Maryland 2009
Hospital Discharge Data from General Hospitals
For Maryland Residents with Cancer Diagnoses

Center for Cancer Surveillance and Control
Maryland Department of Health and Mental Hygiene
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Highlights of the 2009 Maryland hospital discharge data:

- Of the 722,203 Maryland hospital discharges in 2009, 33,685 (4.7%) had cancer listed in any one of the 15 discharge diagnostic categories. Of these 33,685 discharges, 19,809 (2.7% of all discharges) had cancer listed in the primary diagnostic category.

- 8,074 (40.8%) of hospital discharges for cancer in Maryland have one of the Cigarette Restitution Fund (CRF) targeted cancers (i.e., lung, colorectal, prostate, female breast, oral, melanoma, or cervical cancer) as the primary diagnosis.

- Of the seven targeted cancers, lung cancer had the highest number of hospital discharges in Maryland (2,589), compared to melanoma which had the lowest amount of hospital discharges (62).

- The total hospital cost for Maryland residents in whom the primary diagnosis on discharge was any type of cancer was $424,379,536 in 2009.

- For all targeted cancers combined, the median total hospital-specific costs (not including physician fees and laboratory fees) for all ages in 2009 was $13,908 per hospitalization.

- Of the seven targeted cancers, colorectal cancer had the highest median total hospital cost at $18,914; the second highest cost was for oral cancer with a median cost of $17,908, followed by lung cancer with a median cost of $15,200.

- For all targeted cancers combined, the mean total hospital-specific costs (not including physician fees and laboratory fees) for all ages in 2009 was $18,650 per hospitalization.

- Of the seven targeted cancers, oral cancer had the highest mean total hospital cost at $30,770; the second highest cost was for colorectal cancer with a mean cost of $24,016, followed by lung cancer with a mean cost of $19,452.

Background

The Cigarette Restitution Fund (CRF) in Maryland requires that funding be provided to local health departments in Maryland's 23 counties and to Baltimore City after the jurisdictions submit plans for the Cancer Prevention, Education, Screening, and Treatment Program. In Baltimore City, this has been accomplished through the Johns Hopkins Medical Institutions, University of Maryland Medical Group, and Baltimore City Health Department.

The CRF law also requires that the Maryland Department of Health and Mental Hygiene (DHMH) determine the "targeted cancers." The targeted cancers selected were lung and bronchus (called lung), colon and rectum (called colorectal), female breast, prostate, oral and pharyngeal (called oral), cervical, and melanoma.

The CRF law also requires that the local screening programs either pay for treatment of clients or link clients to treatment if they are diagnosed with a targeted or non-targeted cancer identified through the screening. Because of this requirement, determining the costs of cancer care is important for CRF planning in Maryland.

Maryland's hospital rates are regulated by the Health Services Cost Review Commission (HSCRC). Among other data, the HSCRC collects data from hospitals in Maryland about each hospital discharge and uses these data to determine the rates allowed for that facility. Because costs of hospitalization account for a major portion of the cost of cancer treatment, we sought to determine the number of hospitalizations and the cost of those hospitalizations among the residents of Maryland who have been discharged from reporting Maryland hospitals with a diagnosis of cancer.

The analysis presented in this document is designed to help planners at DHMH and the local programs allocate CRF funds for cancer prevention, education, screening, and treatment.

Methods

General hospitals in Maryland report a standard set of information to the HSCRC on each hospital discharge. The HSCRC makes available a database containing non-confidential (unidentified) discharge information for every year. In this report, DHMH staff analyzed the discharge data from the calendar year 2009, using SAS software.

DHMH examined the number of hospitalizations where cancer was listed as the primary diagnosis or among any of the 15 provided diagnoses, and compared the results to the total number of hospitalizations in 2009. The type of cancer for all 15 diagnostic positions was determined by the International Classification of Disease, Version 10 (ICD-10) Diagnostic Codes (for additional information on ICD codes, definitions and notes, see Attachments 1 and 2).

The number of general hospital discharges with cancer as the primary diagnosis was compared to the number of new cancer cases reported to the Maryland Cancer Registry diagnosed in that jurisdiction the same year. The cost of hospital discharges for every cancer as the primary diagnosis was also examined. Hospitalizations for which the total costs were zero dollars were removed from the dataset for this analysis because they likely reflected patients who were not actually admitted.

Those discharged with cancer listed in the primary diagnostic position were most likely to be people hospitalized for that diagnosis. Discharges where cancer was listed in a 2nd through 15th position may have already had the same cancer listed as the primary diagnosis, had a different cancer as the primary diagnosis, or had a non-cancer primary diagnosis. Therefore, a **total** number of hospitalizations for that cancer could not be obtained. Determining whether the hospitalization was ***due to cancer*** was not possible when cancer was listed in the 2nd through 15th diagnostic category for the hospitalization.

The data were further stratified into three age groups: age 49 years and under; ages 50-64 years; and age 65 years and over.

For comparison across jurisdictions, the following measures were calculated: (1) crude rates for the population; (2) age-adjusted standardized rates using the 2000 U.S. standard million population, with age groups in 19 categories; and (3) ratio of the number of hospital discharges with cancer as the primary diagnosis by the number of cancer cases reported in each jurisdiction. The population by county data used to calculate rates were obtained from the U.S. Census website (http://factfinder.census.gov).

Data obtained from HSCRC are secure from unauthorized access and disclosure. DHMH manages and releases this information in accordance with the HSCRC Data Use Agreement. Cells with counts of 0-5 hospital discharges are suppressed and presented as "<6." Complementary suppression of discharge counts in additional cell(s) is used, denoted by "s," to prevent back-calculation of numbers in those cells with primary suppression.

Results

Figure 1 (shown in Table 1) illustrates the distribution of cancer, defined as listed in any of the 15 diagnostic positions, and non-cancer general hospital discharges from Maryland hospitals in 2009. Of the 722,203 hospital discharges, 33,685 (4.7%) had a cancer listed in one or more of the diagnostic categories, and of those, 19,809 discharges (2.7%) had cancer listed as the primary diagnosis. Among discharges where cancer was listed as the primary diagnosis, Table 1 revealed that targeted cancers (lung, colorectal, prostate, female breast, oral, melanoma, and cervical) contributed a total of 8,074 (40.8%) of the 19,809 total cancer discharges. By way of comparison, metastatic cancers are listed as the primary diagnosis in 3,812 (19.2%) of the 19,809 total cancer discharges.

Figure 2 (as depicted in Table 2) plots the total number of hospital discharges where cancer was listed as the primary diagnosis, by the jurisdiction of patient residence. The total number of hospital discharges ranged from 68 discharges in Garrett County to 3,726 discharges in Baltimore County.

Figure 3 depicts the crude rate of general hospital discharges where cancer was listed as the primary diagnosis for each jurisdiction. Hospitalizations with a primary diagnosis of cancer ranged from 17.0 per 10,000 population in St. Mary's County to 68.8 per 10,000 population in Kent County.

Figure 4 shows the age-adjusted rate of hospital discharges by jurisdiction where cancer was listed as the primary diagnosis per 100,000 population. Hospital discharges ranged from 168.5 per 100,000 population in Garrett County to 495.7 per 100,000 population in Baltimore City.

Figure 5 shows the ratio of the number of hospital discharges where cancer is the primary diagnosis to the number of all new cancer cases reported for residents within each jurisdiction. Garrett County had the lowest ratio (0.43) and Baltimore City had the highest ratio (1.03). The ratio could be an indication of the burden of cancer in each jurisdiction. In Baltimore City, there were more hospital discharges (3,153) than new cancer cases (3,048) for 2009, which is why the ratio is greater than one. This could mean that some cases were diagnosed earlier, but hospitalized in 2009. The ratio was obtained by dividing the number of hospital discharges by the number of new cancer cases.

Figures 6 through 15 (as shown in Table 3) provide the number of hospital discharges by categorical costs for every type of cancer listed as the primary diagnosis. These figures show that among the targeted cancers, lung, colorectal and oral are the most expensive to treat. The total amount of hospital costs for Maryland residents, among whom the primary diagnosis on discharge was any type of cancer, was found to be $424,379,536. Table 3 further reveals information about the relative cost burden or cost of treatment among the seven targeted cancers. The total cost for all seven targeted cancers was $150,452,228 (35.5%) of the total for all cancers. The median of total hospital costs (not including physician fees and some laboratory fees) in 2009 for all targeted cancers combined was $13,908 per hospitalization. The three targeted cancers with the highest median hospital cost were: 1) colorectal ($18,914); 2) oral ($17,908); and 3) lung ($15,200). The median hospital cost for other cancers was $13,888. Hospital costs do *not* reflect physician and other costs that are billed separately. (See Attachment 2 for the definition of "total costs.")

Tables 4, 5, and 6 display the total number of hospital discharges and hospital costs by cancer type, for three age groups: age 49 years and under; ages 50-64 years; and age 65 years and over. The median total hospital charges due to the seven targeted cancers fluctuated with age. For persons age 49 years and under, the median total cost in 2009 was $14,477 for all targeted cancers combined. For persons ages 50 to 64 years, the median cost was $13,416; and for persons age 65 years and over, the median cost at discharge was $14,280.

Summary/Conclusion

Due to the requirement that local screening programs either pay for treatment of clients or link clients to treatment if they are diagnosed with a cancer identified through the screening, it is important to determine the financial impact of cancer care for Cigarette Restitution Fund (CRF) program planning in Maryland. While recognizing that cancer cases may be treated at either outpatient or inpatient facilities, the ideal method to evaluate the cost of cancer treatment is through Maryland hospital discharge data because costs of hospitalization account for a major portion of the cost of cancer treatment. The data also reflects the burden of cancer related to hospitalizations in each jurisdiction. A limitation is that this analysis includes hospital costs but excludes other costs that are not associated with the hospital bill (e.g., physician, internist, oncologist, or surgeon).

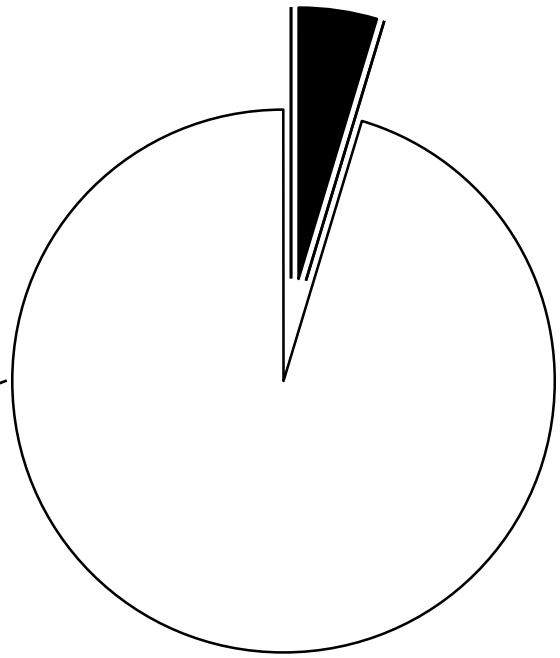
In the year 2009, there were 722,203 hospital discharges among Maryland residents. Of these 722,203 hospital discharges, 33,685 (4.7%) had cancer listed in at least one of the diagnostic categories and 19,809 discharges (2.7%) had cancer listed in the primary diagnosis.

Of the 19,809 discharges that had cancer in the primary diagnostic category, 8,074 (40.8%) of these discharges had one of the CRF targeted cancers (i.e., lung, colorectal, prostate, female breast, oral, melanoma, or cervical cancer) as the primary diagnosis. The median hospital cost for all seven targeted cancers was $13,908. Of the targeted cancers, the three highest median hospital costs were: colorectal cancer ($18,914), oral cancer ($17,908) and lung cancer ($15,200). Meanwhile, the median hospital cost for all other cancers was $13,888.

The mean hospital cost for all seven targeted cancers was $18,650. Of the targeted cancers, the three highest mean hospital costs were: oral cancer ($30,770), colorectal cancer ($24,016) and lung cancer ($19,452). Meanwhile, the mean hospital cost for all other cancers was $23,359. Due to the higher hospital cost to treat all targeted cancers compared to all other cancers, programs should focus their screening efforts towards reducing the incidence of these targeted cancers.

Figure 1.

Total General Hospital Discharges among Maryland Residents for Calendar Year 2009 (722,203)



Total Cancer General Hospital Discharges from Maryland Hospitals for 2009 where Cancer is listed in **any** diagnostic category = **33,685 (4.7%)**

Of these **33,685** discharges, **19,809 (2.7%** of all discharges**)** had Cancer in the primary diagnostic category

Total Non-Cancer General Hospital Discharges from Maryland Hospitals for 2009 = **688,518 (95.3%)**

Table 1.

Frequency of General Hospital Discharges in 2009 With Targeted and All Other Cancers Listed as the Primary Diagnosis* and Subsequent Diagnoses*, among Maryland Residents

Hospital diagnosis position where cancer is listed	Type of Cancer										
	Lung	Colorectal	Female Breast	Prostate	Oral	Melanoma	Cervical	Total Targeted Cancer	Non-Targeted Cancer	Metastatic Cancer	Total Cancer
as Primary Dx	2,589	2,214	1,546	1,228	298	62	137	8,074	7,923	3,812	19,809
as 2nd Dx	178	90	52	28	s	19	<6	382	381	2,556	3,319
as 3rd Dx	122	55	50	47	16	s	<6	305	308	1,996	2,609
as 4th Dx	132	41	50	37	11	s	<6	280	246	1,518	2,044
as 5th Dx	107	39	34	32	<6	8	<6	229	200	1,209	1,638
as 6th Dx	71	19	23	25	<6	<6	9	156	178	874	1,208
as 7th Dx	61	18	25	17	6	<6	<6	134	120	648	902
as 8th Dx	24	12	13	22	<6	<6	7	83	80	497	660
as 9th Dx	23	9	16	16	<6	<6	<6	69	75	362	506
as 10th Dx	11	9	13	12	<6	<6	<6	49	50	205	304
as 11th Dx	6	<6	10	19	<6	<6	<6	44	40	149	233
as 12th Dx	6	<6	6	8	<6	<6	<6	25	46	105	176
as 13th Dx	<6	<6	<6	6	<6	<6	<6	20	26	80	126
as 14th Dx	<6	<6	6	<6	<6	<6	<6	15	11	54	80
as 15th Dx	<6	<6	<6	9	<6	<6	<6	20	19	32	71

<6 = Cells containing 0-5 hospital discharges are suppressed per HSCRC Data Use Agreement.

s = Data in a cell is suppressed to prevent disclosure of data in other cell(s).

*International Classification of Diseases, Version 9 (Attachment 1)

Figure 2.

Total of General Hospital Discharges in 2009 with Targeted and All Other Cancers Listed as the Primary Diagnosis by Jurisdiction of Residence

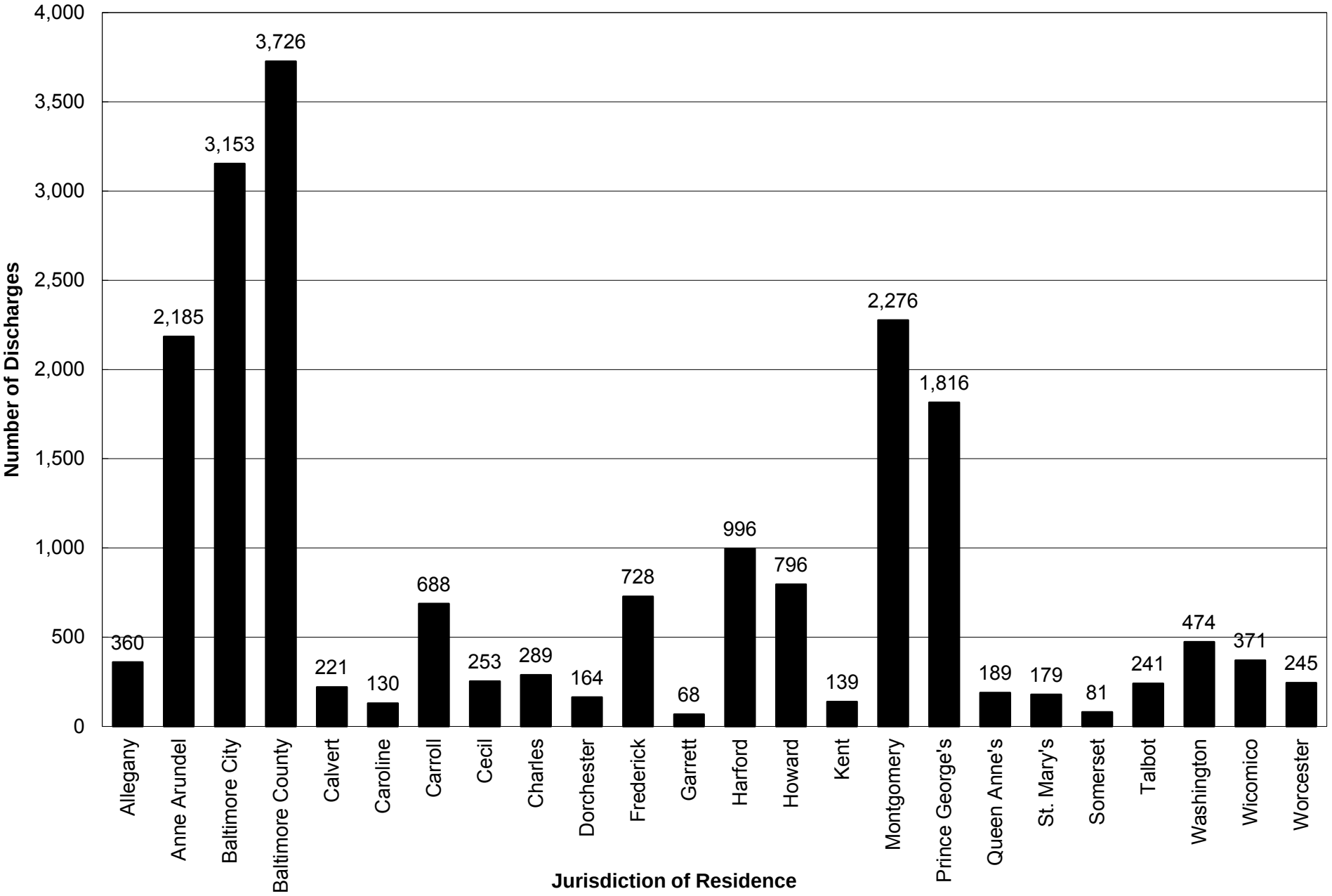


Table 2.

Number of General Hospital Discharges in 2009 With Targeted and All Other Cancers Listed as the Primary Diagnosis Among Maryland Residents, by Jurisdiction of Residence

Jurisdiction or County	Type of Cancer									
	Lung	Colorectal	Female Breast	Prostate	Oral	Melanoma	Cervical	Non-Targeted Cancer	Metastatic	Total
Allegany	59	46	7	12	<6	<6	<6	150	79	360
Anne Arundel	338	219	189	212	41	11	15	790	370	2,185
Baltimore City	495	314	226	130	58	10	18	1,197	705	3,153
Baltimore County	493	416	283	221	43	10	26	1,498	736	3,726
Calvert	21	41	23	7	7	<6	<6	90	29	221
Caroline	11	18	11	7	<6	<6	<6	52	28	130
Carroll	76	67	45	39	16	<6	<6	314	127	688
Cecil	47	29	12	<6	<6	<6	<6	96	59	253
Charles	39	45	28	8	<6	<6	<6	123	41	289
Dorchester	27	14	11	<6	<6	<6	<6	54	51	164
Frederick	77	99	38	41	14	<6	s	313	138	728
Garrett	11	12	<6	<6	<6	<6	<6	23	s	68
Harford	93	111	108	68	12	<6	s	422	171	996
Howard	72	90	78	52	9	<6	<6	359	128	796
Kent	13	22	<6	12	<6	<6	<6	58	27	139
Montgomery	260	216	216	146	36	7	14	953	428	2,276
Prince George's	222	237	163	106	s	<6	25	686	355	1,816
Queen Anne's	27	14	14	17	<6	<6	<6	73	38	189
St. Mary's	24	19	32	6	<6	<6	<6	63	30	179
Somerset	s	s	<6	10	<6	<6	<6	37	16	81
Talbot	24	30	13	23	<6	<6	<6	103	43	241
Washington	68	68	18	25	8	<6	<6	199	84	474
Wicomico	48	45	14	39	7	<6	<6	150	67	371
Worcester	31	33	<6	31	<6	<6	<6	96	46	245
Maryland, Unspecified	<6	<6	<6	<6	<6	<6	<6	24	<6	41
Total	2,589	2,214	1,546	1,228	298	62	137	7,923	3,812	19,809

<6 = Cells containing 0-5 hospital discharges are suppressed per HSCRC Data Use Agreement.

s = Data in a cell is suppressed to prevent disclosure of data in other cell(s).

Figure 3.

Crude Rate of General Hospital Discharges per 10,000 Jurisdiction Population with Targeted and All Other Cancers Listed as the Primary Diagnosis by Jurisdiction of Residence in 2009

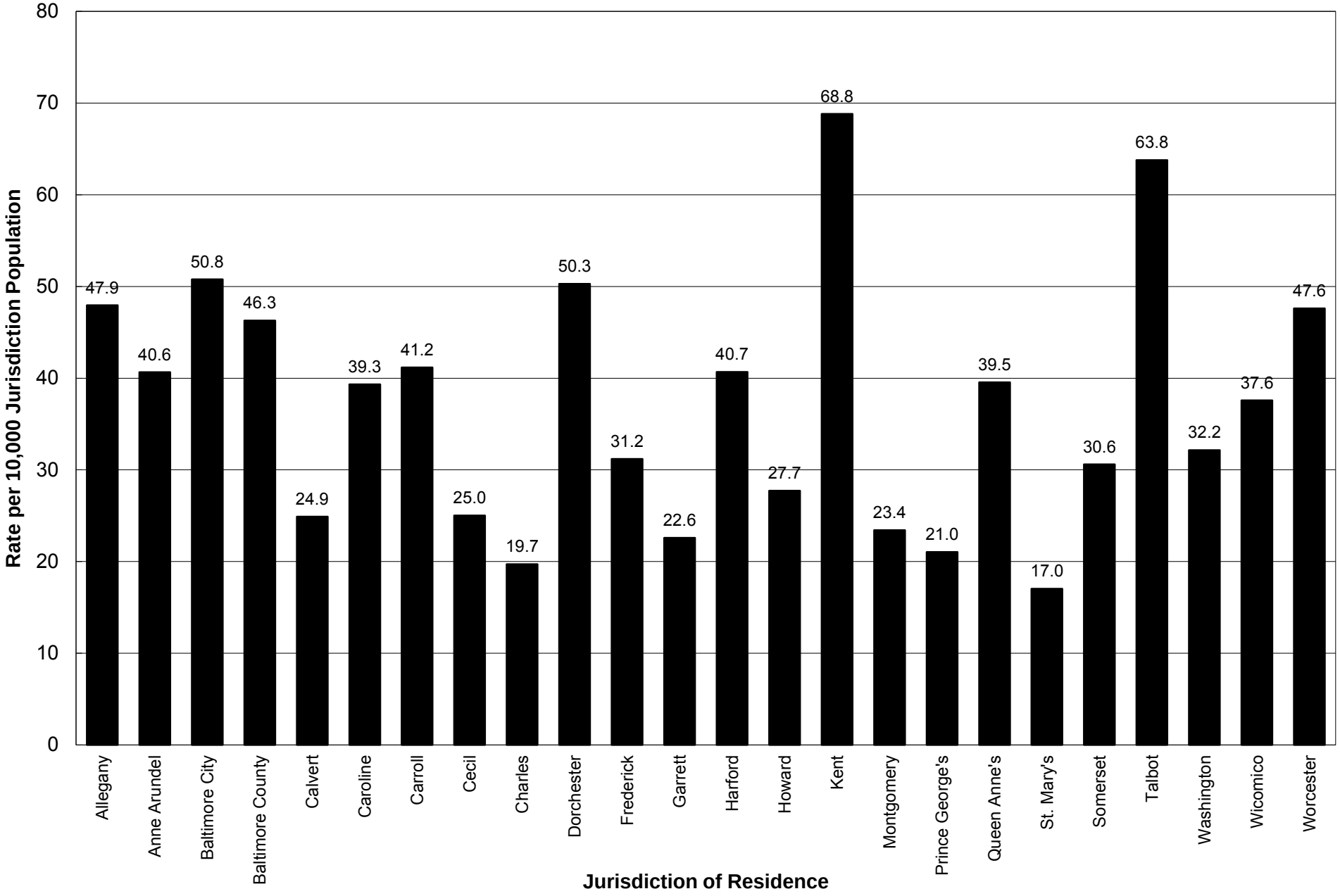
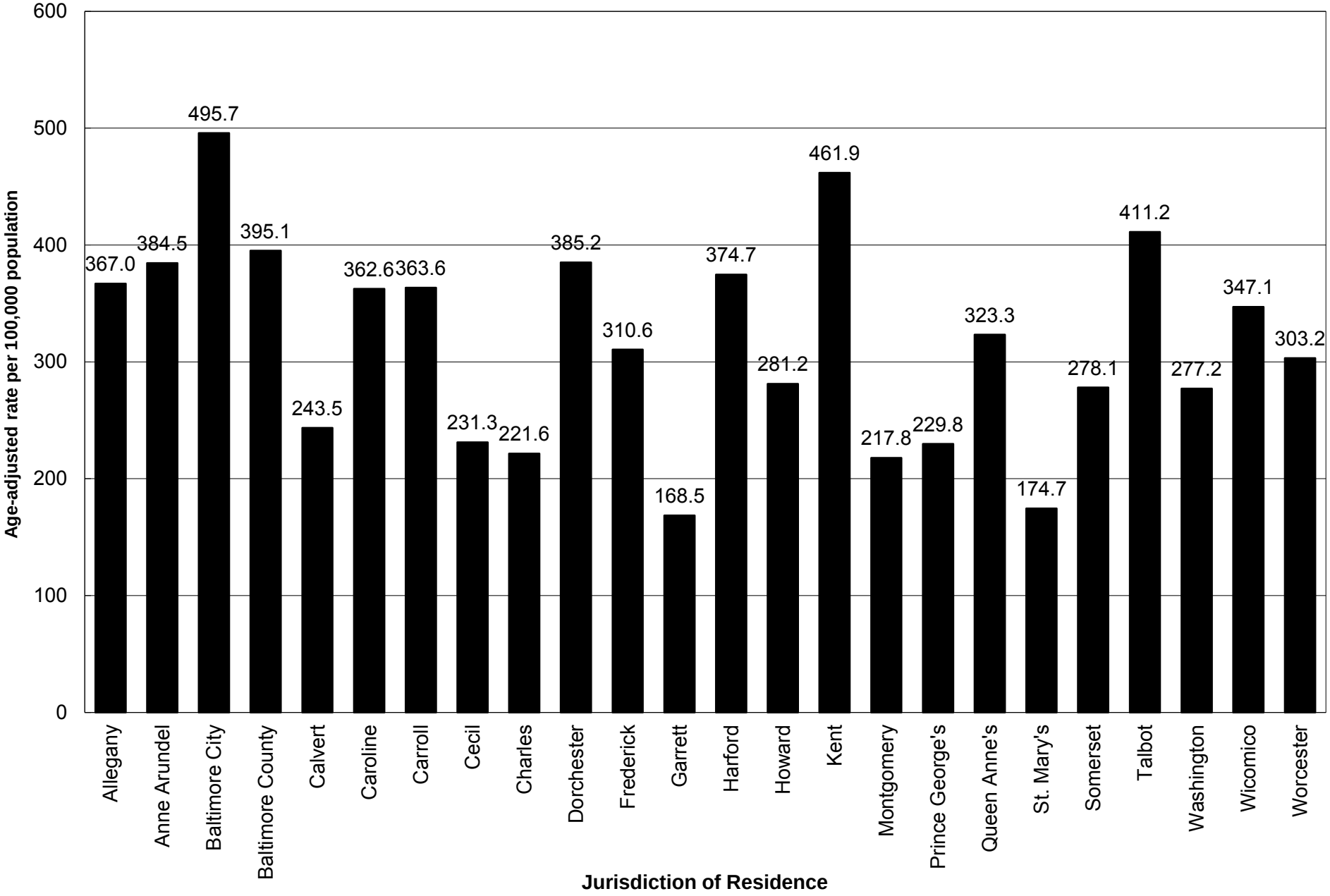


Figure 4.

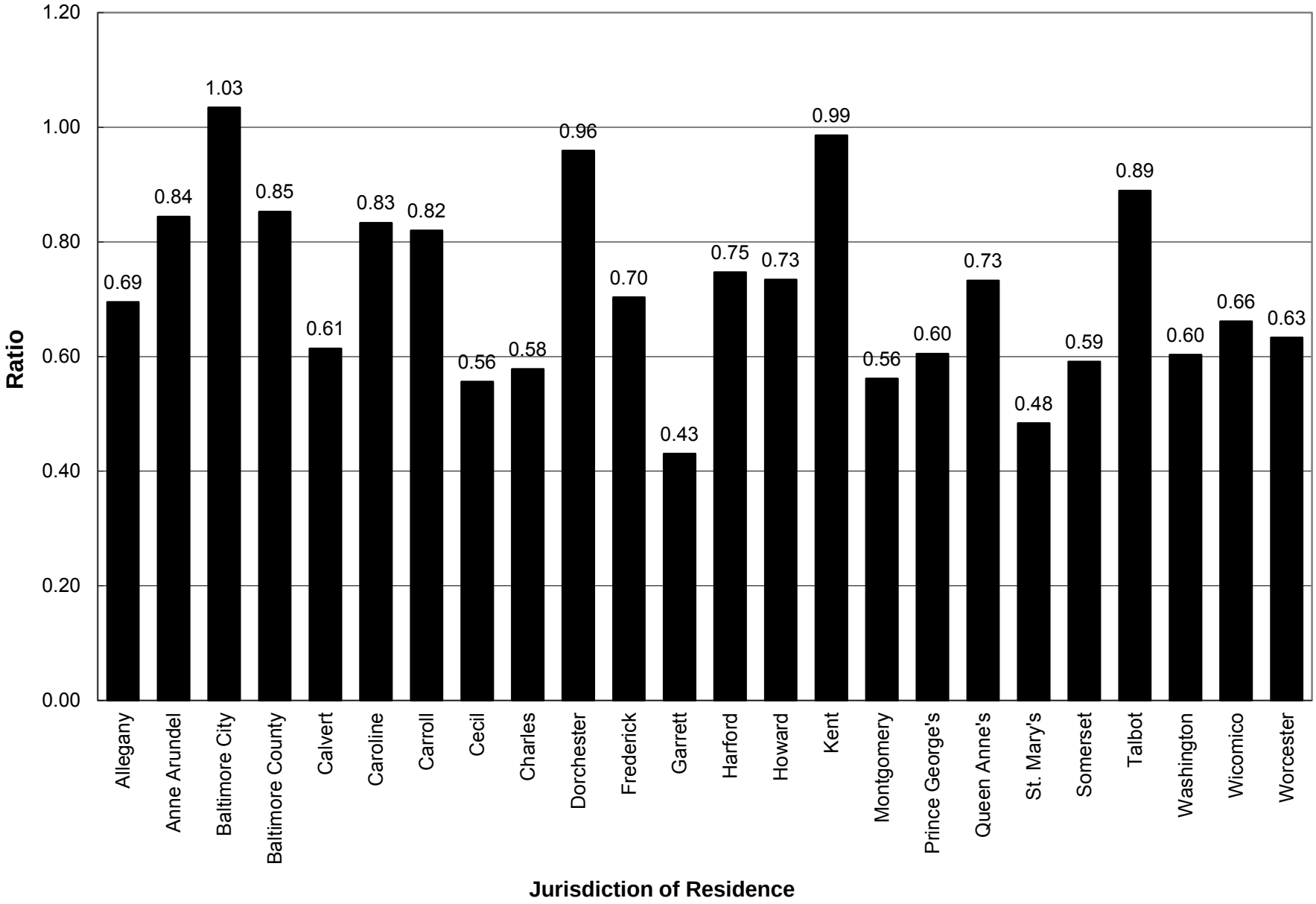
Age-adjusted* Rate of General Hospital Discharges per 100,000 Jurisdiction Population with Targeted and All Other Cancers Listed as the Primary Diagnosis by Jurisdiction of Residence in 2009



*Rates are per 100,000 and are age-adjusted to 2000 U.S. standard million population

Figure 5.

Ratio of General Hospital Cancer Discharges in 2009 with Targeted and All Other Cancers Listed as the Primary Diagnosis to the Number of All New Cancer Cases Reported* by Jurisdiction of Residence



*Total cancer cases reported to the Maryland Cancer Registry for 2009

Figure 6.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009 Where Lung Cancer is Listed as the Primary Diagnosis

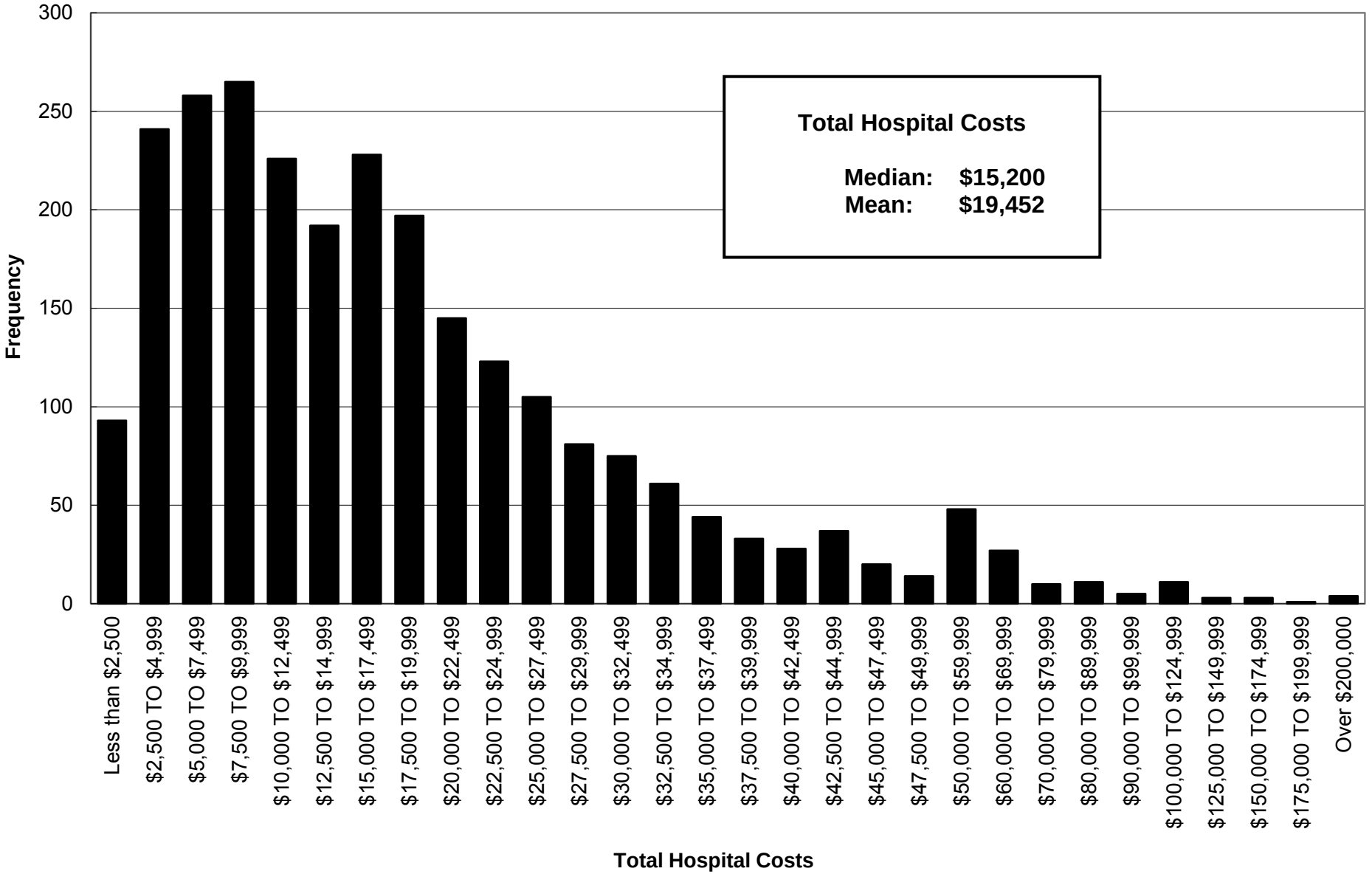


Figure 7.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009 Where Colorectal Cancer is Listed as the Primary Diagnosis

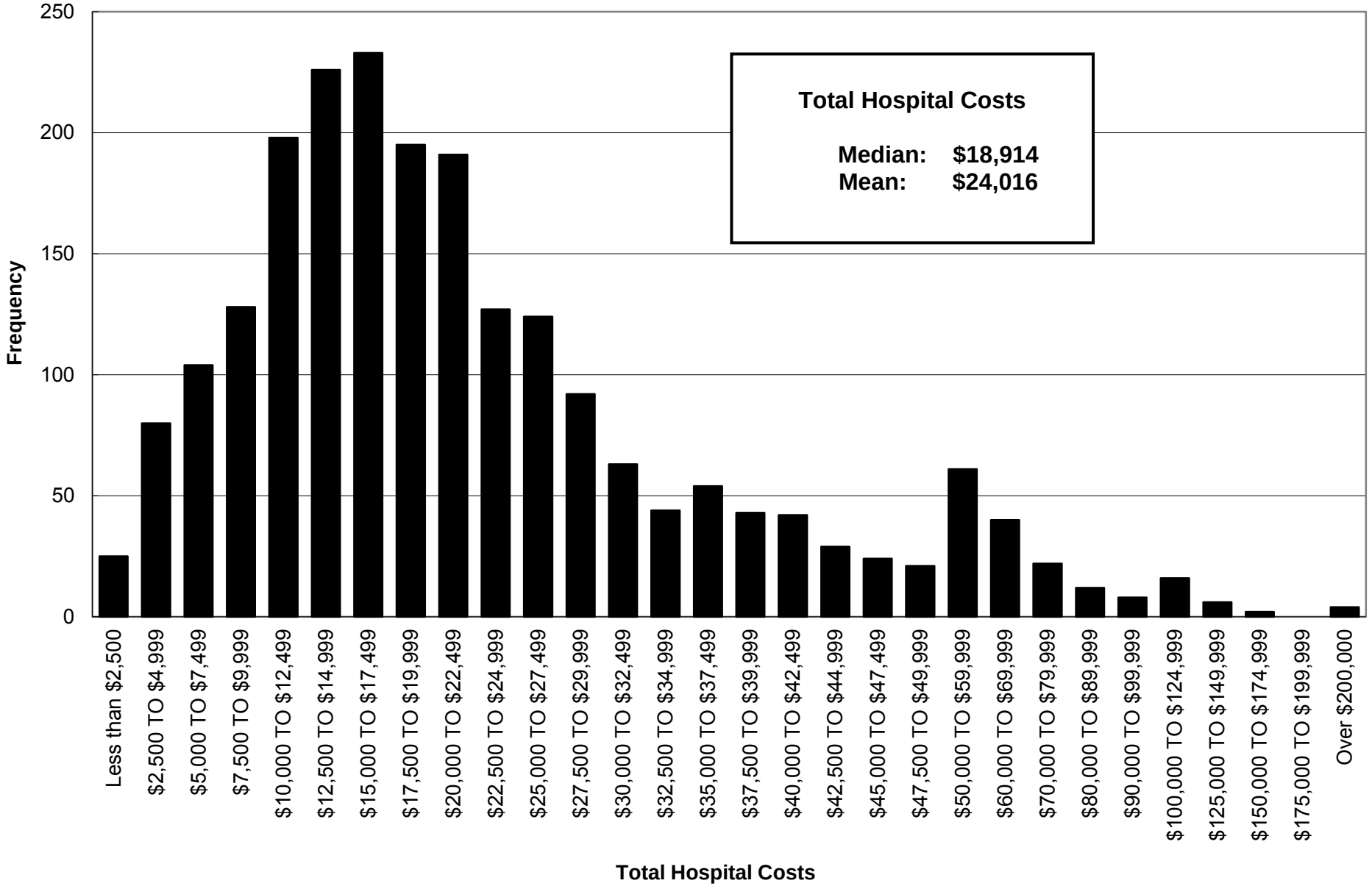


Figure 8.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009 Where Female Breast Cancer is Listed as the Primary Diagnosis

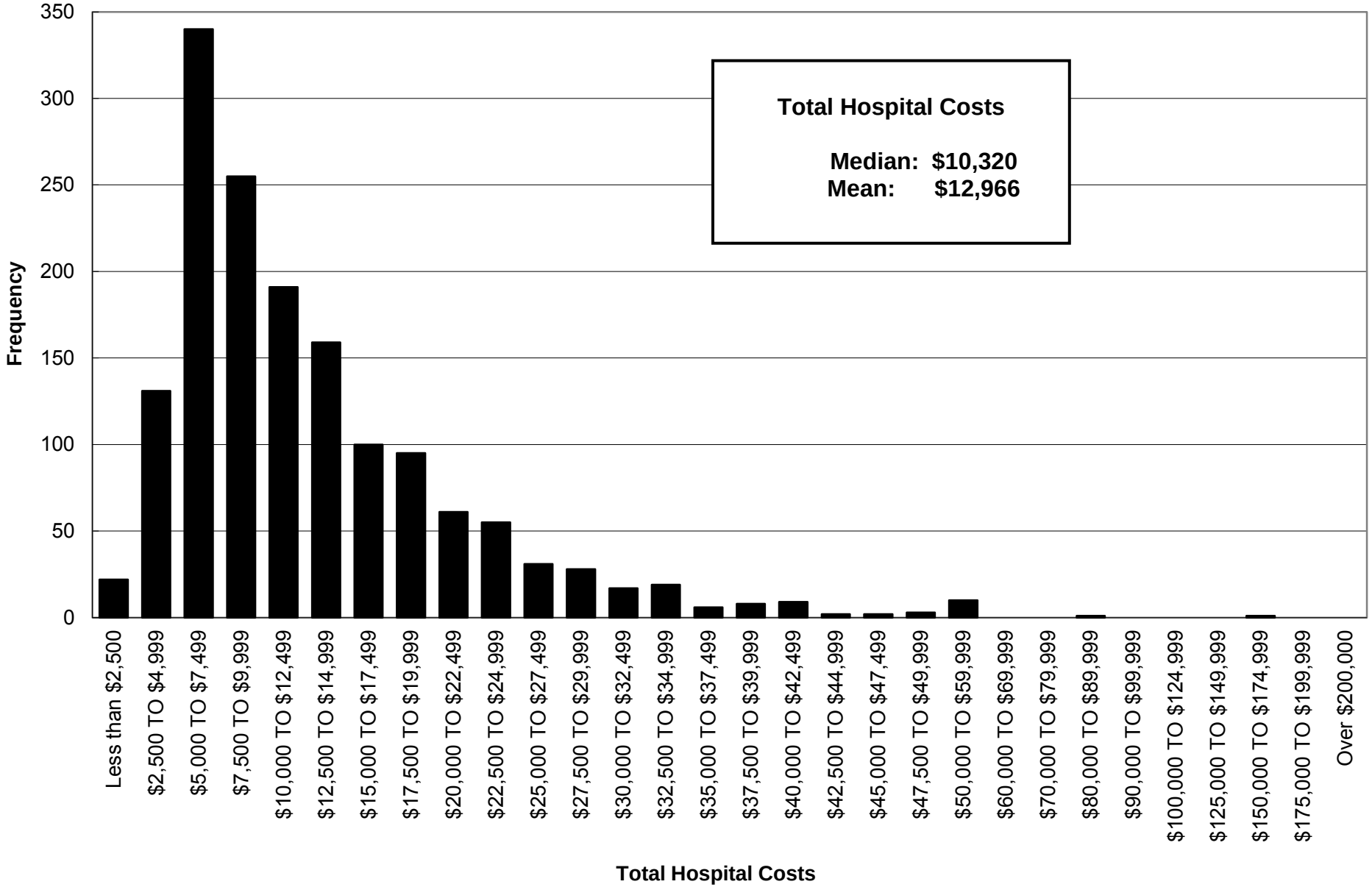


Figure 9.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009
Where Prostate Cancer is Listed as the Primary Diagnosis

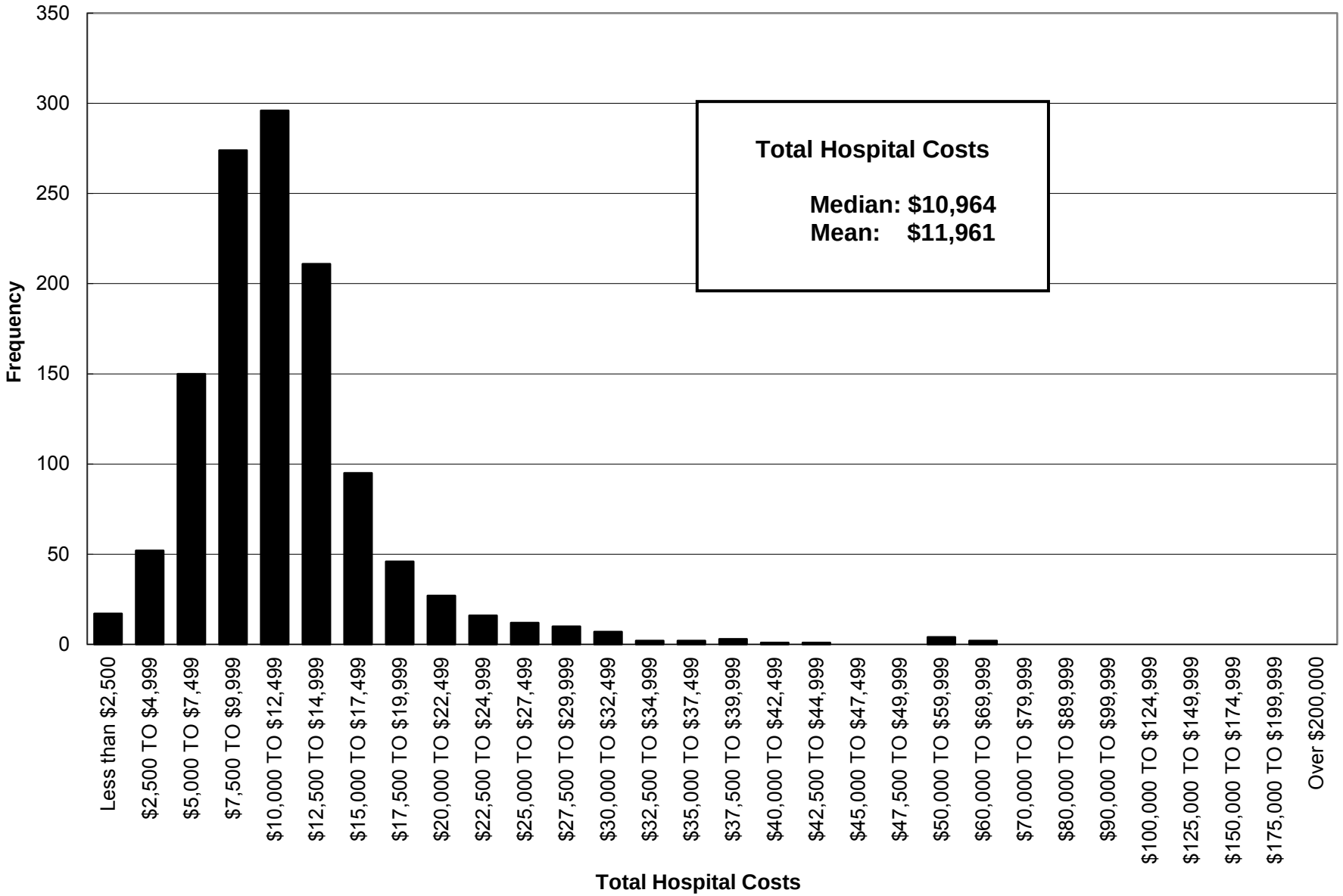


Figure 10.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009 Where Oral Cancer is Listed as the Primary Diagnosis

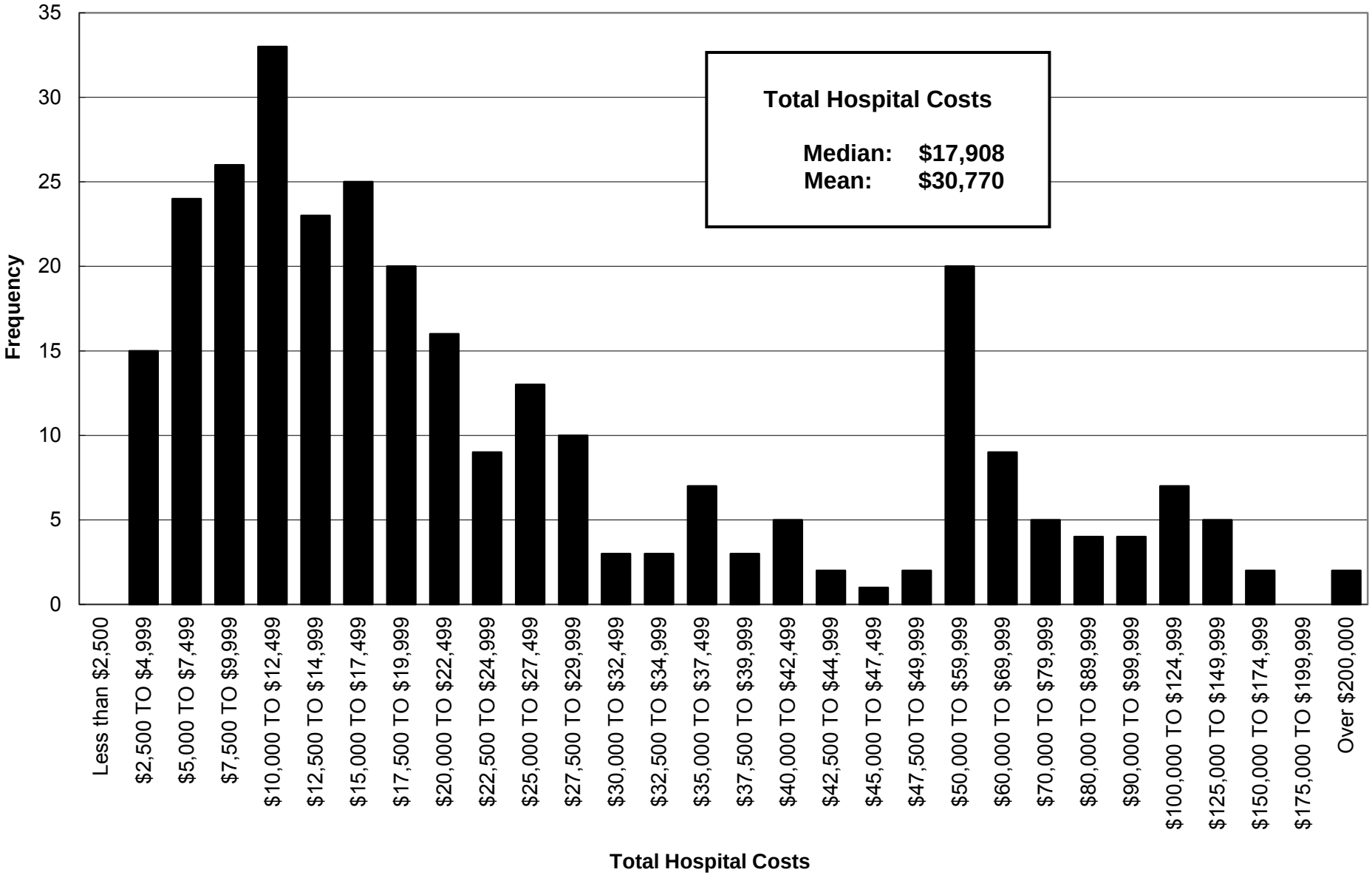


Figure 11.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009 Where Melanoma is Listed as the Primary Diagnosis

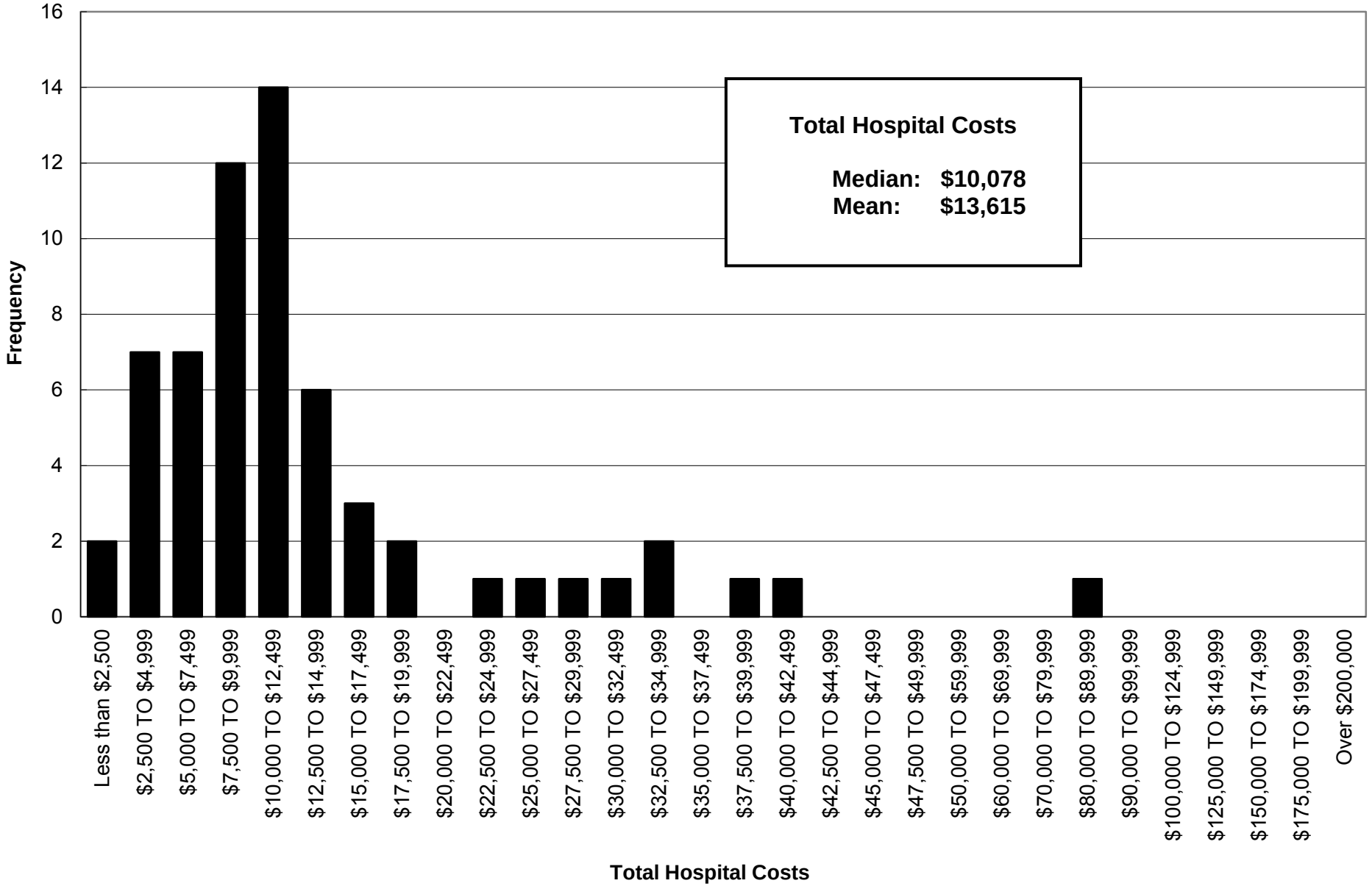


Figure 12.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009
Where Cervical Cancer is Listed as the Primary Diagnosis

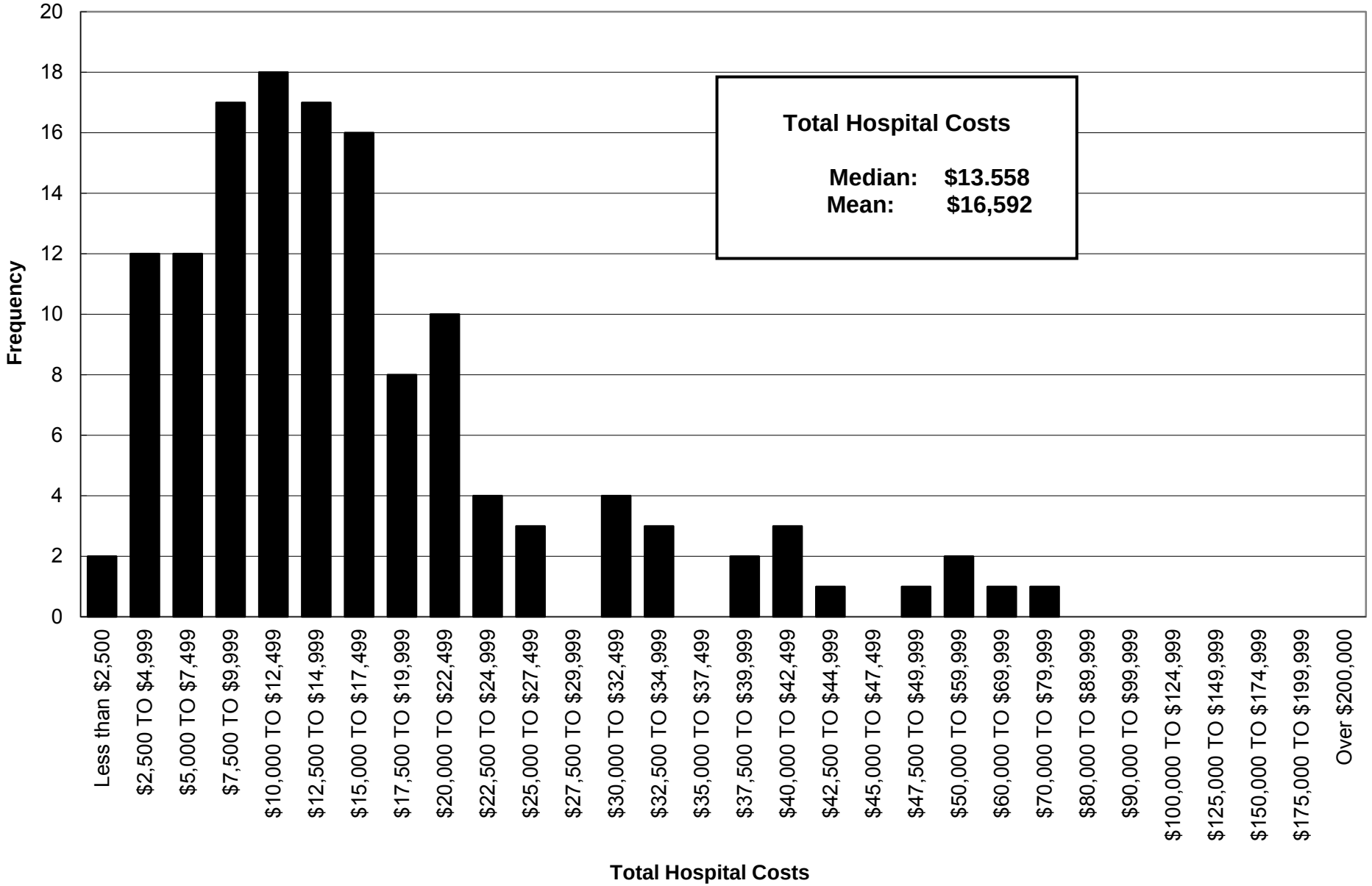


Figure 13.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009 Where Other Non-Targeted Cancers are Listed as the Primary Diagnosis

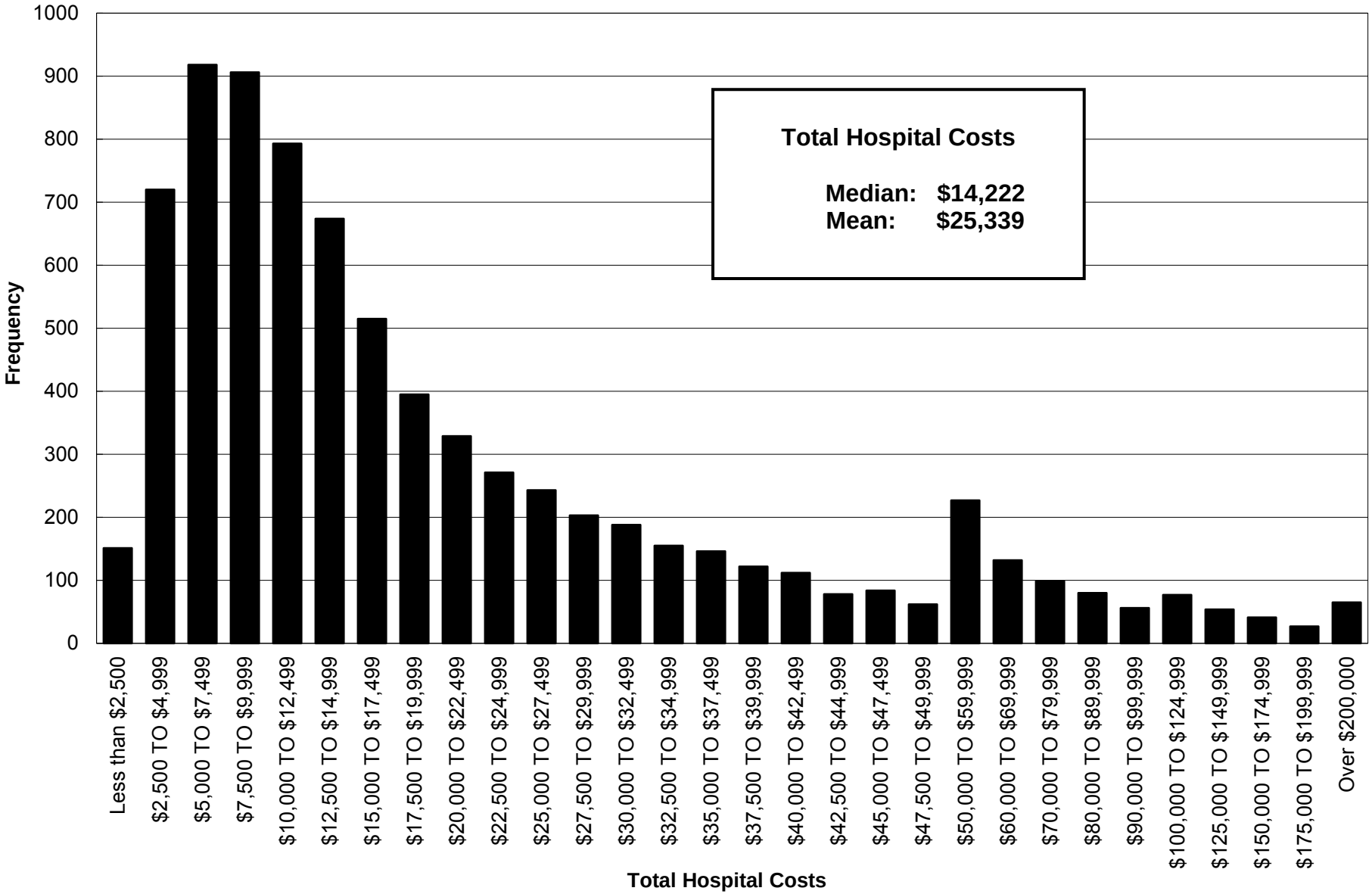


Figure 14.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009 Where Metastatic Cancer is Listed as the Primary Diagnosis

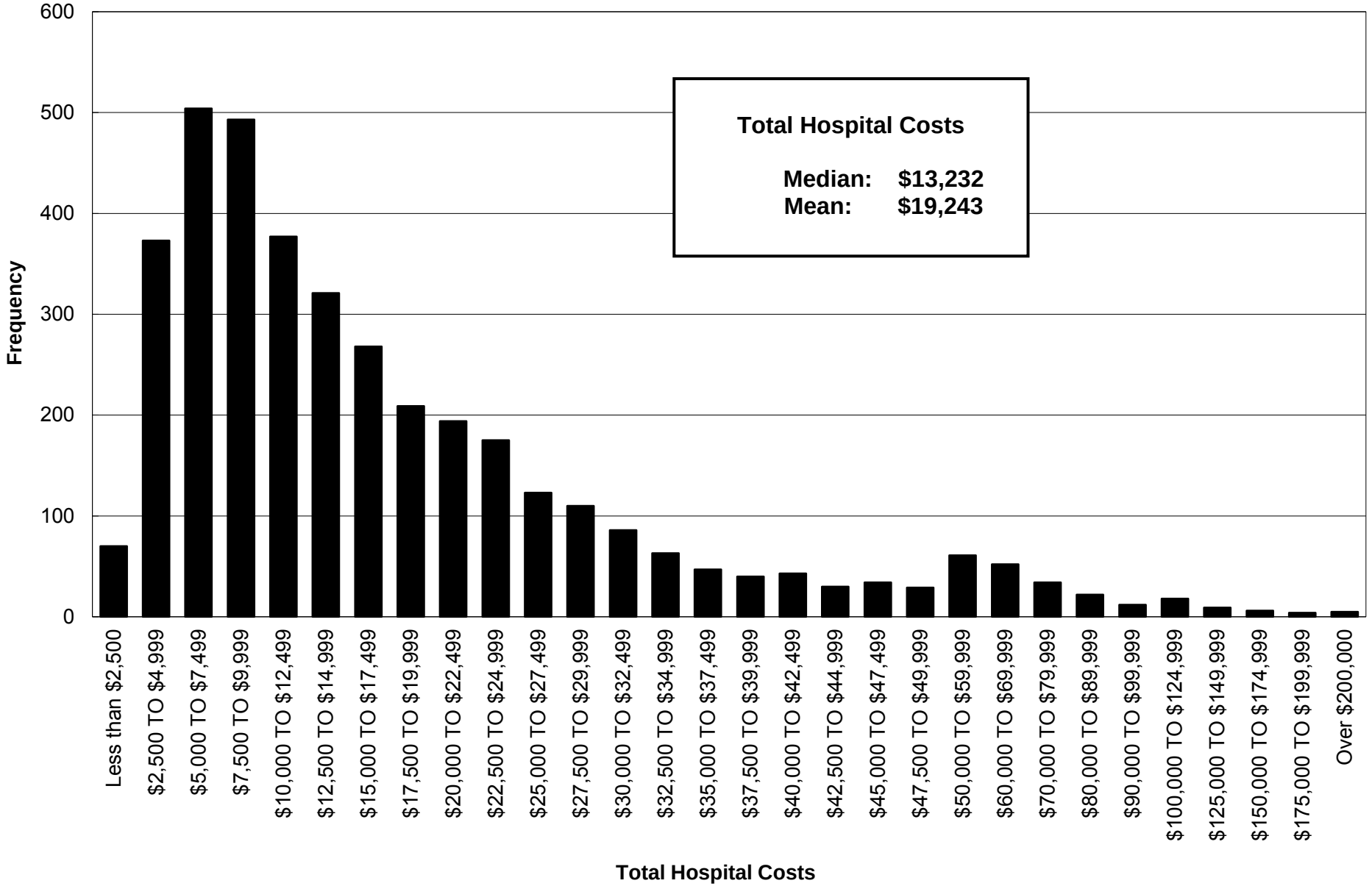


Figure 15.

Frequency of Hospital Discharges by Category of Total Hospital Costs for 2009
Where Any Type of Cancer is Listed as the Primary Diagnosis

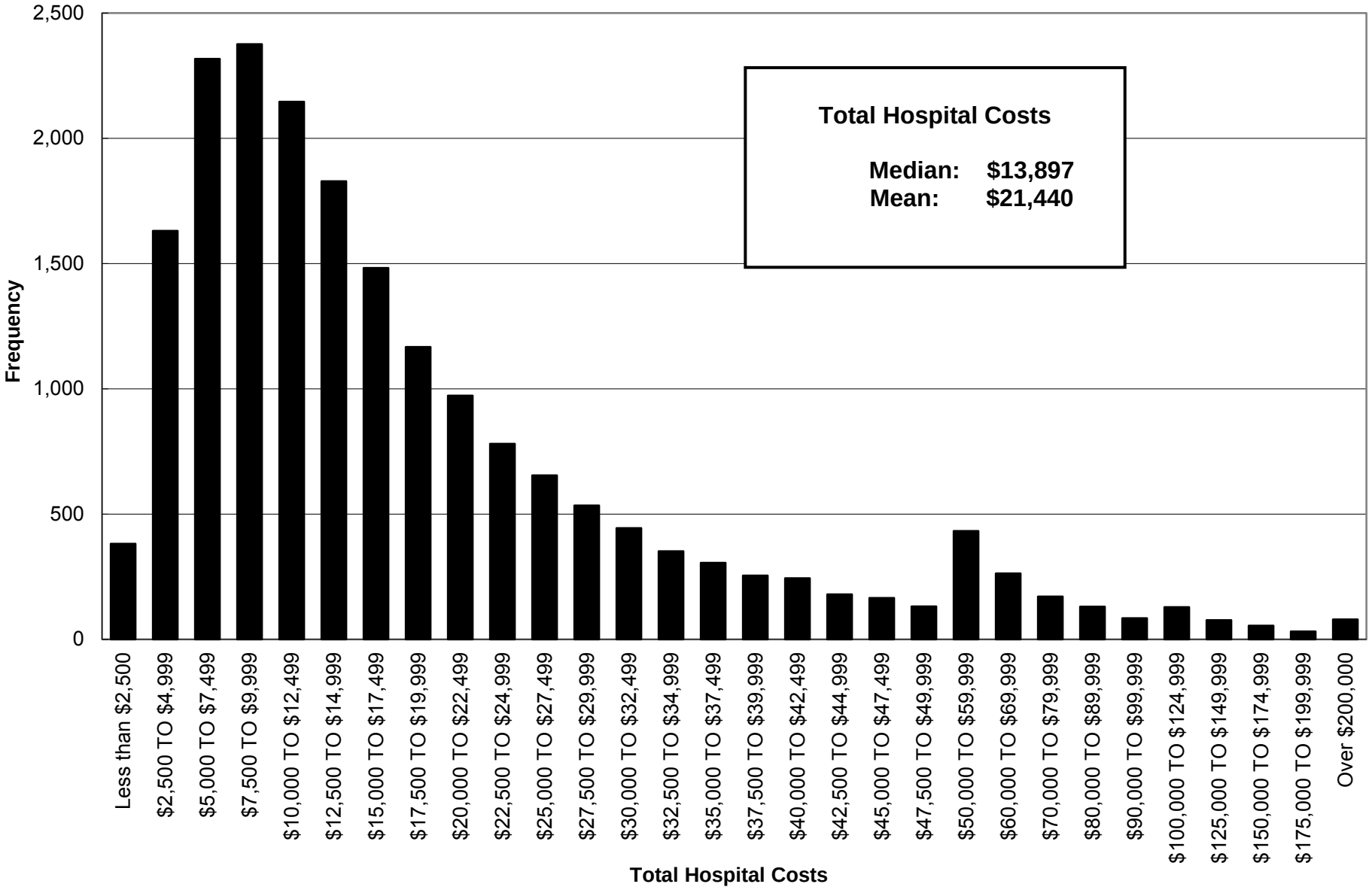


Table 3.

General Hospital Discharges in Maryland in 2009: Costs by Type of Cancer among Maryland Residents, Where Cancer is Listed as the Primary Diagnosis for All Ages

		Total Costs for Hospitalization				
Cancer	**Total Discharges***	**Mean**	**Median**	**Minimum**	**Maximum**	**Total**
Lung	2,587	$19,452	$15,200	$690	$395,226	$50,321,035
Colorectal	2,214	$24,016	$18,914	$791	$223,689	$53,170,461
Female Breast	1,546	$12,966	$10,320	$685	$153,818	$20,046,178
Prostate	1,223	$11,961	$10,964	$828	$68,420	$14,627,759
Oral	298	$30,770	$17,908	$2,508	$340,363	$9,169,518
Melanoma	62	$13,615	$10,078	$869	$83,101	$844,143
Cervical	137	$16,592	$13,558	$1,162	$74,806	$2,273,134
Total of Targeted Cancers	8,067	$18,650	$13,908	$685	$395,226	$150,452,228
Total Other Cancers	11,727	$23,359	$13,888	$498	$751,999	$273,927,309
Total of All Cancers	19,794	$21,440	$13,897	$498	$751,999	$424,379,536

*Discharges where the total costs was zero dollars were removed from this analysis.

Table 4.

General Hospital Discharges in Maryland in 2009: Costs by Type of Cancer among Maryland Residents, Where Cancer is Listed as the Primary Diagnosis for Ages 49 Years and Under

		Total Costs for Hospitalization				
Cancer	**Total Discharges***	**Mean**	**Median**	**Minimum**	**Maximum**	**Total**
Lung	159	$20,361	$16,104	$1,021	$193,918	$3,237,469
Colorectal	243	$22,068	$17,722	$1,198	$115,421	$5,362,462
Female Breast	425	$15,321	$13,908	$1,358	$53,963	$6,511,465
Prostate	81	$12,200	$10,466	$5,494	$66,494	$988,198
Oral	59	$26,066	$13,819	$2,508	$167,409	$1,537,900
Melanoma	13	$15,887	$10,093	$869	$83,101	$206,525
Cervical	74	$17,141	$14,022	$1,162	$68,145	$1,268,458
Total of Targeted Cancers	1,054	$18,133	$14,477	$869	$193,918	$19,112,477
Total Other Cancers	2,077	$29,724	$14,769	$1,079	$751,999	$61,735,979
Total of All Cancers	3,131	$25,822	$14,649	$869	$751,999	$80,848,456

*Discharges where the total costs was zero dollars were removed from this analysis.

Table 5.

General Hospital Discharges in Maryland in 2009: Costs by Type of Cancer among Maryland Residents, Where Cancer is Listed as the Primary Diagnosis for Ages 50 to 64 Years

		Total Costs for Hospitalization				
Cancer	**Total Discharges***	**Mean**	**Median**	**Minimum**	**Maximum**	**Total**
Lung	817	$20,850	$15,627	$690	$395,226	$17,034,624
Colorectal	689	$23,496	$18,212	$1,227	$217,416	$16,188,779
Female Breast	598	$14,031	$11,346	$685	$153,818	$8,390,633
Prostate	750	$12,034	$11,219	$1,331	$68,420	$9,025,628
Oral	102	$35,010	$20,319	$3,285	$340,363	$3,571,008
Melanoma	17	$15,830	$10,472	$4,878	$39,050	$269,118
Cervical	42	$16,460	$12,040	$1,551	$74,806	$691,339
Total of Targeted Cancers	3,015	$18,299	$13,416	$685	$395,226	$55,171,128
Total Other Cancers	4,107	$23,956	$14,067	$830	$717,140	$98,388,888
Total of All Cancers	7,122	$21,561	$13,665	$685	$717,140	$153,560,016

*Discharges where the total costs was zero dollars were removed from this analysis.

Table 6.

General Hospital Discharges in Maryland in 2009:
Costs by Type of Cancer among Maryland Residents,
Where Cancer is Listed as the Primary Diagnosis for Ages 65 Years and Over

		Total Costs for Hospitalization				
Cancer	**Total Discharges***	**Mean**	**Median**	**Minimum**	**Maximum**	**Total**
Lung	1,611	$18,652	$14,724	$717	$165,731	$30,048,943
Colorectal	1,282	$24,664	$19,456	$791	$223,689	$31,619,219
Female Breast	523	$9,836	$7,786	$1,075	$54,235	$5,144,080
Prostate	392	$11,770	$10,542	$828	$57,618	$4,613,933
Oral	137	$29,639	$18,319	$3,737	$229,345	$4,060,610
Melanoma	32	$11,516	$9,439	$2,698	$41,418	$368,501
Cervical	21	$14,921	$11,245	$3,015	$41,845	$313,337
Total of Targeted Cancers	3,998	$19,052	$14,280	$717	$229,345	$76,168,623
Total Other Cancers	5,543	$20,531	$13,446	$498	$445,026	$113,802,442
Total of All Cancers	9,541	$19,911	$13,793	$498	$445,026	$189,971,064

*Discharges where the total costs was zero dollars were removed from this analysis.

Attachment 1: International Classification of Diseases, Version 10 (ICD-10) Diagnostic Codes Used to Define "Targeted Cancers" in the Preparation of this Report

Targeted Cancer	ICD-10 Codes Included
Breast (female)	174.00 - 174.99
Cervix, Invasive	180.00 - 180.99
Colon and Rectum	153.00 - 154.19, 159.0
Lung and Bronchus	162.20 - 162.99
Melanoma	172.00 - 172.99
Oral	140.00 - 149.99
Prostate	185.00 - 185.99
All Other (Primary)	150.00 - 152.99, 154.20 - 154.89, 154.90 - 162.19, 163.00 - 171.99, 173.00 - 173.99, 175.00 - 179.99, 181.00 - 184.99, 186.00 - 195.99, 199.00 - 208.99
Metastatic (Secondary)	196.00 - 198.99
Total	140.00 - 208.99

Attachment 2: Definitions and Notes

"Any cancer" - Having an International Classification of Disease (ICD-9) code denoting cancer in the hospital discharge dataset. ICD-9 codes that denote primary or secondary cancer are found in Attachment 1.

"Diagnostic position" or "Diagnosis category" - Upon discharge from a hospital, the hospital codes each individual discharge by up to 15 diagnostic ICD-9 codes that reflect the patient's diagnoses. The coding instructions to the hospital state that the *primary diagnosis* is the "condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital."

When an ICD-9 code appears in a "secondary," "tertiary," or subsequent diagnostic category, it is less certain whether the patient was admitted *because of* that diagnosis or whether this is another diagnosis the patient has that is *unrelated to* this hospitalization. For example, a patient admitted for a heart attack will have "myocardial infarction" coded as the primary diagnosis. If the patient *also* has colorectal (CRC) cancer, colorectal cancer may be coded in one of the subsequent diagnostic categories. Having a cancer diagnosis in a secondary, tertiary, or subsequent diagnostic category may or may not indicate that the hospitalization was *due to* the cancer.

When data are analyzed using "cancer as primary diagnosis," the hospitalization is highly likely to be due to that cancer. If "cancer in any diagnostic category" is used for analysis or tally, it *overestimates* the number of hospitalizations due to cancer by attributing the reason for the hospitalization to cancer when, in fact, there were other diagnoses more likely to have caused the hospitalization.

When only "cancer as primary diagnosis" is used for analysis, however, it *underestimates* the total number of hospitalizations due to that cancer. For example, hospitalizations were analyzed in which CRC is the *second* diagnosis (and therefore not included in hospitalizations in which CRC is the primary diagnosis), to see what the primary diagnosis was. Many of the diagnoses were related to CRC, such as "liver metastases" "colostomy closure," "volume depletion," etc.

"Cancer as primary diagnosis" was used in most of the tables and figures based upon the certainty that those represented a hospitalization *due to* that cancer. By using "cancer as primary diagnosis", the data is an *underestimate* of the total number of hospitalizations due to that cancer. Ideally, it would have been better to include the cancer-related causes of hospitalization but the exact number of these is difficult or impossible to determine.

"General hospital"- Any of Maryland's 66 general hospitals. These exclude specialty hospitals such as chronic care, rehabilitation, psychiatric, Veterans, or orthopedic hospitals.

"Hospital discharge" versus "Patient discharge" - In one year of HSCRC hospital discharge data, each hospital discharge is listed as a separate record. The analyses contained in this document looked at *hospital discharges*. Some patients may have been hospitalized more than once during the period and are thus counted more than once in the analysis. Because the HSCRC database does not have identifiers, it is not possible to determine whether a patient had one or multiple hospital discharges within that year and data analysis based on the number of *patients* discharged from Maryland hospitals in that period could not be performed.

"ICD-9" codes - Codes from the International Classification of Disease 9th Revision, Clinical Modification 2001 code book (AMA Press, July, 2000).

"Jurisdiction of residence" - The Maryland location where the hospitalized patient was noted to reside when admitted to the hospital. These include Maryland's 23 counties and Baltimore City.

"Non-targeted cancers" or "All other cancers" - All other cancers found in the list in Attachment 1, other than the targeted cancers. Secondary cancers are included.

Number of hospital discharges—confidentiality considerations - Because of confidentiality restrictions on the use of the non-confidential dataset, all cells in the tables with a number less than 6 (i.e., 0-5) were suppressed and presented as "<6." Complementary suppression of discharge counts in additional cell(s) is used, denoted by "s," to prevent back-calculation of numbers in those cells with primary suppression.

"Primary source of payment" and "Secondary source of payment" - The first and second sources of payment for the hospitalization, as declared by the patient at the time of admission. Because this is declared on admission, it may not accurately reflect who actually is billed for the hospitalization after discharge. For example, a patient may lose insurance coverage, or may have said "self-pay" but be found eligible for Medical Assistance and therefore not be billed for the hospitalization.

"Secondary cancer" - Having an ICD-9 code of 197.0—198.99 that denotes secondary cancer in various sites.

“Targeted cancer” - One of seven cancers selected as “targeted” under the Cigarette Restitution Fund program. These include lung, colorectal, female breast, prostate, cervical, oral, and melanoma. Their ICD-9 codes are found in Attachment 1.

“Total costs” - The total costs billed for the hospitalization, such as room, pharmacy, radiology, laboratory, operating room, and central supply costs, but excluding costs that are not part of the hospital bill (e.g., physician, internist, oncologist, or surgeon).