

Relationship between Cancer Incidence, Mortality Rates and Funding

by

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INTRODUCTION

Cancer is a leading cause of death worldwide and it is the second leading cause of death in Americans, second only to the heart disease, according to Centers for Disease control and prevention. A total of 1,638,910 cancer cases (848,170 men and 790,740 women) and 577,190 deaths from cancer occurred in United States in 2012. The total number of cancer deaths in 2008 in United States was 565,496, which indicates that cancer deaths have increased from 2008 to 2012. It is estimated that 1 in 4 deaths in United States is due to cancer (Siegel, Naishadham, & Jemel, 2012).

Cancers of prostate, lung and bronchus and colorectal in men and cancers of breast, lung and bronchus, and colorectal in women continue to be the most common causes of cancer death. These four cancers are known to account for more than half of the total cancer deaths in men and women. According to data from Surveillance Epidemiology and End Results (SEER) and 13 cancer registries, the incidence rate of cancer during the most recent five years (2004-2009) declined slightly in men (0.6% per year) and remained stable in the women while mortality rates decreased by 1.8% per year in men and 1.6% per year in women (Surveillance Epidemiology and End Results). The incidence rates decreased for all four major cancer types, but for female breast cancer from 2005-2008 it remained relatively stable. Cancer data from 1999-2008 indicated that mortality rates have declined by more than 1% in men and women with the exception of American Indians/Alaska natives, among whom rates have remained stable (Surveillance Epidemiology and End Results).

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Numerous clinical trials are conducted to find treatments to help decrease mortality rates. Cancer clinical trials focus upon the evaluation of biomedical outcomes such as duration of survival, retardation of disease process and control of major physical symptoms.

BACKGROUND

Ten most common cancer types in the United States with their incidence rates, mortality rates, clinical trials and funding statistics are summarized below.

Prostate cancer: Prostate cancer is the most common cancer in men in US. The incidence rate of prostate cancer in 2005-2009 according to SEER statistics is 154.8 per 100,000 men per year (Surveillance Epidemiology and End Results). According to National Cancer Institute (NCI), about 241,740 cases of prostate cancer were diagnosed in United States in 2012 (National Cancer Institute). This cancer ranks first position in incidence rate among ten most common cancer types in United States.

Prostate cancer is the second leading cause of cancer death in American men, behind only lung cancer. According to NCI the estimated death cases of prostate cancer in this year is 28,170 (National Cancer Institute). About 1 man in 6 will be diagnosed with this cancer during his life time (National Cancer Institute, 2013). It ranks fourth position in mortality rate next to lung and bronchus, colorectal and breast cancer.

There are numerous clinical trials conducted in prostate cancer all over the world. Including all phases of clinical development, 763 clinical trials are conducted at NCI (National Cancer Institute). It ranks fourth position in clinical trials among top ten cancers in USA behind the colorectal cancer, lung and bronchus cancer and breast cancer. NCI funds prostate cancer at \$288,326,756 (NIH, 2011). It ranks third position in receiving funds from NIH behind the breast cancer and lung and bronchus cancer. The estimated research funding that each prostate cancer case received from NIH in year 2011 was \$1196 (NIH, 2011).

Breast cancer: Breast cancer is the most common cancer among American women, other than skin cancers. About 1 in 8 women in the US will develop invasive breast cancer during their life time (Breast Cancer, 2013). The incidence rate of breast cancer in 2005-2009 according to SEER statistics is 124.3 per 100,000 women (Surveillance Epidemiology and End Results). According to NCI, about 229,060 cases of breast cancer were diagnosed in United States in 2012 which was the highest diagnosed cancer in women (National Cancer Institute). This cancer ranks second position in incidence rate among ten most common cancer types in United States in 2012.

According to NCI, the estimated deaths due to breast cancer in 2012 were 39,920 (National Cancer Institute). It ranks third position in mortality rate behind the lung and bronchus cancer and colorectal cancer. As its incidence and mortality rates are high many clinical trials are conducted. The main aim of conducting breast cancer clinical trials is to identify new and improved methods of treating the cancer. They are conducted based on type, phase, status and age. Depending upon the phase of breast cancer, 899 clinical trials are conducted in NCI (National Cancer Institute). It ranks third position in clinical trials among ten most common cancer types in United States behind the colorectal and lung and bronchus cancer.

NCI funded breast cancer research at \$625,059,909 in 2011 (NIH, 2011). It ranked first position in receiving highest funding among all cancer types in United States. The estimated research fund that each breast cancer case received from NIH in year 2011 was \$2687 (NIH, 2011).

Lung and Bronchus cancer: The incidence of diagnosis with this cancer is equal in men and women in United States. The incidence rate for lung and bronchus cancer in 2005-2009

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according to SEER statistics is 62.6 per 100,000 individuals per year (Surveillance Epidemiology and End Results). According to NCI, it was estimated that about 226,160 cases were diagnosed with lung and bronchus cancer in 2011 (“Lung and Bronchus”, 2012).

The highest cancer mortality rate in United States is due to lung and bronchus cancer. It is by far the leading cause of cancer death among both men and women. Each year more people die of lung cancer than of colon, breast and prostate cancers combined (National Cancer Institute, 2013). According to NCI, the estimated deaths due to lung and bronchus cancer in 2012 were 160,340 (National Cancer Institute). Because of its high mortality rate, large clinical trials are conducted in this cancer.

NCI conducted 1,133 trials in lung cancer including both non small cell and small cell lung cancer (National Cancer Institute). Lung cancer ranks second position in clinical trials among ten most common cancer types in US behind colorectal cancer in 2012. NCI provides funding for lung and bronchus at \$296,814,144 (NIH, 2011). It ranks second position in receiving funds among all cancer types in United States. The estimated research fund that each lung and bronchus cancer case received from NIH in year 2011 is \$1342 (NIH, 2011).

Colorectal cancer: Colorectal cancer is the third most commonly diagnosed cancer and third leading cause of cancer death in both men and women in US. The incidence rate of colorectal cancer in 2005-2009 according to SEER statistics is 46.3 per 100,000 men and women per year (Surveillance Epidemiology and End Results). According to NCI it was estimated that about 143,460 cases were diagnosed with colorectal cancer in 2012 (National Cancer Institute)

Colorectal cancer has higher mortality rate so a great deal of research is conducted. According to NCI the estimated death cases of colorectal cancer in the year 2012 is 51,690

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(National Cancer Institute). It ranks second position in mortality rate behind lung and bronchus cancer. Life time risk of developing colorectal cancer is about 1 in 20 (5.1%). The risk of this cancer is slightly lower in women than in men. It is the third leading cause of cancer related deaths in United States when both men and women are considered separately, and the second leading cause when both sexes are combined. It is expected that this cancer causes 50,830 deaths in 2013 (Colorectal Cancer, 2013).

NCI conducted 877 trials in colon cancer and 898 trials in rectal cancer depending on phase of trial (National Cancer Institute). It ranks first position in clinical trials among ten most common cancer types in US. NCI funded prostate cancer at \$265,125,350 (NIH, 2011). It ranks fourth position in receiving funds from NIH next to the breast cancer, lung and bronchus cancer and prostate cancer (NCI, 2011). The estimated research fund that each colorectal cancer case received from NIH in year 2011 is \$1877 (NIH, 2011).

Melanoma: Melanoma is the fastest growing cancer in United States and worldwide. It accounts for less than 5% of skin cancer cases but causes a large majority of skin cancer deaths. Life time risk of getting this cancer is about 2% (1 in 50) for whites, 0.1% (1 in 1000) for blacks, and 0.5% (1 in 200) for Hispanics (National Cancer Institute, 2013). The incidence rate of melanoma cancer in 2005-2009 according to SEER statistics is 21.0 per 100,000 men and women per year (Surveillance Epidemiology and End Results). SEER statistics states that the incident rate of melanoma cancer is high in males when compared to females. According to NCI, it was estimated that 76,250 cases were diagnosed with melanoma cancer in 2012 (National Cancer Institute). This cancer ranks fifth position in incidence rate among ten most common types of cancers in US.

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According to NCI the estimated deaths due to melanoma in 2012 were 9,180 (National Cancer Institute). It ranks eighth position in mortality rate among ten most common cancer types in US. NCI conducted 375 trials in melanoma cancer depending on its phase (National Cancer Institute).

Melanoma ranks fifth position in NCI funding and it received \$115,640,464 for its research and clinical trial (NCI, 2010). The estimated research fund that each Melanoma case received from NIH in 2011 was \$1646 (NIH, 2011).

Bladder cancer: Bladder cancer is the sixth most commonly diagnosed cancer in US, fourth among men and eleventh among women. The incidence rate of bladder cancer in 2005-2009 according to SEER statistics was 20.8 per 100,000 men and women per year (Surveillance Epidemiology and End Results). According to NCI, it was estimated that 73,510 cases were diagnosed with bladder cancer in 2012 (National Cancer Institute). According to Bladder Cancer Advocacy Network (BCAN) there are over 520,000 bladder cancer survivors in US. This cancer ranks sixth position in incidence rate among top 10 cancers in United States.

According to NCI the estimated deaths due to bladder cancer in 2012 were 14,880 (National Cancer Institute). It ranks sixth position in mortality rate next to lung and bronchus, colorectal, breast cancer, prostate cancer and Non-Hodgkin's lymphoma. NCI conducted 252 clinical trials in bladder cancer depending on its phase (Surveillance Epidemiology and End Results). It ranks eighth position in NCI funding and it received \$20,552,576 for its research and clinical trials (NCI, 2010). The estimated research fund that each bladder cancer case received from NIH in 2011 was \$296 (NIH, 2011).

Non-Hodgkin's Lymphoma: Non-Hodgkin's Lymphoma is the seventh most common cancer in men and women in the USA. The incidence rate of Non-Hodgkin lymphoma cancer in 2005-2009 according to SEER statistics was 19.6 per 100,000 men and women per year (Surveillance Epidemiology and End Results). According to NCI, it was estimated that 70,130 cases were diagnosed with Non-Hodgkin lymphoma in 2012 (National Cancer Institute).

Non-Hodgkin's Lymphoma cancer is the second leading cause of cancer deaths in men in US after lung cancer. According to NCI the estimated deaths due to Non-hodgkins lymphoma cancer in 2012 were 18,940 (National Cancer Institute). It ranks fourth position in mortality rate behind lung and bronchus, colorectal and breast cancer.

NCI conducted 252 trials in Non-Hodgkin lymphoma in children and 1011 trials in Non-Hodgkin lymphoma in adults depending on its phase (National Cancer Institute). It ranks fifth position in NCI funding and received \$122.4 million for its research and clinical trials (NCI, 2010). The estimated research fund that each Non-Hodgkin's Lymphoma cancer case received from NIH in 2011 was \$1904 (NIH, 2011).

Kidney and Renal pelvis: Kidney and pelvis cancer is the eighth most common cancer in USA. According to SEER statistics the incidence rate of kidney and pelvis cancer in 2005-2009 was 15.1 per 100,000 men and women per year (Surveillance Epidemiology and End Results). According to NCI it was estimated that 64,770 cases were diagnosed with kidney and pelvis cancer in 2012 (National Cancer Institute). This cancer ranks eighth position in incidence rate among ten most common cancer types in United States.

According to NCI the estimated deaths due to this cancer in 2012 was 13,570 (National Cancer Institute). It ranks seventh position in mortality rate among ten most common cancer

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types in United States. NCI conducted 309 clinical trials in kidney and pelvis cancer depending on the cancer phase (National Cancer Institute). It ranks fourth position in NCI funding and receives about \$46,183,328 for its research and clinical trials (NCI, 2010). The estimated research fund that each kidney and pelvis cancer case received from NIH in 2011 was \$758 (NIH, 2011).

Thyroid cancer: Thyroid cancer is one most common cancer in USA and ranks ninth position among ten most common cancer types in US. The incidence rate of thyroid cancer according to SEER statistics in 2005-2009 was 11.6 per 100,000 men and women per year (Surveillance Epidemiology and End Results). According to NCI it was estimated that 56,460 cases were diagnosed with thyroid cancer in 2012 (National Cancer Institute).

According to NCI the estimated deaths due to thyroid cancer in 2012 was 1,780 (National Cancer Institute). This cancer ranks tenth position in mortality rate among ten most common cancer types in US. NCI conducted 130 trials in thyroid cancer depending on the cancer phase (National Cancer Institute) it ranks ninth position in clinical trials among ten most common cancer types in United States. This cancer is in ninth position in NCI funding and received \$ 16,207,259 for its research and clinical trials (NCI, 2010). The estimated research fund that each thyroid cancer case received from NIH in 2011 was \$337 (NIH, 2011).

Endometrial cancer: Endometrial cancer is the most frequently occurring gynecological cancer ranking fourth position among all female cancers (Cramer, 2012) and ranks last position among top 10 cancers in United States. The incidence rate of endometrial cancer in 2005-2009 according to SEER statistics is 24.1 per 100,000 women per year (Surveillance

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Epidemiology and End Results). According to NCI it is estimated that 47,130 cases were diagnosed with endometrial cancer in the year 2012 (National Cancer Institute).

According to NCI the estimated deaths due to endometrial cancer in 2012 was 8,010 (National Cancer Institute). It ranks ninth position in mortality rate among ten most common cancer types in United States. This cancer ranks ninth position in mortality rate among ten most common cancer types in US. NCI conducted 180 trials in endometrial cancer depending on its phase (National Cancer Institute). It ranks ninth position in clinical trials among ten most common cancer types in United States. NCI spends least amount of funds of about \$15,869,815 (2010) for its research and clinical trials. The estimated research fund that each endometrial cancer case received from NIH in year 2011 is \$341 (NIH, 2011).

RESEARCH QUESTION

Are some cancer types funded out of proportion to their incidence in the US population? If so, why might this be?

METHODOLOGY

To answer this question:

- The ten most prevalent cancers in the United States were chosen. Statistics of estimated new cases, death cases, incidence rate, mortality rate, number of clinical trials ongoing and amount of funds they receive from NIH, in the year 2012 were collected.
- Incidence cases and deaths due to these cancers were collected from statistics of NCI and SEER.
- Incidence rate and mortality rate of these cancers were calculated using formulae from SEER.
- The number of clinical trials conducted on these cancers was determined using the NCI website.
- The amount of funds received by each case of cancer type for its clinical trials and research were found from the incidence case numbers and NIH funds for cancers.
- Funding that these cancers receive from NIH was compared to the available clinical trials.
- Public awareness about these cancers with respect to their clinical trials, new treatments and therapies were estimated by collecting the number of mentions of each cancer type in 2012, from New York Times, Washington Post and Chicago Tribune, applying limits of restricted to articles, blogs and multimedia to each newspaper website.
- Other major public awareness was measured by examining broadcast media, mentions on CNN News for each cancer was determined for the last four years (2009-2012).

RESULTS

Tables (1-7) and Figures (1-9) provide statistical information about the ten most common cancer types in United States.

Table 1. Estimated Cancer Incidence Cases and Deaths in 2012 .

SNO	Type of Cancer	Estimated Cases	Estimated Deaths
1	Prostate Cancer	241,740	28,170
2	Breast Cancer	229,060	39,920
3	Lung and Bronchus Cancer	226,160	160,340
4	Colorectal Cancer	143,460	51,690
5	Melanoma	76,250	9,180
6	Bladder Cancer	73,510	14,880
7	Non-Hodgkin's Lymphoma	70,130	18,940
8	Kidney and Pelvis Cancer	64,770	13,570
9	Thyroid Cancer	56,460	1,780
10	Endometrial Cancer	47,130	8,010

The above data is collected from National Cancer Institute (National Cancer Institute) of the year 2012.

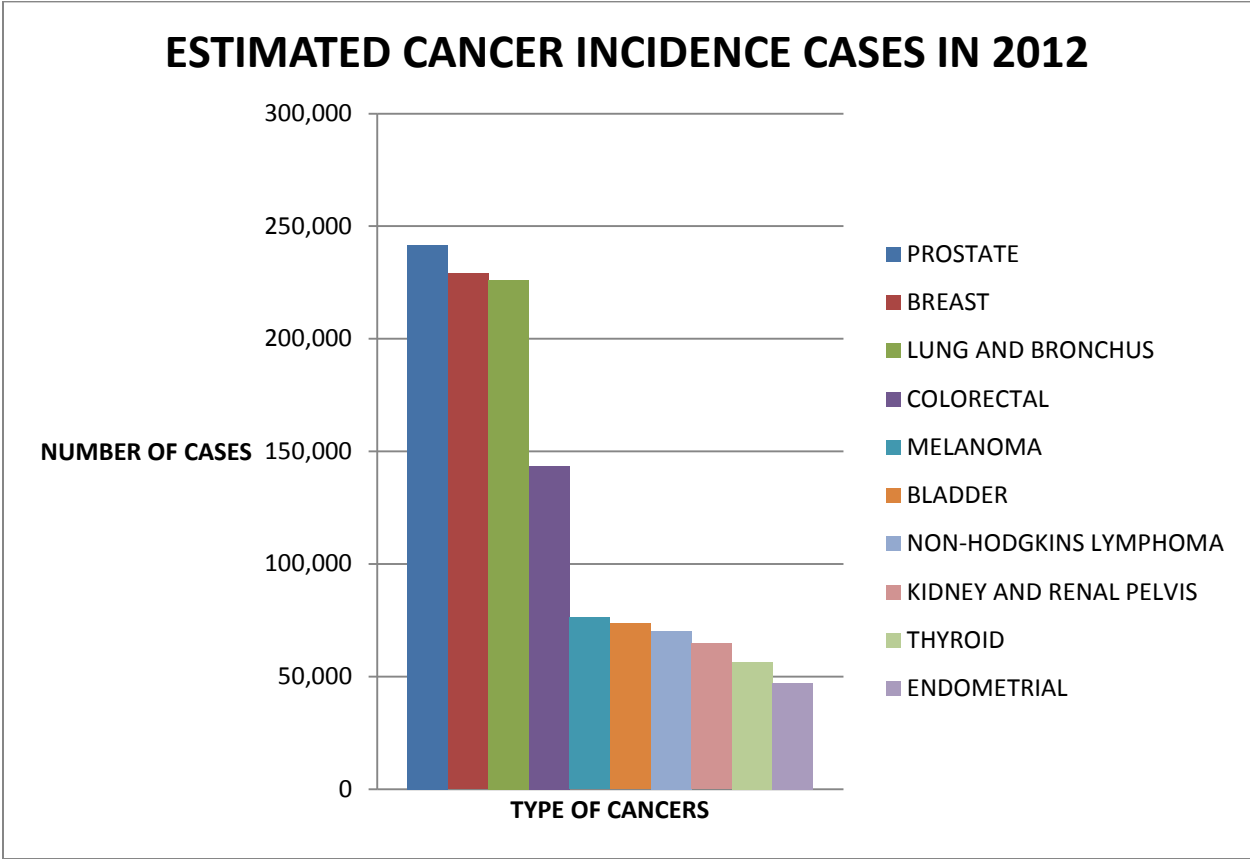


Figure 1. Estimated Cancer Incidence cases in 2012.

Figure 1 is the graphical representation of table 1.

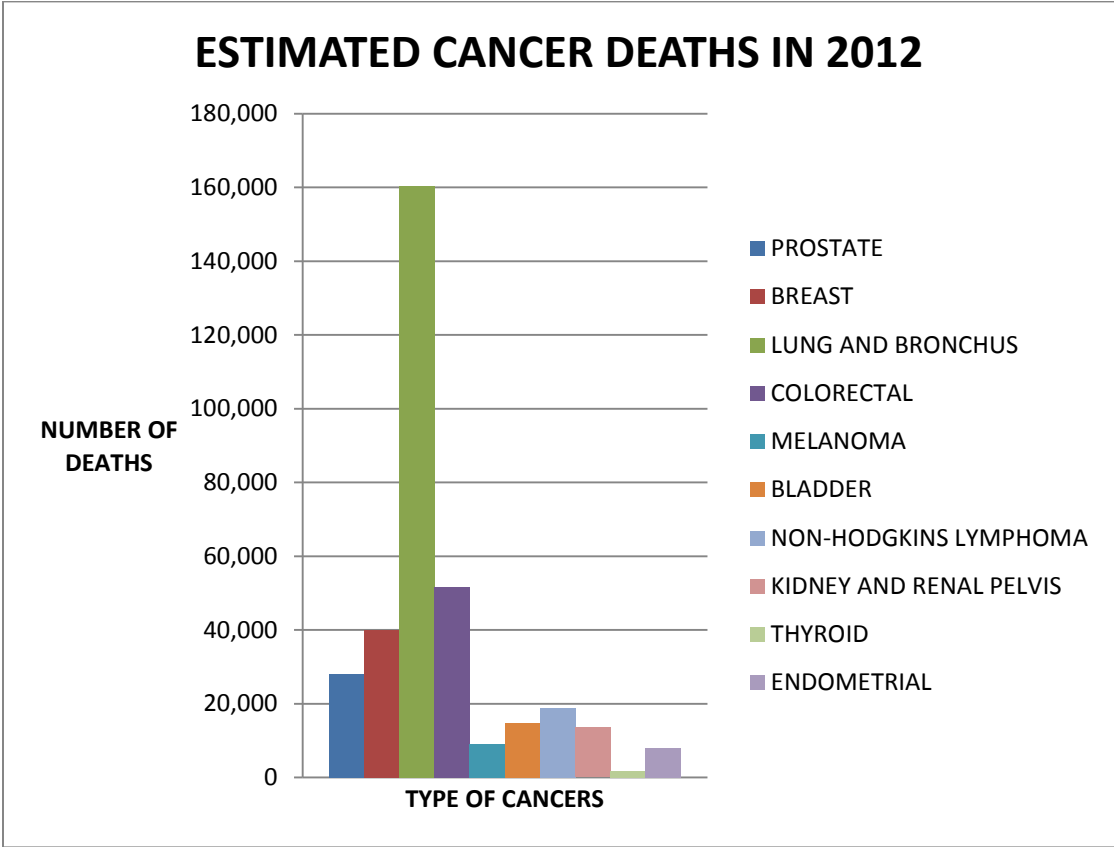


Figure 2. Estimated Cancer Deaths in 2012.

Figure 2 is the graphical representation of table 1.

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To narrow down the concept of incidence and death cases, the incidence rate and mortality rate of ten most common cancers in United States was calculated. According to National Cancer Institute (Cancer Incidence Rate), “cancer incidence rate is the number of new cancers of a specific site/type occurring in a specified population during a year, usually expressed as the number of cancers per 100,000 populations at risk”. This number can be judged appropriately by cancer incidence rate:

$$\text{Incidence rate} = (\text{New cancers} / \text{Population}) \times 100000.$$

Here the numerator indicates the number of new cancer cases and the denominator indicates the size of the population. The population used depends on the rate to be calculated. For cancer sites that occur in only one sex, the sex specific population is used.

According to the NCI (Cancer Mortality Rate), “cancer mortality rate is the number of deaths with cancer as the underlying cause of death, occurring in specified population during a year. Cancer mortality is usually expressed as the number of deaths due to cancer per 100,000 populations at risk”. This number can be judged appropriately by cancer mortality rate:

$$\text{Mortality rate} = (\text{Cancers deaths} / \text{Population}) \times 100,000.$$

Here the numerator indicates the number of cancer deaths and the denominator indicates the size of the population. The population used depends on the rate to be calculated. For cancer sites that occur in only one sex, the sex specific population is used.

Thus by using the above formulae, incidence rates and mortality rates were calculated for these 10 cancers that are evident in Table 2.

Table 2. Cancer Incidence and Mortality Rates in 2012.

SNO	Type of cancer	Incidence Rate	Mortality Rate
1	Prostate Cancer	77	9
2	Breast Cancer	75	13
3	Lung and Bronchus Cancer	71	51
4	Colorectal Cancer	45	17
5	Melanoma	22	3
6	Bladder Cancer	22	5
7	Non-Hodgkin's Lymphoma	21	6
8	Kidney and Pelvis Cancer	19	4
9	Thyroid Cancer	15	1
10	Endometrial Cancer	15	3

The Table 2 illustrates the incidence rates and mortality rates of ten most common cancers in United States per 100,000 populations in 2012.

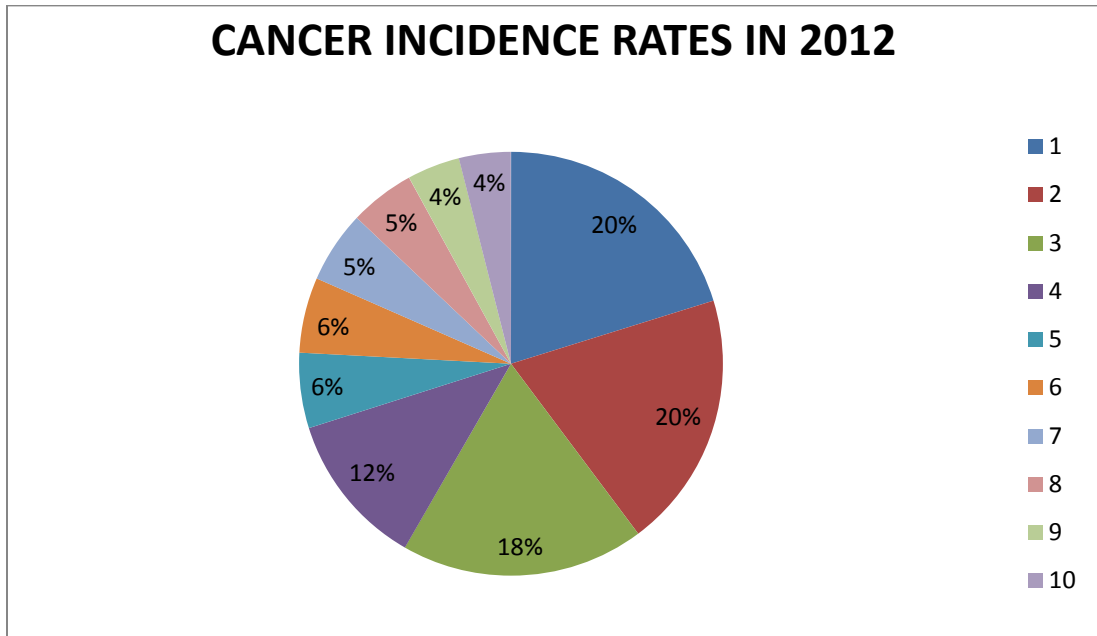


Figure 3. Cancer Incidence Rates in 2012. 1 Prostate Cancer, 2 Breast Cancer, 3 Lung and Bronchus Cancer, 4 Colorectal Cancer, 5 Melanoma, 6 Bladder Cancer, 7 Non-Hodgkins’s Lymphoma, 8 Kidney and Renal Pelvis Cancer, 9 Thyroid Cancer, 10 Endometrial Cancer.

Figure 3 is the graphical representation of Table 2.

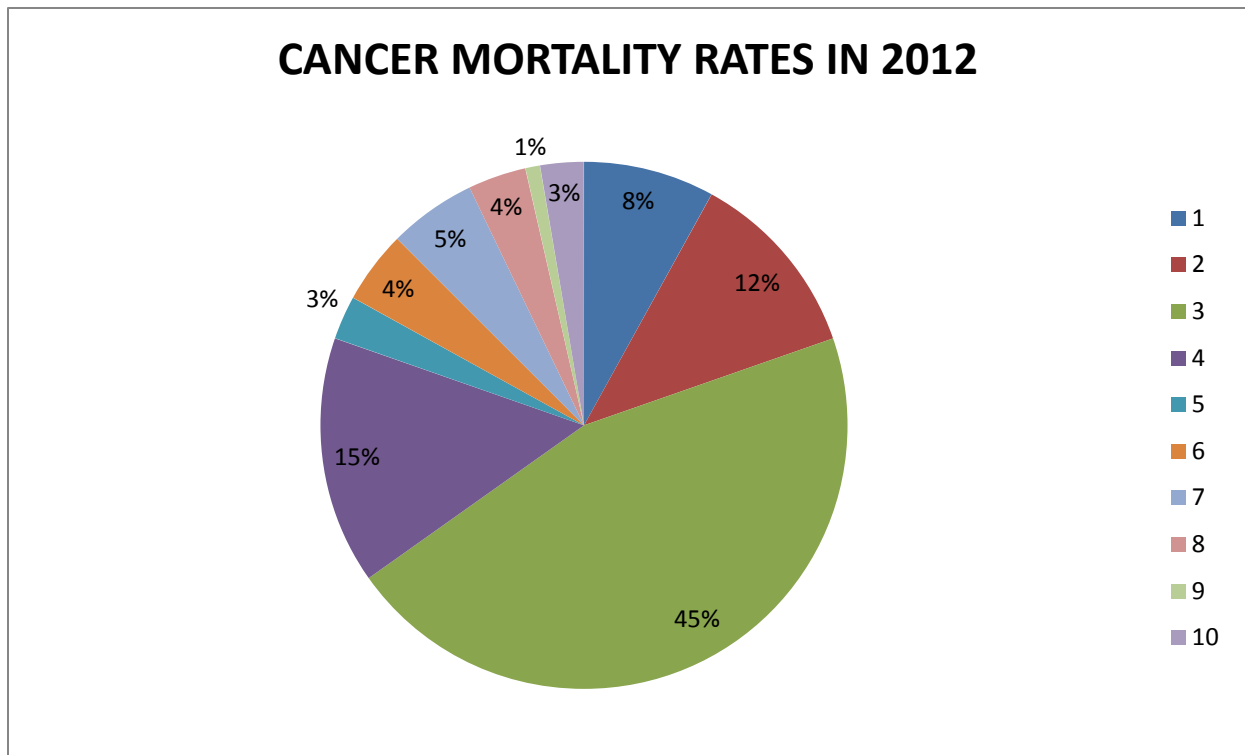


Figure 4. Cancer Mortality rates in 2012. 1 Prostate Cancer, 2 Breast Cancer, 3 Lung and Bronchus Cancer, 4 Colorectal Cancer, 5 Melanoma, 6 Bladder Cancer, 7 Non-Hodgkins's Lymphoma, 8 Kidney and Renal Pelvis Cancer, 9 Thyroid Cancer, 10 Endometrial Cancer.

Figure 4 is the graphical representation of Table 2.

Table 3. Cancer Clinical Trials Conducted in 2012.

SNO	Type of Cancer	Number of Clinical Trials
1	Prostate Cancer	763
2	Breast Cancer	899
3	Lung and Bronchus Cancer	1133
4	Colorectal Cancer	1775
5	Melanoma	375
6	Bladder Cancer	192
7	Non-Hodgkin's Lymphoma	252
8	Kidney and Pelvis Cancer	309
9	Thyroid Cancer	130
10	Endometrial Cancer	180

The above data were collected from National Cancer Institute (National Cancer Institute) and these data illustrate the Cancer Clinical Trials conducted in 2012.

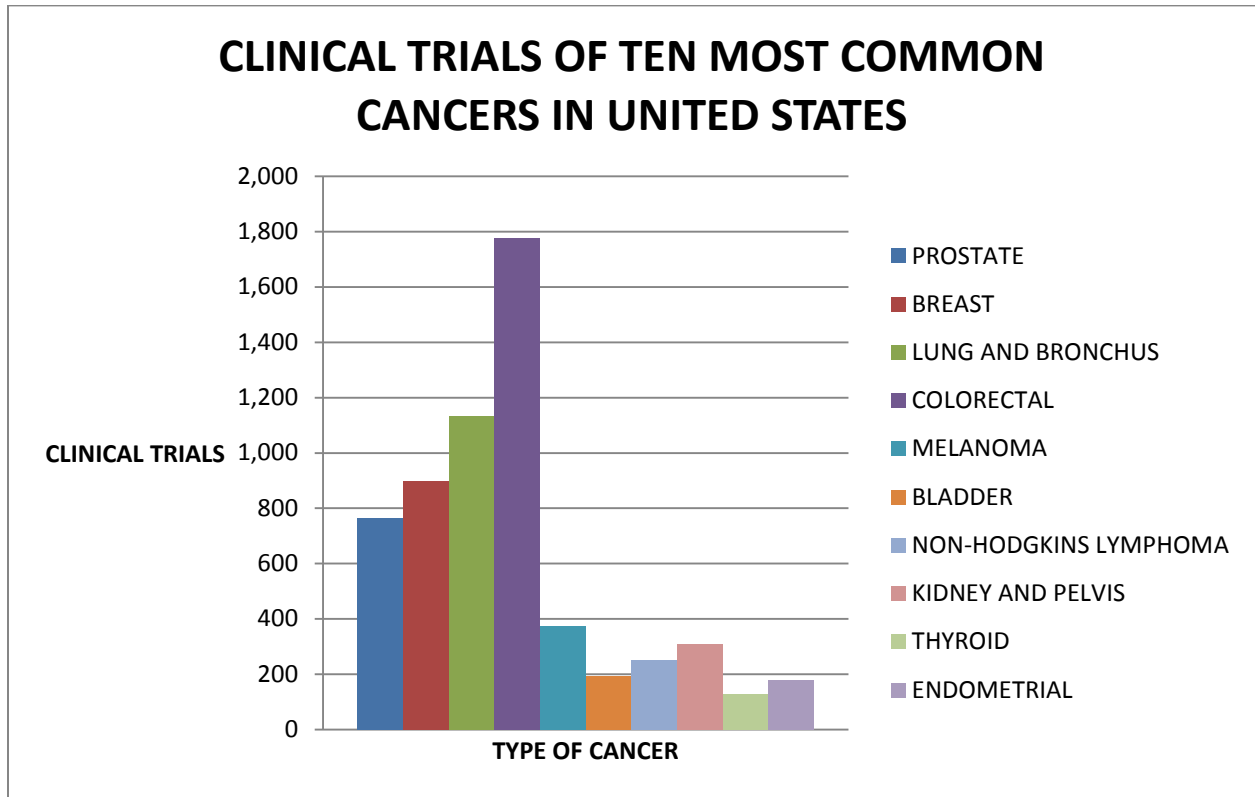


Figure 5. Clinical Trials of Ten most common cancers in United States.

Figure 5 is the graphical representation of Table 3.

Table 4. Funds these Cancers Received from NIH in 2012.

SNO	Type of Cancer	Funds in US \$
1	Prostate Cancer	\$288,326,756
2	Breast Cancer	\$625,059,909
3	Lung and Bronchus Cancer	\$296,814,144
4	Colorectal Cancer	\$265,125,350
5	Melanoma	\$115,640,464
6	Bladder Cancer	\$20,552,576
7	Non-Hodgkin's Lymphoma	\$126,375,523
8	Kidney and Pelvis Cancer	\$46,183,328
9	Thyroid Cancer	\$16,207,259
10	Endometrial Cancer	\$15,869,815

Data were collected from National Cancer Institute (National Cancer Institute) of the year 2012.

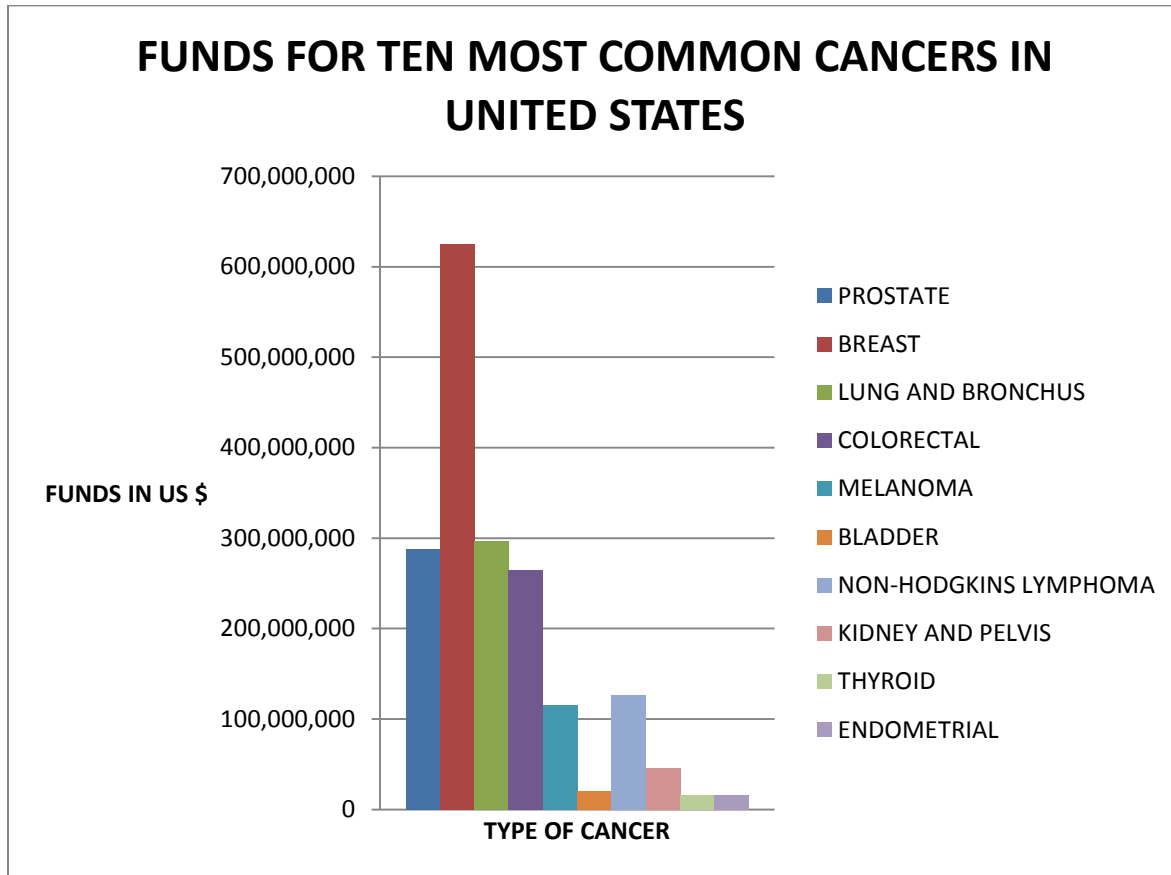


Figure 6. Funds for Ten Most Common Cancers in United States.

Figure 6 is the graphical representation of Table 4.

Table 5. NIH Fund Received Per Estimated Diagnosis in 2012.

SNO	Type of Cancer	NIH fund received per estimated diagnosis in \$ in 2012.
1	Prostate Cancer	1192
2	Breast Cancer	2728
3	Lung and Bronchus Cancer	1312
4	Colorectal Cancer	1848
5	Melanoma	1516
6	Bladder Cancer	279
7	Non-Hodgkin's Lymphoma	1802
8	Kidney and Pelvis Cancer	713
9	Thyroid Cancer	287
10	Endometrial Cancer	287

NIH fund received per estimated diagnosis in 2012 for each type of cancer was calculated from number of incident cases and amount of funds received from NIH in 2012 (National Cancer Institute).

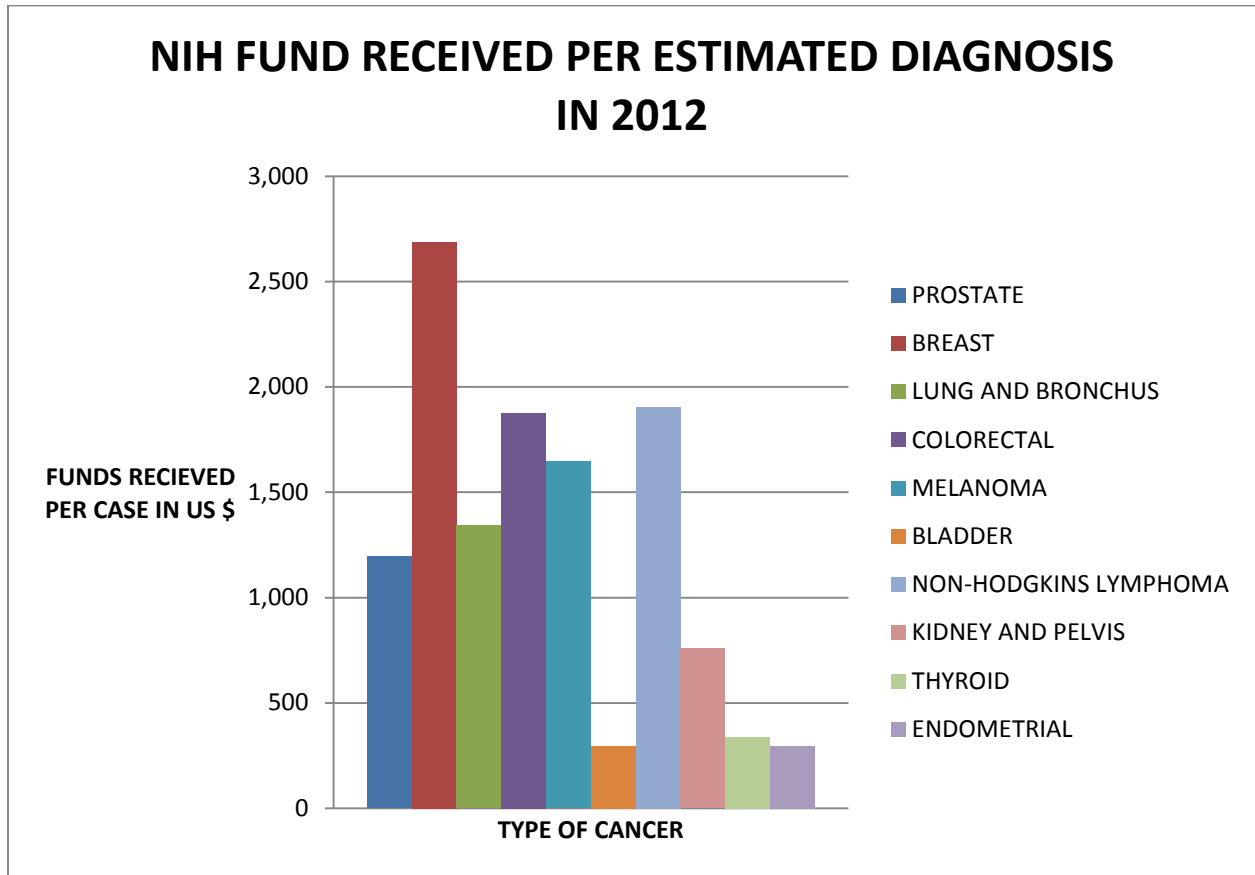


Figure 7. Funds Received Per Estimated Diagnosis.

Figure 7 is the graphical representation of Table 5.

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Table 6, Figure 8 and Table 7, Figure 9 illustrate the number of mentions of the ten most common cancers in United States on CNN News in the years (2009-2012) (CNN) and in selected Newspapers in 2012 (The New York Times) (The Washington Post) (Chicago Tribune) respectively.

Table 6. Number of Mentions on CNN News in the Years (2009-2012).

TYPE OF CANCER	2009	2010	2011	2012
Prostate Cancer	148	147	138	102
Breast Cancer	307	351	262	265
Lung and Bronchus Cancer	176	188	179	190
Colorectal Cancer	23	22	18	19
Melanoma	26	31	23	20
Bladder Cancer	25	33	42	18
Non-Hodgkin's Lymphoma	26	34	27	17
Kidney and Pelvis Cancer	13	11	28	20
Thyroid Cancer	18	40	69	27
Endometrial Cancer	09	09	09	06

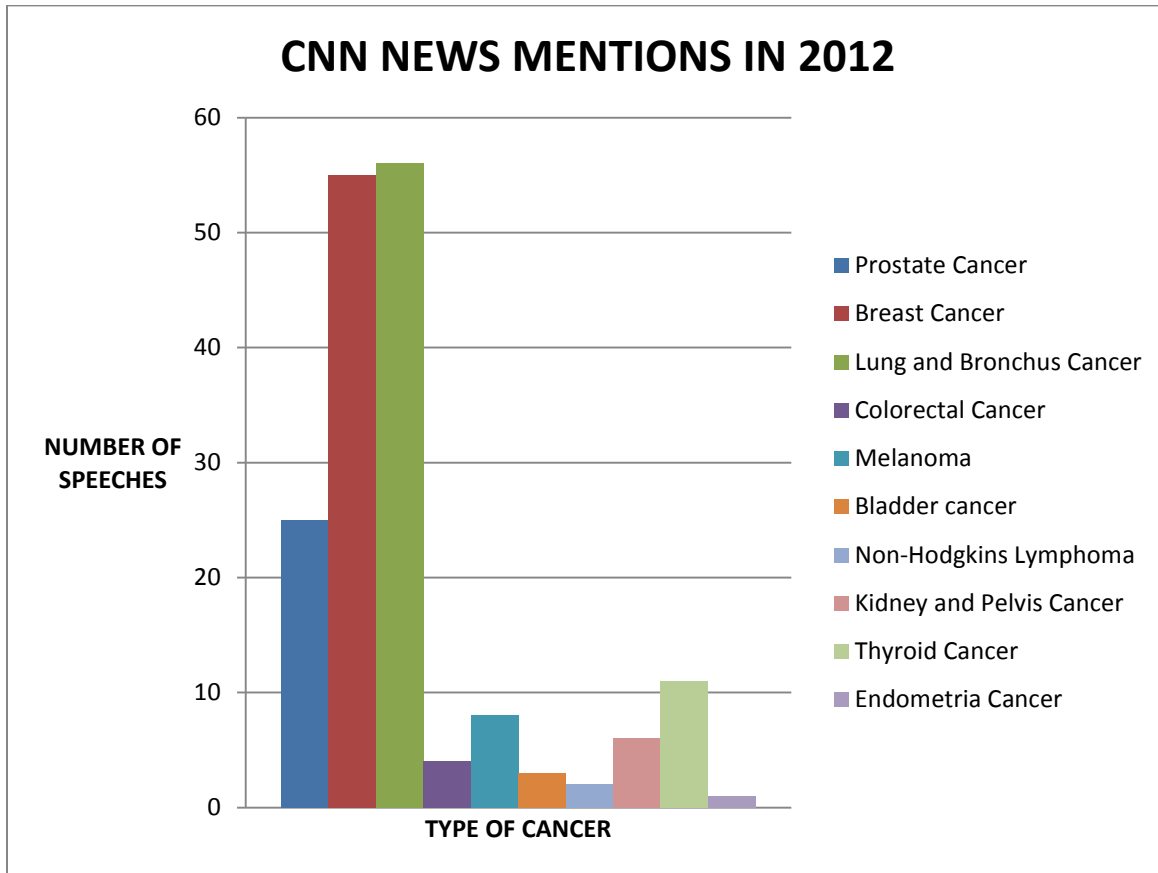


Figure 8. CNN News Mentions in 2012.

Figure 8 is the graphical representation of Table 6.

Table 7. Number of Mentions of Ten Most Common Cancers in United States in Selected Newspapers in 2012.

Type of Cancer	New York Times	Washington Post	Chicago Tribune
Prostate Cancer	869	195	115
Breast Cancer	985	755	315
Lung and Bronchus Cancer	332	197	187
Colorectal Cancer	52	24	15
Melanoma	130	38	55
Bladder Cancer	44	39	40
Non-Hodgkin's Lymphoma	23	66	1
Kidney and Pelvis Cancer	29	7	17
Thyroid Cancer	36	12	15
Endometrial Cancer	6	4	3

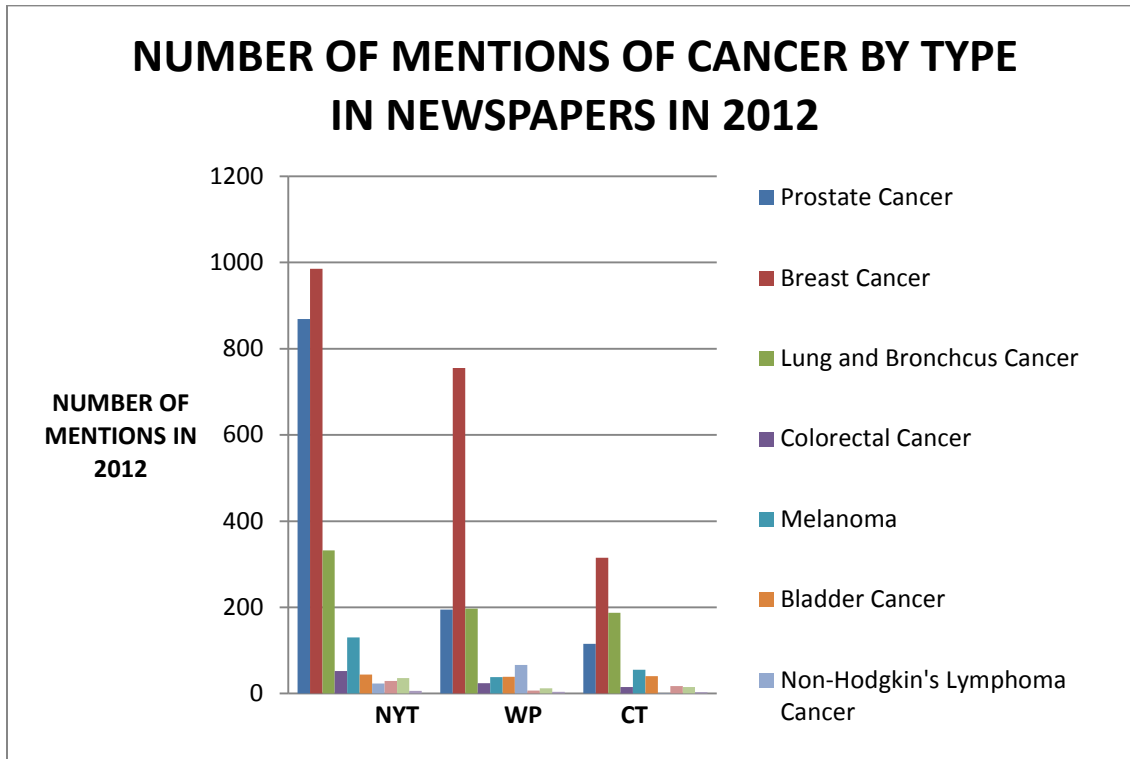


Figure 9. Number of Mentions of Cancer by Type in Newspapers in 2012.

DISCUSSION

This study concerns the ten most common cancers that are prevalent in the United States and compared their incidence, deaths, incidence rate, mortality rate, clinical trials and funding. These data were also compared to public awareness as measured by mentions in newspaper and broadcast media.

Authoritative research

This research work is based on the incidence and mortality data, clinical trial data, and funds these cancers receive for their clinical trial and research work. Results from Table 1 suggest that prostate cancer has the highest number of incidence cases in the United States in 2012. Prostate cancer, breast cancer, lung and bronchus cancer and colorectal cancer together consists of double the number of cases compared to the other six most common cancers. Results from Table 1 suggest that lung and bronchus cancer has the highest number of deaths. The overall deaths of the first four most common cancers are almost four times more to the total number of deaths of later six most common cancers in United States. Table 1 indicates that lung and bronchus cancer has more deaths. Figure 1 illustrates that the first four most common cancers have highest incidence cases than later six most common cancers in United States.

Table 2 represents that the incidence rate of first four most common cancer types is double the incidence rate of later six most common cancer types in United States. Thus prostate, breast, lung and bronchus and colorectal cancer account for more than half of the cancers incidence and mortality rates in United States.

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Table 3 represents the number of clinical trials conducted for ten most common cancers in United States. Results from the Table 3 suggest that colorectal cancer has the highest number of clinical trials despite of its low incidence rate and mortality rate. As the incidence rate of prostate cancer is high, it was expected to have greater number of clinical trials. But the number of clinical trials conducted is not high and mortality rate is also relatively lower than other most common cancers. Figure 5 demonstrates that first four most common cancer types have highest number of clinical trials conducted compared to six other most common cancer types in United States.

The NIH is the major organizations for funding cancer studies in the US. Table 4 shows NIH funding for the ten most common cancers. From this table, it is evident that breast cancer is highly funded. It is almost three times the funding of prostate, lung and bronchus, and colorectal cancers. Together, the sum of these 3 cancer funds equals the funds of breast cancer. Breast cancer has relatively high incidence rate but mortality rate is very low. The lower mortality rates are due to early detection, diagnosis and staging of cancer. It is also evident from the Table 4 that bladder cancer received relatively low funding compared to thyroid and endometrial cancers despite of its relatively high incidence and mortality rates.

Table 5 demonstrates that breast cancer has higher funding than other cancer types. Figure 7 infers that the funding pattern is not related to the incidence cases because prostate cancer, which has the highest incidence rate does not have highest funding. Funding is not related to mortality rate because lung and bronchus cancer which has highest mortality do not have highest funding. Thus the funding pattern is not in proportion to incidence and mortality rate.

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Figure 8 clearly demonstrates that the first three most common cancer types had the highest mentions on CNN News than other cancer types in 2012.

Results from Table 7 suggest that breast cancer has the highest media mentions. From Figure 9 it is evident that breast cancer had highest mentions in selected newspapers (The New York Times) (The Washington Post) (Chicago Tribune). Hence it is suggested that public breast cancer awareness is greatest followed by prostate cancer and lung and bronchus cancer.

Public awareness

There are various ways to make the public aware of cancer-related information. Articles in the major websites that are commonly seen by the public, such as CNN, ABC, CBS and MSN, social media such as face book, twitter, blogs from specific organizations such as NCI, SEER and NIH, and news papers such as The New York Times, The Daily news, The Los Angeles Times, USA today, Washington Posts and The Boston Globe.

Table 6 represents number of times each cancer was mentioned on CNN News (CNN) in the past four years. Results from Table 6 suggest that the number of awareness mentions related to the ten most common cancers decreased from 2009 to 2012.

Table 7 represents number of mentions of each cancer type in 2012 in New York Times, Washington Post and Chicago Tribune (The New York Times) (The Washington Post) (Chicago Tribune). Results from the Table 7 suggest that breast cancer mentions are higher than other cancer types in all the three major news papers. Breast cancer received highest funding than all cancer types and this funding is in proportion to the media mentions of cancer type.

Relationship between Cancer Incidence, Mortality Rates and Funding

From the above tables and figures it is noticed that funds are in proportion to the media mentions of cancer. Hence it is possible that public awareness of disease drives funding pattern. It would be much better if mortality rate of the disease drives the NIH funding pattern. Thus the cancers that have high mortality rate will be benefited by utilizing these funds for research and clinical trials and thereby treating the disease well.

The question can be raised whether NIH is practicing good public policy in granting funds to these ten most common cancers in United States? On what criteria these funds are allocated? And why the public awareness is given much priority in funding though mortality should be the major factor to be considered.

Though the incidence rate, mortality rate, clinical trials, NIH funds, media and newspaper mentions had given enough details about the cancers but still few questions are puzzled such as, are there better ways to utilize the NIH funds other than research and clinical trials such as utilizing these funds for prevention, diagnosis, treatment and cure? Do things like pink ribbons that represent breast cancer awareness month (BCAM) organized by major breast cancer charities every October to increase awareness in public helps to raise funds for breast cancer studies? And does this negatively impact other cancer research?

CONCLUSION

From the data presented it may be concluded that the number of clinical trials and funds for cancer types are not in proportion to each cancer's mortality rate. Lung and bronchus cancer has the highest mortality in the country but it is funded low. Whereas the breast cancer which has medium mortality rate is in the leading position and received highest funds from NIH among all cancers. Research and clinical trials are based on the funds that these research institutes get from NIH. Hence there should be proportionate funding that would help in finding new treatments and extend the research work. And also the number of clinical trials conducted is not in the proportion because colorectal cancer has the highest number of clinical trials despite of its low mortality rate. Thus mortality rate is affected by number of clinical trials conducted and amount of funds received. Shouldn't these fluctuations be altered to decrease the mortality rate in the United States?

REFERENCES

- Breast Cancer*. (2013, February 26). Retrieved April 18, 2013, from cancer.org:
<http://www.cancer.org/cancer/breastcancer/detailedguide/breast-cancer-key-statistics>
- Cancer Incidence Rate*. (n.d.). Retrieved from National Cancer Institute:
<http://www.cancer.gov/statistics/glossary/incidence>
- Cancer mortality and morbidity*. (n.d.). Retrieved April 18, 2013, from World Health Organization:
http://www.who.int/gho/ncd/mortality_morbidity/cancer/en/index.html
- Cancer Mortality Rate*. (n.d.). Retrieved from National Cancer Institute:
<http://www.cancer.gov/statistics/glossary/mortality>
- Chicago Tribune*. (n.d.). Retrieved 2012, from chicagotribune.com:
<http://www.chicagotribune.com/>(refined search by applying limits of search for "prostate cancer" and date options "jan 1 2012 -dec 31 2012")
- CNN*. (n.d.). Retrieved April 20, 2013, from <http://www.cnn.com/> (Refined the search as "prostate cancer, 2009" likewise searched for all top ten cancers in the United States for the years 2010, 2011 and 2012)
- Colorectal Cancer*. (2013, January 17). Retrieved April 18, 2013, from cancer.org:
<http://www.cancer.org/cancer/colonandrectumcancer/detailedguide/colorectal-cancer-key-statistics>
- National Cancer Institute. (n.d.). *Bladder Cancer*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/bladder>
- National Cancer Institute. (n.d.). *Breast Cancer*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/breast>
- National Cancer Institute. (n.d.). *Clinical Trials Search Results*. Retrieved April 18, 2013, from National Cancer Institute:
<http://www.cancer.gov/clinicaltrials/search/results?protocolsearchid=6158092&vers=1>
- National Cancer Institute. (n.d.). *Colon and Rectal Cancer*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/colon-and-rectal>
- National Cancer Institute. (n.d.). *Endometrial Cancer*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/endometrial>
- National Cancer Institute. (n.d.). *Kidney Cancer*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/kidney>
- National Cancer Institute. (n.d.). *Lung Cancer*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/lung>

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National Cancer Institute. (2013, January 17). *Lung Cancer (Non-Small Cell)*. Retrieved April 18, 2013, from cancer.org: <http://www.cancer.gov/cancertopics/types/lung>

National Cancer Institute. (n.d.). *Melanoma*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/melanoma>

National Cancer Institute. (2013, January 17). *Melanoma Skin Cancer*. Retrieved April 18, 2013, from cancer.org: <http://www.cancer.org/cancer/skincancer-melanoma/detailedguide/melanoma-skin-cancer-key-statistics>

National Cancer Institute. (n.d.). *National Cancer Institute*. Retrieved April 26, 2013, from cancer.gov: <http://www.cancer.gov/>

National Cancer Institute. (n.d.). *Non-Hodgkin Lymphoma*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/non-hodgkin>

National Cancer Institute. (n.d.). *Prostate Cancer*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/prostate>

National Cancer Institute. (2013, January 17). *Prostate Cancer*. Retrieved April 18, 2012, from cancer.org: <http://www.cancer.org/cancer/prostatecancer/detailedguide/prostate-cancer-key-statistics>

National Cancer Institute. (n.d.). *Thyroid Cancer*. Retrieved April 18, 2013, from National Cancer Institute: <http://www.cancer.gov/cancertopics/types/thyroid>

Siegel, R., Naishadham, D., & Jemal, A. (2012). *Cancer Statistics, 2012*. pp. 10-29.

Surveillance Epidemiology and End Results. (n.d.). Retrieved April 18, 2013, from National Cancer Institute: <http://seer.cancer.gov/statfacts/html/prost.html>

The New York Times. (n.d.). Retrieved jan-dec 2012, from nytimes.com: <http://www.nytimes.com/>(refined search by applying limits of date range and result type)

The Washington Post. (n.d.). Retrieved 2012, from washingtonpost.com: <http://www.washingtonpost.com/?reload=true>(refined search by applying limits of past 12 months)