney & renal pelvis	220	2.8
Leukemia	210	2.7
All Others	1700	21.8
Total	7800	

Cancer Deaths in Males

Type	# of Cancers	% of Total
Lung	1000	31.3
Prostate	360	11.2
Colon & Rectum	280	8.8
Pancreas	180	5.6
Leukemia	160	5.0
Esophagus	140	4.4
Non-Hodgkin's Lymphoma	130	4.1
Bladder	110	3.4
Kidney & Renal pelvis	110	3.4
Brain	100	3.1
All Others	630	19.7
Total	3200	

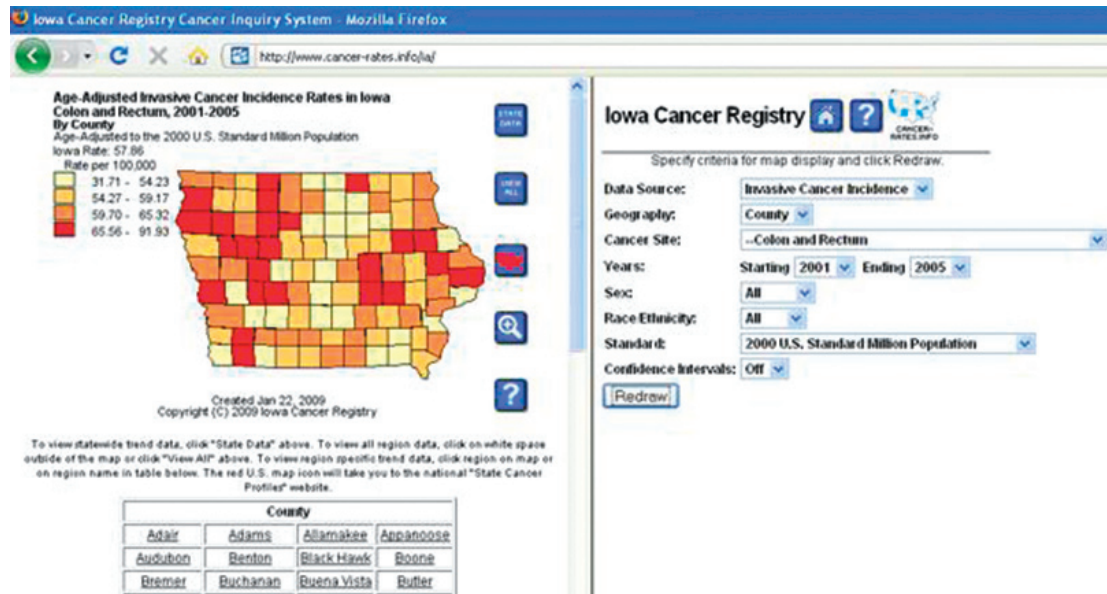
New Cancers in Males

Type	# of Cancers	% of Total
Prostate	2100	25.6
Lung	1300	15.9
Colon & Rectum	860	10.5
Bladder (invasive and noninvasive)	600	7.3
Skin Melanoma	360	4.4
Non-Hodgkin's Lymphoma	350	4.2
Kidney & Renal pelvis	330	4.0
Leukemia	270	3.3
Oral Cavity	230	2.8
Pancreas	180	2.2
All Others	1620	19.8
Total	8200	

Fortunately for Iowans, the chances of being diagnosed with many types of cancer can be reduced through positive health practices such as smoking cessation, physical exercise, healthful dietary habits, and limiting alcohol consumption. Early detection through obtaining recommended screening tests and regular health checkups can improve cancer survival.

Accessing Iowa Cancer Data

Cancer data are available for the state of Iowa over the world wide web at <http://www.public-health.uiowa.edu/shri/>. Just click on “Iowa Cancer Data” and you will be taken to the page that looks like this:



Data are available for incidence (new cases) as well as for mortality (deaths) for the years 1973-2005. Usually each summer, these data are updated for the next year. Data can be selected by county, cancer site, year, sex, and race, and the corresponding map is then created using the Redraw button.



Invasive Cancer Incidence Rates in Polk County, Iowa						
Colon and Rectum, 2001-2005						
Year	2001	2002	2003	2004	2005	2001-2005
Population at Risk	380625	385479	389862	394211	401755	1951932
Total Cases	192	200	177	211	169	949
Crude Rate	50.44	51.88	45.40	53.52	42.07	48.62
Age-Adjusted Rate	54.84	56.45	49.76	57.85	45.32	52.66
Statewide Age-Adjusted Rate	62.78	60.40	56.50	56.04	53.79	57.86

Note: All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Million Population.

You can select on a county of interest in the table shown above to view the population, number of cases, and rates by year for the time period selected.

HELPFUL HINTS



provides a comparison of the age-adjusted incidence rate for all the counties in the state.



generates a line graph of the data selected that can be incorporated into reports.



creates a report with the age-adjusted incidence rates by cancer site for the county selected.

If you want to be able to compare the state of Iowa to the surrounding states, you can also go to State Cancer Profiles, <http://statecancerprofiles.cancer.gov/> where you can view incidence and mortality rates by state. This is also available from the Iowa Cancer Data webpage by clicking on the red icon of the United States next to the map as shown above.



This website is more structured so data are provided for pre-specified years (currently years 2001-2005 only). Selections can be made by state, cancer type, race, and sex. This website also provides trend data, maps, screening and risk factor data, and census data.

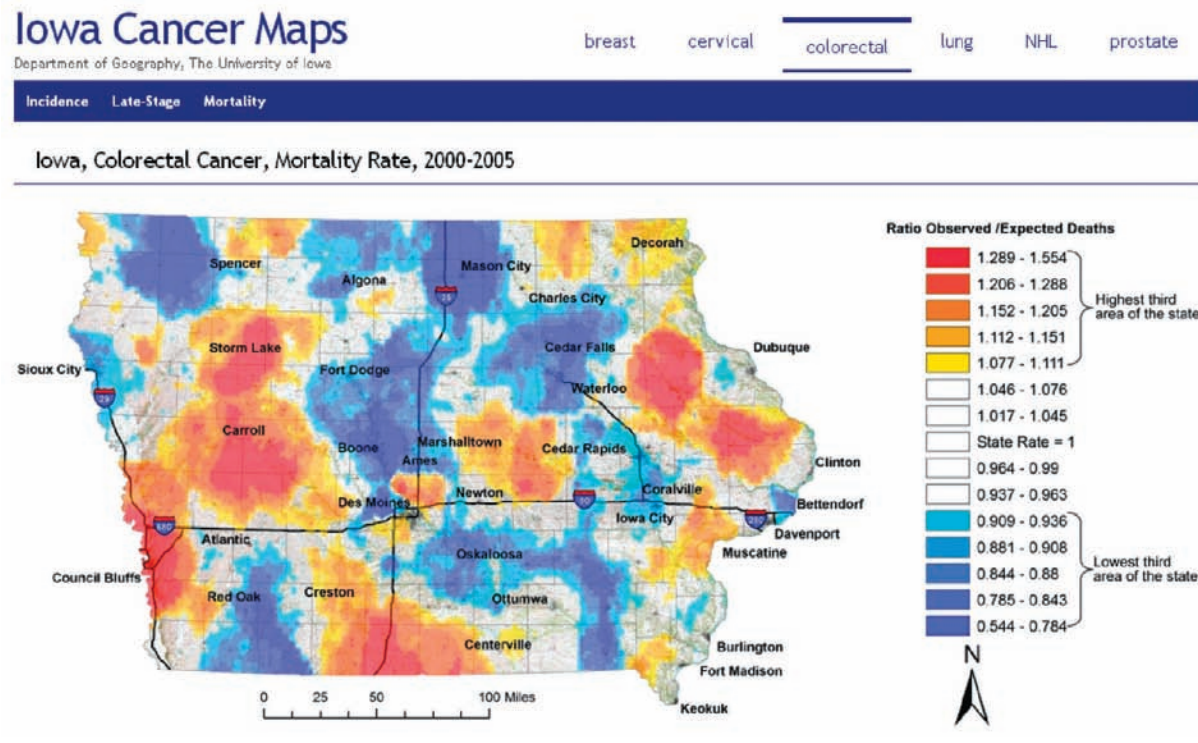
If you need more detailed data, you can download SEER*Stat by going to <http://seer.cancer.gov/data/access.html>. SEER*Stat is provided free of charge by the National Cancer Institute as a powerful tool to address specific questions for which statistics (incidence, prevalence, mortality, survival) can be produced for studying the impact of cancer on a population. You can design queries to select the data you want for Iowa.

Risk factor data are often needed for our work in cancer prevention and control. At Cancer Control P.L.A.N.E.T. (<http://cancercontrolplanet.cancer.gov/>) you can find 5 steps to developing a comprehensive cancer control plan or program, as well as information by cancer control topic, such as diet/nutrition, sun safety, survivorship, or tobacco control. The Iowa Behavioral Risk Factor Surveillance System (BRFSS) also has risk factor data available at <http://www.idph.state.ia.us/brfss/>. The BRFSS is the largest, continuously conducted, telephone survey in the world. It is conducted by states under the guidance of the Center for Disease Control and Prevention. The survey is designed to identify and monitor risk factors for chronic diseases and other leading causes of death.

The Iowa Consortium for Comprehensive Cancer Control (ICCCC) was formed in 2001 to create a comprehensive, statewide cancer plan to address critical cancer problems in the state of Iowa. This plan was called *Changing the Face of Cancer in Iowa: A State Plan for 2003-2005*. This plan was updated in 2006 to *Reducing the Burden of Cancer in Iowa: A Strategic Plan for 2006-2011*. Information on the consortium can be viewed at <http://www.canceriowa.org/>.

If you click on the **Cancer Information** tab shown here in the screen shot, and then click on Iowa Statistical Information, you have the option to view **Iowa Cancer Maps**.

Detailed maps generated by the Geography Department at the University of Iowa can be found on this website as noted. Updated maps are also available at <http://www.iowa.edu/iowacancermaps/>. The map of colorectal cancer mortality for the years 2000-2005 is shown below.



The University of Iowa's Holden Comprehensive Cancer Center has a Cancer Information Service available at <http://www.uihealthcare.com/cis>. A toll free number (800-237-1225) can be used to address questions that individuals have about cancer.

UNIVERSITY OF IOWA HOLDEN COMPREHENSIVE CANCER CENTER
University of Iowa Health Care

Cancer Information Service

UI Health Care Home Cancer Center Home Appointments Contact Us Search

Questions About Cancer?

The Cancer Information Service answers questions about cancer.

Whether you are a patient, family member, friend, health professional or a school child writing a report, the Cancer Information Service provides answers to your questions about cancer. As a follow-up to your question, the CIS often provides written materials from a variety of national organizations.

The Cancer Information Service provides information on:

- Risk factors for cancer and how to reduce your risk
- Screening tests for cancer
- Symptoms
- Diagnostic tests
- Any type of cancer
- Treatment options, including clinical trials
- Coping skills
- Community resources
- Cancer Statistics

Cancer Information Service staff members do not make medical recommendations, but respond to general questions about cancer and act as an information resource.

The Cancer Information Service: a nation-wide service with over 20 years of experience

Contact Us

You can contact us by:
Phone: 800-237-1225
Email: cancer-information@uiowa.edu

Visiting our office:
University Hospitals, 4802 JPP
Monday through Friday
8 a.m. to 5 p.m. (CT)

Mailing Address:
UI Hospitals and Clinics
200 Hawkins Drive, 4802 JPP
Iowa City, IA 52242

UI Hospitals and Clinics buildings and campus are non-smoking environments.

Registry data have been quite useful for cancer research. They assist with cancer control research relating to prevention, screening, early detection, treatment, survivorship, and quality of life. They augment cancer health services research. They provide for population-based hypothesis generation and hypothesis testing for the further investigation of cancer etiology and survival. They also assist in the collection of biospecimens for molecular research.

Research Projects During 2009

The State Health Registry of Iowa is participating in three dozen funded studies during 2009. Brief descriptions of a few of these studies are provided.

Agricultural Health Study

The Agricultural Health Study is a long-term study of agricultural exposures (including pesticides) and chronic disease (especially cancer) among commercial pesticide applicators, private pesticide applicators, and spouses of private pesticide applicators in Iowa and North Carolina. The study is funded primarily by the National Cancer Institute. We are in the 17th year of the study, which received renewed funding at the end of 2003 for continuation into 2010.

In the first five years (1993-1997), 89,658 subjects (58,564 in Iowa and 31,094 in North Carolina) were enrolled in the study. This total for Iowa included 31,877 private applicators, 21,771 spouses of private applicators, and 4,916 commercial applicators. Enrollment consisted of completing questionnaires about past exposures and health. The second phase of the study for private applicators and their spouses was completed at the end of 2003. It involved a telephone interview, a mailed dietary questionnaire, and collection of a cheek cell sample from all consenting cohort members. The telephone interview asked about pesticide use since enrollment, current farming and work practices, and health changes. The dietary health questionnaire asked about cooking practices and types of foods eaten. Cooking practices and diet may play a role in cancer and other health conditions. The cheek cells are being used to understand possible links between genetics, exposures, and disease. For commercial applicators, the second phase of the study was completed at the end of 2005. The study's third phase began in 2005, involves updating information about exposures and health, and is ongoing.

Since 1997, cohort members have been linked annually to mortality and cancer registry incidence databases in both states. In addition, mortality data on the cohort are being obtained from the National Death Index. More information about recent results from this study, the study background, frequently asked questions, other resources (internet & telephone) for agricultural health information, references for publications to date, and information for scientific collaborators can be found at the website, www.aghealth.org. The abstract is available for these publications at the website. The cancer-related references for some of the recent publications are provided in the last section of this report.

Geographical Information Systems

The State Health Registry of Iowa continues its involvement with research utilizing a geographical information system to develop and test a methodology for identifying regions of excess cancer burden for breast, colorectal, prostate, cervical and non-Hodgkin's lymphoma cancers in Iowa. In 2008 a project supported by the SEER Rapid Response Projects (PI Professor Gerard Rushton) was completed. Graduate student Chetan Tiwari designed a web-based mapping program which permits users to request geographically detailed maps of these cancer burdens based on datasets held by cancer registries on their secure computer servers. The system is currently undergoing beta testing by the New Jersey and Utah cancer registries as well as by a research group in the National Cancer Institute. Results will be used to plan more appropriate cancer prevention and control programs.

The Registry has also provided data in 2008 for maps on cancer incidence and mortality created for use by the Iowa Consortium for Comprehensive Cancer Control. The maps were created by Dr. Gerard Rushton, Professor of Geography at the University of Iowa, and graduate students Kirsten Beyer, Zunqiu Chen, and David Haynes. These maps can be used for planning purposes for cancer prevention and control activities. These maps can be viewed at <http://www.uiowa.edu/iowacancermaps/>. Several of these maps were used by graduate student Kirsten Beyer in interactions with residents of Storm Lake, IA, where rates of colorectal cancer late-stage diagnosis and mortality are high, in an effort to understand community cancer experiences and discuss interventions to reduce the local burden of colorectal cancer. Currently, maps of temporal changes in the cancer burden in Iowa over the last eight years are being prepared and will soon be added to this website.

A SEER Rapid Response Surveillance Study, “Enhancing the utility of geocoding accuracy assessments via regression modeling on geographic characteristics and feature size,” was conducted by Dr. Dale Zimmerman, Professor of Statistics at the University of Iowa, with assistance from graduate student Jie Li. Geocoding accuracy is important to assess because inaccurate geocodes of patients’ addresses make it more difficult to accurately characterize and map spatial patterns of cancer incidence, staging, survival, and mortality. In his study, Dr. Zimmerman found that local street network characteristics, such as street segment length and street density, can affect geocoding accuracy in a systematic manner. Knowledge of these variables for a patient’s address may therefore be used to better predict the magnitude of the positional error incurred when the address is geocoded.

Iowa Women’s Health Study

This is a population-based cohort of 41,837 Iowa women, aged 55-69 in 1986, who were recruited to determine whether diet, body fat distribution and other risk factors were related to cancer incidence. Exposure and lifestyle information was collected in a baseline mailed survey and subsequently in several follow-up mailed surveys. Mortality and cancer incidence have been ascertained since 1986 through linkage to the State Health Registry of Iowa databases and the National Death Index. The project has resulted in over 200 publications, some of which occurred in 2008 and are listed in the references provided in the last section of this report.

Non-Hodgkin Lymphoma (NHL)

The State Health Registry of Iowa (SHRI) with researchers at the Mayo Clinic participated in a collaborative, population-based case-control study of NHL involving researchers at the National Cancer Institute and three other Surveillance, Epidemiology, and End Results (SEER) registries. The main objective of the study was to better characterize risk factors for NHL. In Iowa, 364 patients newly diagnosed with NHL between July 1, 1998 and June 30, 2000 were enrolled. A similar number of population controls participated. Blood samples were sought from study participants. The SHRI also coordinated the acquisition of pathology reports, slides and tissue blocks from all SEER centers. The slides were reviewed to confirm the diagnosis of NHL pathologic classification. More recently, we are collaborating with researchers at the Mayo Clinic to investigate whether genes with functional, common variant polymorphisms involved in immune function and regulation are associated with overall survival from NHL among these patients. To achieve this aim, medical record reviews were performed to obtain more detailed information on the treatment received for NHL. In addition, NHL patients not diagnosed and/or treated at the University of Iowa Hospitals and Clinics or at the Mayo Clinic

are being contacted by Registry staff to see if they have a family history of hematopoietic cancer. If they do, they are being invited to participate by providing a family history and by providing blood samples from themselves and their relatives. These research activities have resulted in several publications during 2008. The references for some of these are provided in the last section of this report.

Patterns of Care Studies

SEER Patterns of Care Studies are conducted to satisfy a U.S. Congressional directive to the National Cancer Institute to “assess the incorporation of state-of-the-art cancer treatment into clinical practice and the extent to which cancer patients receive such treatments and include the results in such assessment in the biennial reports.” This year’s Patterns of Care Study will involve small cell lung cancer, acute myeloid leukemia, multiple myeloma, and hepatocellular carcinoma in adults diagnosed between January 1, 2007 and December 31, 2007. The objectives of the SEER Patterns of Care Study are to: 1) describe the use of adjuvant therapy in a community setting, 2) characterize the practice patterns in different communities, 3) describe more completely the use of surgery in the treatment of specific cancers, 4) compare the patterns of treatment for cancer over time, 5) compare patterns of care by age and race/ethnicity, 6) describe effect of co-morbid conditions on treatment, and 7) describe treatment by hospital characteristics: i.e. for profit vs. not for profit, teaching vs. non-teaching, etc. The SHRI has been involved with these types of studies over the past 20 years. During 2008, they have resulted in several publications, which are provided in the last section of this report.

Pooled Analyses

Today, researchers are increasingly looking to combine their study data with that of other studies evaluating similar outcomes. During 2008 these activities resulted in several publications, which are listed in the last section of this report, involving breast cancer, ovarian cancer, and non-Hodgkin lymphoma.

Race/ethnicity

For several years, the State Health Registry of Iowa has collaborated with other SEER registries to provide more accurate cancer statistics for American Indians. This has involved an ongoing project to link records from the State Health Registry of Iowa and other SEER Registries with records from the Indian Health Service (IHS). In 2008, this resulted in several publications, which are listed in the last section of this report, summarizing the cancer experience of American Indians between 1999 and 2004. In these publications, the American Indians residing in Iowa were included in the Northern Plains IHS region.

Second Cancer Studies

Over the past two decades, the State Health Registry of Iowa has participated in several second cancer studies. These have consisted of cohorts with a first cancer of the cervix, ovary, testis, uterus, female breast, non-Hodgkin’s lymphoma, or Hodgkin’s disease. They have been conducted primarily in collaboration with the Radiation Epidemiology Branch at the National Cancer Institute and other registries in North America and Europe. Generally these studies evaluate the treatment received for the first cancer and the risk it places on the patient for development of a second cancer. They typically involve medical record review and pathology material retrieval.

The WECARE (Women's Environmental Cancer and Radiation Epidemiology) Study is another example of a second cancer study. This study was designed to examine the interaction of gene carrier status and radiation exposure in the etiology of female breast cancer. Data collection not only involved medical record review, but also participant interviews and blood sample collection.

Results from the second cancer studies have provided important medical information and will continue to do so in the future. Several publications during 2008 involving second cancers are provided in the last section of this report.

SEER-Medicare

In the early 1990s, the cancer incidence and survival data from the State Health Registry of Iowa were combined with other SEER Registry data and linked to Medicare data. This linked data set has been updated on several occasions since and has become an important data resource for cancer research regarding epidemiologic and health services research related to the diagnosis, treatment and procedures, costs, and survival of cancer patients. Over the years many publications have resulted from this linked data set, the authors, titles, and abstracts of which can be viewed at <http://appliedresearch.cancer.gov/cgi-bin/pubsearch/pubsearch/index.pl>.

Cooperative Agreements and Other Registries

The SHRI maintains cooperative agreements with several hospital cancer registries and other agencies/entities. Some of the latter include:

- Iowa Department of Public Health
- Iowa Consortium for Comprehensive Cancer Control
- The University of Iowa
 - Center for Health Effects of Environmental Contamination
 - Center for Public Health Statistics
 - Environmental Health Sciences Research Center
 - Health Effectiveness Research Center
 - Holden Comprehensive Cancer Center
 - Iowa Center for Agricultural Safety and Health
 - Injury Prevention Research Center
 - Preventive Intervention Center
 - Reproductive Molecular Epidemiology Research & Education Program

Selected 2008 Publications

AGRICULTURAL HEALTH STUDY

1. Dennis, L. K., Lowe, J. B., Lynch, C. F., and Alavanja, M. C. Cutaneous melanoma and obesity in the agricultural health study. *Ann Epidemiol*, 18: 214-21, 2008.
2. Greenburg, D. L., Rusiecki, J., Koutros, S., Dosemeci, M., Patel, R., Hines, C. J., Hoppin, J. A., and Alavanja, M. C. Cancer incidence among pesticide applicators exposed to captan in the Agricultural Health Study. *Cancer Causes Control*, 19: 1401-7, 2008.
3. Hines, C. J., Deddens, J. A., Jaycox, L. B., Andrews, R. N., Striley, C. A., and Alavanja, M. C. Captan exposure and evaluation of a pesticide exposure algorithm among orchard pesticide applicators in the Agricultural Health Study. *Ann Occup Hyg*, 52: 153-66, 2008.
4. Kang, D., Park, S. K., Beane-Freeman, L., Lynch, C. F., Knott, C. E., Sandler, D. P., Hoppin, J. A., Dosemeci, M., Coble, J., Lubin, J., Blair, A., and Alavanja, M. Cancer incidence among pesticide applicators exposed to trifluralin in the Agricultural Health Study. *Environ Res*, 107: 271-276, 2008.
5. Koutros, S., Mahajan, R., Zheng, T., Hoppin, J. A., Ma, X., Lynch, C. F., Blair, A., and Alavanja, M. C. Dichlorvos exposure and human cancer risk: results from the Agricultural Health Study. *Cancer Causes Control*, 19: 59-65, 2008.
6. Koutros, S., Cross, A. J., Sandler, D. P., Hoppin, J. A., Ma, X., Zheng, T., Alavanja, M. C., and Sinha, R. Meat and meat mutagens and risk of prostate cancer in the agricultural health study. *Cancer Epidemiol Biomarkers Prev*, 17: 80-7, 2008.
7. Mozzachio, A. M., Rusiecki, J. A., Hoppin, J. A., Mahajan, R., Patel, R., Beane-Freeman, L., and Alavanja, M. C. Chlorothalonil exposure and cancer incidence among pesticide applicator participants in the agricultural health study. *Environ Res*, 108: 400-3, 2008.

IOWA WOMEN'S HEALTH STUDY

1. Ahmed, R. L., Prizment, A., Lazovich, D., Schmitz, K. H., and Folsom, A. R. Lymphedema and quality of life in breast cancer survivors: the Iowa Women's Health Study. *J Clin Oncol*, 26: 5689-96, 2008.
2. Bardia, A., Vachon, C. M., Olson, J. E., Vierkant, R. A., Wang, A. H., Hartmann, L. C., Sellers, T. A., and Cerhan, J. R. Relative weight at age 12 and risk of postmenopausal breast cancer. *Cancer Epidemiol Biomarkers Prev*, 17: 374-8, 2008.
3. Cutler, G. J., Nettleton, J. A., Ross, J. A., Harnack, L. J., Jacobs, D. R., Jr., Scrafford, C. G., Barraji, L. M., Mink, P. J., and Robien, K. Dietary flavonoid intake and risk of cancer in postmenopausal women: the Iowa Women's Health Study. *Int J Cancer*, 123: 664-71, 2008.
4. Limburg, P. J., Liu-Mares, W., Vierkant, R. A., Wang, A. H., Harnack, L., Flood, A. P., Sellers, T. A., and Cerhan, J. R. Prospective evaluation of trans-fatty acid intake and colorectal cancer risk in the Iowa Women's Health Study. *Int J Cancer*, 123: 2717-9, 2008.
5. Sellers, T. A., Vierkant, R. A., Djeu, J., Celis, E., Wang, A. H., Kumar, N., and Cerhan, J. R. Unpasteurized milk consumption and subsequent risk of cancer. *Cancer Causes Control*, 19: 805-11, 2008.

NON-HODGKIN LYMPHOMA (NHL)

1. Anderson, L. A., Gridley, G., Engels, E. A., Morton, L. M., Cerhan, J. R., Cozen, W., Severson, R. K., Davis, S., Hartge, P., and Linet, M. S. Antibiotic use and risk of non-Hodgkin's lymphoma: a population-based case-control study. *Br J Cancer*, 98: 161-4, 2008.
2. Cerhan, J. R., Engels, E. A., Cozen, W., Davis, S., Severson, R. K., Morton, L. M., Gridley, G., Hartge, P., and Linet, M. Blood transfusion, anesthesia, surgery and risk of non-Hodgkin lymphoma in a population-based case-control study. *Int J Cancer*, 123: 888-94, 2008.
3. Frankenfeld, C. L., Cerhan, J. R., Cozen, W., Davis, S., Schenk, M., Morton, L. M., Hartge, P., and Ward, M. H. Dietary flavonoid intake and non-Hodgkin lymphoma risk. *Am J Clin Nutr*, 87: 1439-45, 2008.
4. Habermann, T. M., Wang, S. S., Maurer, M. J., Morton, L. M., Lynch, C. F., Ansell, S. M., Hartge, P., Severson, R. K., Rothman, N., Davis, S., Geyer, S. M., Cozen, W., Chanock, S. J., and Cerhan, J. R. Host immune gene polymorphisms in combination with clinical and demographic factors predict late survival in diffuse large B-cell lymphoma patients in the pre-rituximab era. *Blood*, 112: 2694-702, 2008.
5. Kelemen, L. E., Wang, S. S., Lim, U., Cozen, W., Schenk, M., Hartge, P., Li, Y., Rothman, N., Davis, S., Chanock, S. J., Ward, M. H., and Cerhan, J. R. Vegetables- and antioxidant-related nutrients, genetic susceptibility, and non-Hodgkin lymphoma risk. *Cancer Causes Control*, 19: 491-503, 2008.
6. Wang, S. S., Davis, S., Hartge, P., Cozen, W., Severson, R. K., Cerhan, J. R., and Rothman, N. Chromosomal aberrations in peripheral blood lymphocytes and risk for non-hodgkin lymphoma. *J Natl Cancer Inst Monogr*: 78-82, 2008.

- Zhang, Y., Sanjose, S. D., Bracci, P. M., Morton, L. M., Wang, R., Brennan, P., Hartge, P., Boffetta, P., Becker, N., Maynadie, M., Foretova, L., Cocco, P., Staines, A., Holford, T., Holly, E. A., Nieters, A., Benavente, Y., Bernstein, L., Zahm, S. H., and Zheng, T. Personal use of hair dye and the risk of certain subtypes of non-Hodgkin lymphoma. *Am J Epidemiol*, 167: 1321-31, 2008.

PATTERNS OF CARE STUDIES

- Cronin-Fenton, D. P., Mooney, M. M., Clegg, L. X., and Harlan, L. C. Treatment and survival in a population-based sample of patients diagnosed with gastroesophageal adenocarcinoma. *World J Gastroenterol*, 14: 3165-73, 2008.
- Stroup, A. M., Harlan, L. C., and Trimble, E. L. Demographic, clinical, and treatment trends among women diagnosed with vulvar cancer in the United States. *Gynecol Oncol*, 108: 577-83, 2008.
- Yabroff, K. R., Harlan, L. C., Clegg, L. X., Ballard-Barbash, R., Stevens, J., and Weaver, D. L. Is mode of breast cancer detection associated with cancer treatment in the United States? *Cancer*, 112: 1011-9, 2008.
- Trimble, E. L., Harlan, L. C., Gius, D., Stevens, J., and Schwartz, S. M. Patterns of care for women with cervical cancer in the United States. *Cancer*, 113: 743-9, 2008.

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PREPARED BY:

Michele M. West, Ph.D.
Coordinator for Special Projects

Charles F. Lynch, M.D., Ph.D.
Principal Investigator

Kathleen M. McKeen
Director

Daniel B. Olson, M.S.
Programmer Analyst

Charles E. Platz, M.D.
Investigator

George Weiner, M.D.
Director, Holden Comprehensive Cancer Center
Professor, Department of Internal Medicine
The University of Iowa

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