Critical Illness in India

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Abstract
This paper gives the first cut rate of Indian incidence of critical illness of cardiovascular, Strokes and Cancer diseases. This paper also compares the critical illness rates currently used in India, CIBT 93 with the rates calculated in this paper. The paper concludes that CIBT 93 should be modified before using in the Indian conditions.

Summary

1. In India Coronary Heart Disease ("CHD") is more prevalent than cancer whereas in UK the trend is reverse.
2. In the next ten years, CHD is expected to increase many folds in rural as well as in Urban India. The range may vary from 13% to 80% at different ages. The major increase is expected in the younger ages than older ages.
3. In India both males and females have higher incidence rates of CHD than corresponding rates in UK.
4. In India females have higher heart attack rates than males, whereas in UK, the trend is opposite.
5. The incidence rates of strokes in India are very low as compared to UK.
6. Both in India and UK the incidence rates of cancer of females are heavier than males between the ages 20 to 60 years.
7. The cancer incidence rates in males and females in India are heavier up to age 60, after that, UK rates become heavier.
8. According to this paper, one of the options available with the profession is either to make some serious adjustments to CIBT 93 rates to make it useable in India or to construct Indian specific critical illness rates

1. Introduction

The idea of writing this paper is to calculate critical illness rates of diseases such as cardiovascular, strokes and cancer in the Indian conditions. The idea also extends to see whether the CIBT 93 rates used in India are appropriate or not. The data used in this paper are published data available on the public domain. Some efforts have been made to cross check the data from other sources and found to be of consistent. This paper does throw light on the deviation of incidence rates of CIBT 93 and calculated rates. The suggestion is to have a re-look at CIBT 93 before using in the Indian conditions.

The section two deals in major causes of deaths in India. The section three deals in the calculation of incidence rates of coronary heart disease in males and females in India. The section four deals in the calculation of incidence rates of strokes and the section four deals in the calculation of incidence rates of cancer in India

2. Major death causes in India

This section explains the most prominent causes of deaths in India. According to the World Health Organization ("WHO"), chronic diseases are major cause of deaths in India accounting for 53% among all deaths in 2005. The total deaths projected in 2005 were 10.362 million and 5.466 million were expected due to chronic diseases. According to WHO sources, over 60 million people will die due to chronic diseases over next 10 years. The following cart shows the spread of deaths due to various causes. It may be seen from the chart below that cardiovascular disease accounts for around 28% of total deaths and cancer accounts for 8%.

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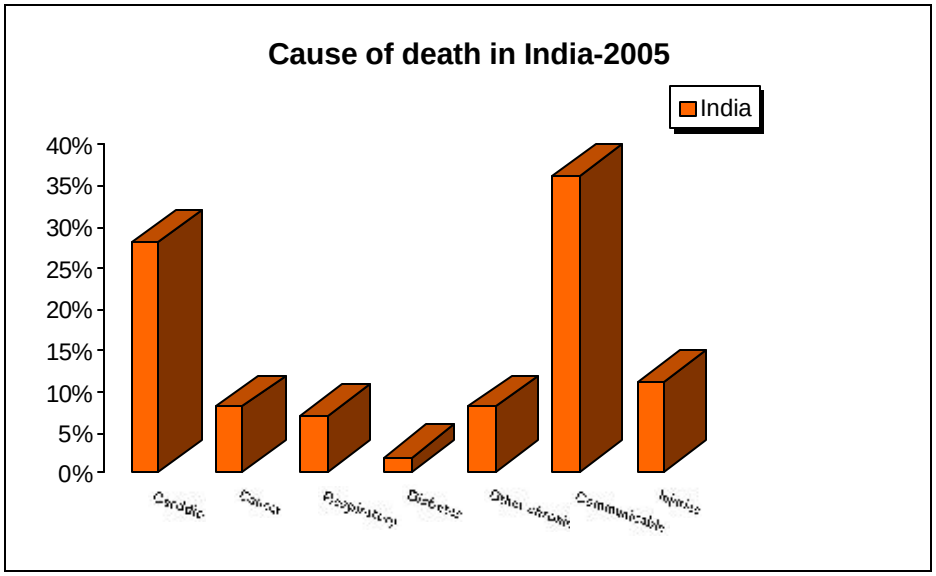
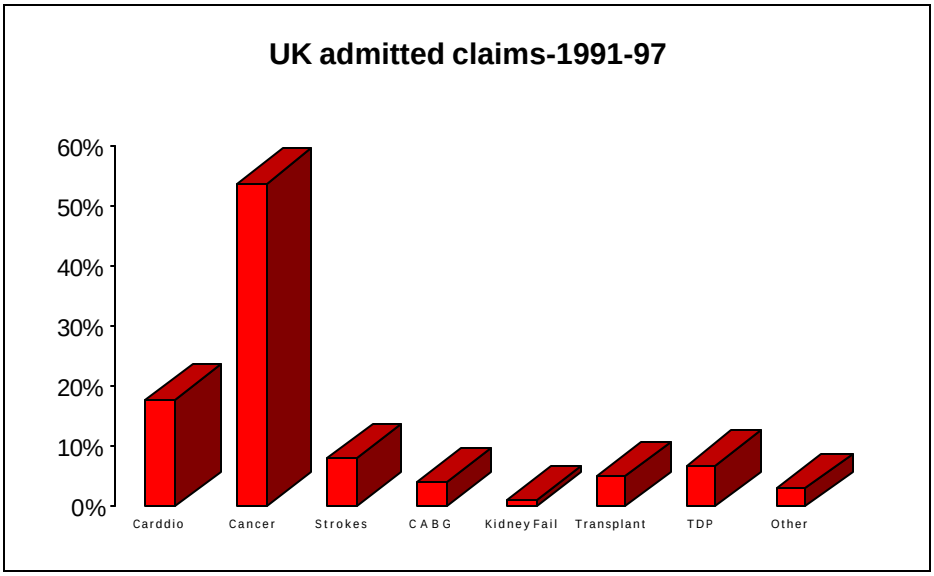


The chart below depicts the admitted claims in the UK insurance industry during the period 1991 to 1997. The cardiovascular disease accounts for 18% of claims whereas cancer accounts for 54% of claims. This is contrast dfference in the contracting diseases in two countries.

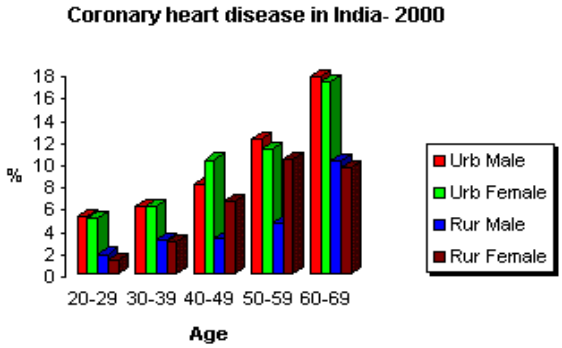


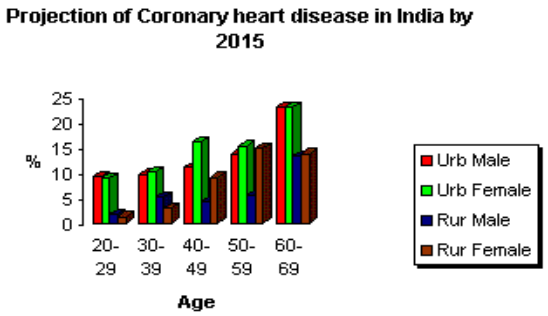
3. Cardiovascular disease

The medical term of heart attack is Myocardial infraction. A heart attack is also called coronary attack and results from Coronary Heart Disease ("CHD")- a disease of blood vessels that feed the heart muscle when arteries are narrowed, less blood and oxygen reaches the heart may lead to heart attack.

3.1 Projections of coronary heart disease in India

The expected shift in the incidence of CHD between 2000 and 2015 is captured in the comparative charts below. It may be noted that the pattern remain same but there is a upwards shift in the percentages.





3.2. Calculation of incidence rates of Coronary Heart Disease

In UK, Critical Ilness rates of cardiovascular disease in CIBT 93 were developed using population data of 1993-94. The idea was to prepare the base table using population data and then update the base table with more recent data in future.

India has adopted the same CIBT 93 critical illness rates without any adjustments for the Indian conditions.

This section of the paper, calculates the incidence rate of Coronary Heart Disease ("CHD") per 10,000 in India using the data published in *National Commission on Macroeconomic and Health (NCMH) background papers, Burden of Disease in India, Ministry of Health & Family Welfare, Government of India, New Delhi, September 2005.*

The data used is of year 2000 and were published at the age interval of five years. The CHD incidence rate at each age is calculated using linear interpolation method. The adoption of linear interpolation in a short age bands such as five years is quite a standard practice.

The incidence rate of CHD is calculated separately for males and females.

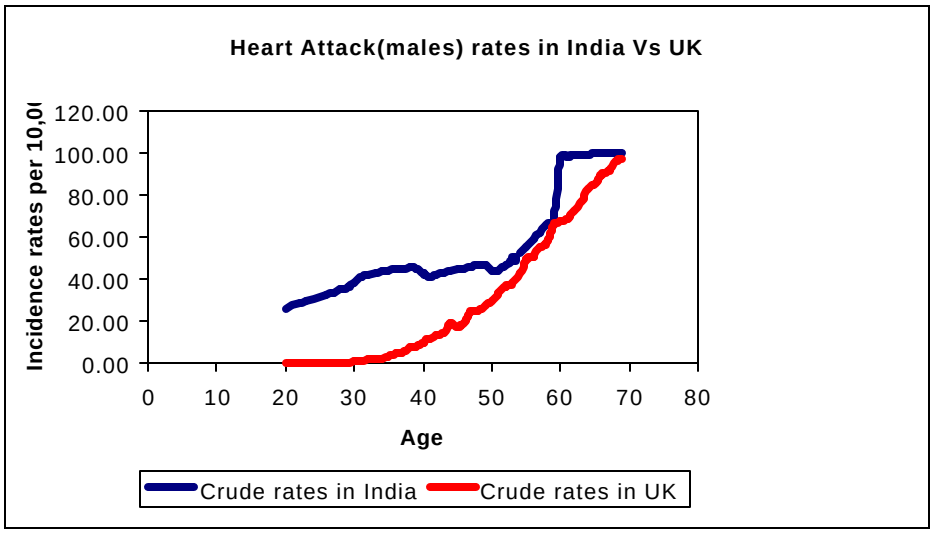
In the CIBT 93 table, two adjustments were made as

- First ever heart attack and
- Sudden death adjustments

The first adjustment converts the multiple incidence rates into first ever heart attack rate and second adjustment allows sudden deaths that go unreported. For the purpose of comparison I have used these two adjustments from CIBT 93 rates. There are other adjustments also in CIBT 93, such as prevalence rate adjustments which that I have not used.

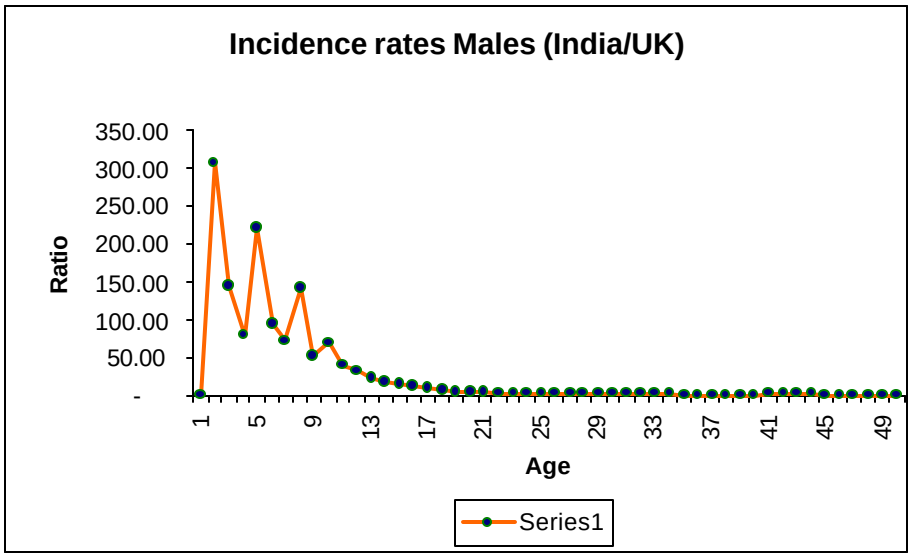
3.3 Males

The graph below shows the comparative heart attack incidence rates in males in India and UK.



It may be noted that the UK rates are smoother than in Indian rates, this is because linear interpolation is used in the Indian rates and proper smoothing is not done.. I am not currently worried about the smoothness of the rates but more interested in getting the trends. It may further be noted overall heart attack rates in Male are higher in India than in UK. It is only between 55-60 years; heart attack incidence rates in India are closer to UK rates.

The next graph captures the difference between the heart attack incidence rates in India and UK



The ratios are getting flat early in the ages because of wide differences in the ratio between the two countries.

The table below giving the heart attack rates in males in India and in UK at each ages.

Critical Illness Incidence rates- Coronary heart disease (Males)					**Per 10,000 lives**	**India**
Age	**Crude CHD incidence rates**	**First ever adjustments**	**Sudden death adjustments**	**Crude rates in India**	**Crude rates in UK**	**Ratio(India/UK)**
20	24.40	100%	9%	26.60	-	-
21	25.39	100%	9%	27.68	0.09	307.53
22	26.38	100%	9%	28.76	0.20	143.78
23	27.37	100%	9%	29.83	0.38	78.51
24	28.36	100%	9%	30.91	0.14	220.78
25	29.35	100%	9%	31.99	0.34	94.08
26	30.33	100%	9%	33.06	0.46	71.88
27	31.32	100%	9%	34.14	0.24	142.25
28	32.31	100%	9%	35.22	0.68	51.79
29	33.30	100%	9%	36.29	0.52	69.80
30	35.48	100%	9%	38.67	0.99	39.07
31	38.30	100%	9%	41.75	1.32	31.63
32	38.94	100%	9%	42.44	1.92	22.11
33	39.58	100%	9%	43.14	2.40	17.97
34	40.21	100%	9%	43.83	2.73	16.06
35	40.85	100%	9%	44.53	3.45	12.91
36	41.49	100%	9%	45.22	5.04	8.97
37	42.13	99%	9%	45.46	5.32	8.54
38	42.76	98%	9%	45.68	7.68	5.95
39	43.40	96%	9%	45.41	8.23	5.52
40	41.37	94%	10%	42.78	10.29	4.16
41	41.14	92%	10%	41.63	12.35	3.37
42	42.92	90%	10%	42.49	13.73	3.09
43	44.71	88%	11%	43.67	14.85	2.94
44	46.50	86%	11%	44.39	19.22	2.31
45	48.29	84%	11%	45.02	17.49	2.57
46	50.07	82%	11%	45.58	19.63	2.32
47	51.86	80%	12%	46.47	25.09	1.85
48	53.65	78%	12%	46.87	25.16	1.86
49	55.44	76%	12%	47.19	27.72	1.70
50	53.37	74%	12%	44.23	29.79	1.48
51	55.22	72%	12%	44.53	33.64	1.32
52	59.14	71%	12%	47.02	37.06	1.27
53	63.05	70%	12%	49.43	38.09	1.30
54	66.97	70%	13%	52.97	42.81	1.24
55	70.88	70%	13%	56.07	49.56	1.13
56	74.79	70%	13%	59.16	51.25	1.15
57	78.71	70%	14%	62.81	55.53	1.13
58	82.62	70%	15%	66.51	57.55	1.16
59	84.58	70%	15%	68.09	66.24	1.03
60	121.51	70%	16%	98.67	67.84	1.45
61	121.51	70%	16%	98.67	69.26	1.42
62	121.51	70%	17%	99.52	72.98	1.36

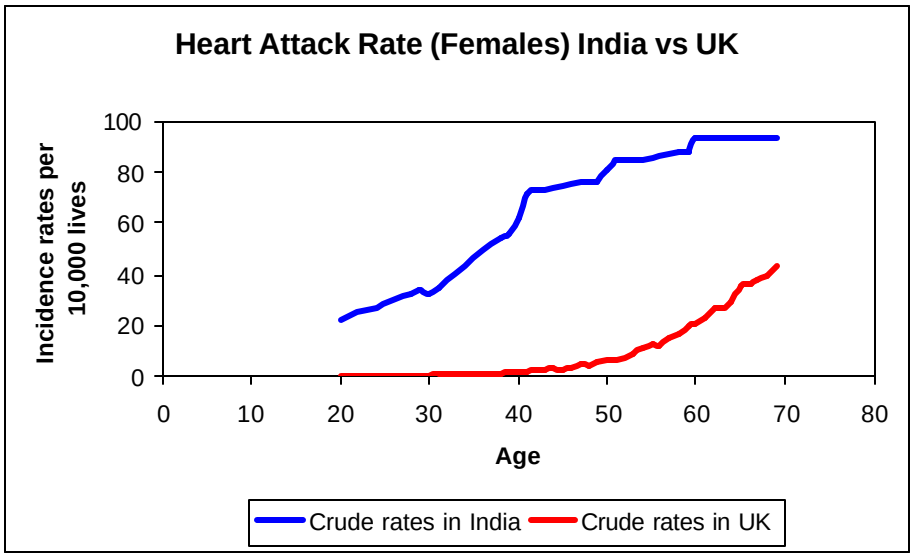
63	121.51	70%	17%	99.52	77.27	1.29
64	121.51	70%	17%	99.52	83.64	1.19
65	121.51	70%	18%	100.37	85.88	1.17
66	121.51	70%	18%	100.37	90.13	1.11
67	121.51	70%	18%	100.37	91.67	1.09
68	121.51	70%	18%	100.37	96.22	1.04
69	121.51	70%	18%	100.37	97.71	1.03

Conclusion: The incidence rates of heart attack in males in India are between two times to three hundred times between the age ranges 55 decreasing to 20 years comparative to UK. It is only after 55 years that the differences are around 3% to 15% with some stray higher percentage differences at ages 60 & 61.

It is quite safe to conclude that the current incidence rates of heart attack in males used in India through CIBT 93 are not appropriate in the present form and some modification is required before it is used.

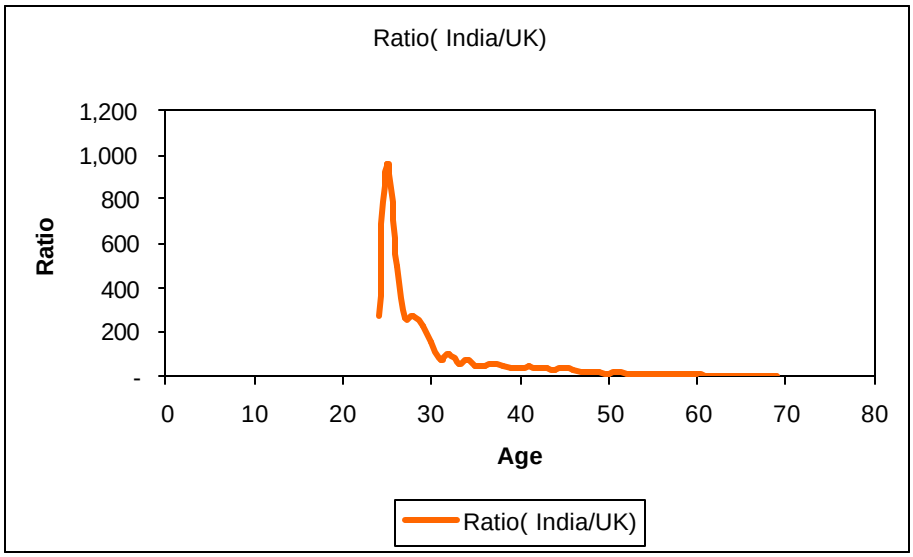
3.4 Females

The graph below shows the comparative heart attack incidence rates in females in India and UK



The female incidence rates in India are smoother than of male's incidence rates, however, there is a large gap between the incidences rates of females in India and UK.

The next graph captures the magnitude of difference between the heart attack rates among in India and UK



The ratios are getting flat early in the ages because of wide differences in the ratio between the two countries.

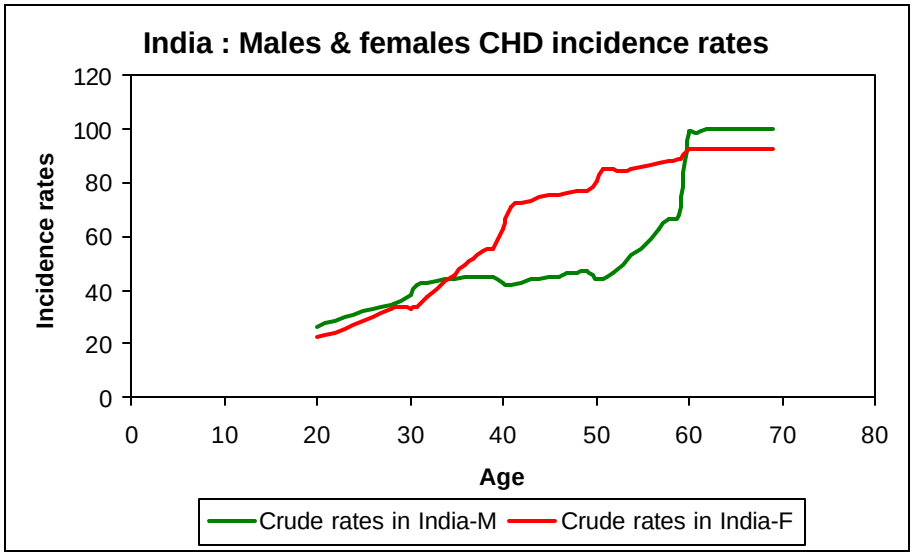
The table below giving the heart attack rates in females in India and in UK at each age.

Critical Illness Incidence rates- Coronary heart disease					Per 10,000 lives India	
Age	Crude CHD incidence rates	First ever adjustments	Sudden death adjustments	Crude rates in India	Crude rates in UK	Ratio(India/UK)
20	19.23	100%	15%	22.11	0.0000	-
21	20.38	100%	15%	23.44	0.0000	-
22	21.53	100%	15%	24.76	0.0700	353.74
23	22.68	100%	15%	26.09	0.0000	-
24	23.84	100%	15%	27.41	0.1000	274.11
25	24.99	100%	15%	28.74	0.0300	957.84
26	26.14	100%	15%	30.06	0.0600	500.99
27	27.29	100%	15%	31.38	0.1200	261.53
28	28.44	100%	15%	32.71	0.1200	272.57
29	29.59	100%	15%	34.03	0.1500	226.88
30	28.44	100%	15%	32.70	0.2100	155.72
31	29.89	100%	15%	34.37	0.4600	74.72
32	32.50	100%	15%	37.38	0.3800	98.36
33	35.11	100%	15%	40.38	0.6600	61.18
34	37.73	100%	15%	43.38	0.6000	72.31
35	40.34	100%	15%	46.39	0.9200	50.42
36	42.95	100%	15%	49.39	0.9200	53.69
37	45.56	99%	15%	51.87	0.9100	57.00
38	48.17	98%	15%	54.29	1.0700	50.74
39	50.78	96%	15%	56.07	1.4600	38.40
40	57.88	94%	15%	62.57	1.7100	36.59
41	67.52	92%	15%	71.43	1.5300	46.69

42	70.06	90%	15%	72.51	2.1400	33.88
43	72.60	88%	15%	73.47	2.3400	31.40
44	75.13	86%	15%	74.31	3.2900	22.59
45	77.67	84%	15%	75.03	2.4800	30.26
46	80.21	82%	15%	75.64	3.5000	21.61
47	82.75	80%	15%	76.13	4.7800	15.93
48	85.29	78%	15%	76.51	4.1500	18.44
49	87.83	76%	15%	76.76	5.8500	13.12
50	95.00	74%	15%	80.85	6.4700	12.50
51	103.08	72%	15%	85.35	6.3500	13.44
52	103.99	71%	15%	84.91	7.2000	11.79
53	104.90	70%	15%	84.44	8.8600	9.53
54	105.81	70%	15%	85.17	10.7200	7.95
55	106.71	70%	15%	85.90	12.7100	6.76
56	107.62	70%	15%	86.63	11.9300	7.26
57	108.53	70%	15%	87.37	14.8000	5.90
58	109.44	70%	15%	88.10	16.7400	5.26
59	109.89	70%	15%	88.46	19.9300	4.44
60	115.70	70%	15%	93.14	20.5300	4.54
61	115.70	70%	15%	93.14	23.0800	4.04
62	115.70	70%	15%	93.14	26.3700	3.53
63	115.70	70%	15%	93.14	26.1500	3.56
64	115.70	70%	15%	93.14	29.1500	3.20
65	115.70	70%	15%	93.14	35.2300	2.64
66	115.70	70%	15%	93.14	36.1300	2.58
67	115.70	70%	15%	93.14	38.3800	2.43
68	115.70	70%	15%	93.14	40.0600	2.32
69	115.70	70%	15%	93.14	43.2900	2.15

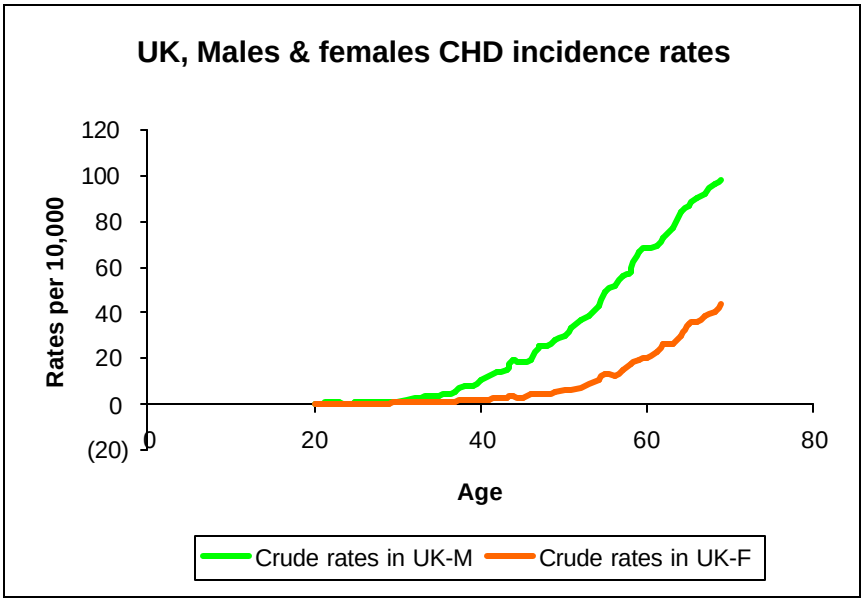
The female heart attack rates in India are much higher than UK. The range varies between two times to five hundred times between different ages.

A comparative male and female heart attack rates in India is captured in the following graph



The female heart attack rates from age 20 to 32 is lower than males heart attack rates; from age 32 to 60 female heart attack rates are much higher than male heart attack rates and then from age 60+, female heart attack rates are lower.

The following chart shows the comparative figures of males and females CHD incidence rates in UK.



Conclusion

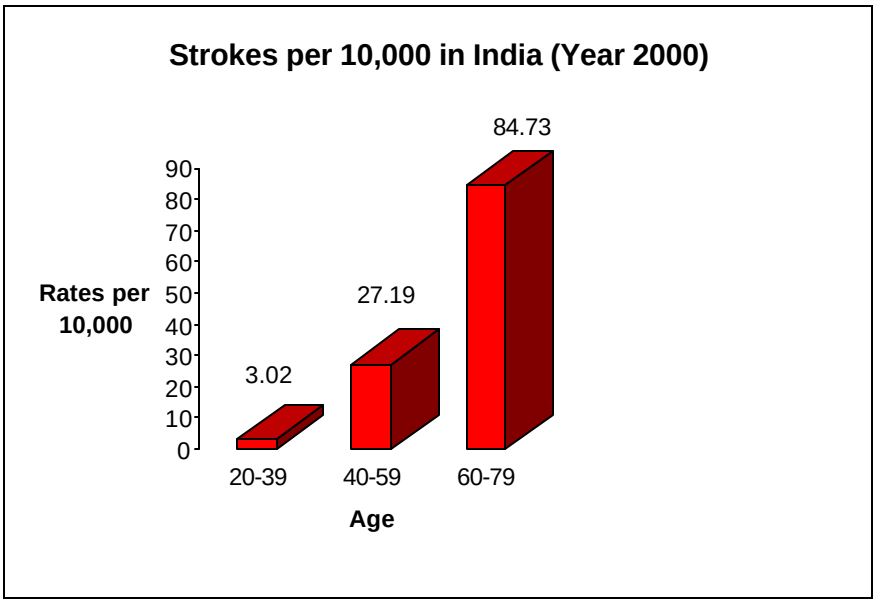
The incidence rates of CHD in females in India is heavier than male's rate in the age range of 32 to 60 years, whereas in UK the trend is reverse, where female's incidence rates of CHD is quite a bit lighter than male rates for almost all the ages. This is one big contrast in the incidence rates of CHD. If the product for CHD is priced in India, this fact should be taken into account in the pricing and valuation exercise. There may be several reasons of reversal of trend in India.

The risk factors such as smoking habits, blood cholesterol, high blood pressure, life style, obesity, stress and diabetes-inducing CHD in India may be different than in UK. One of the possible reasons of higher females heart attack over males in India as compared to UK could attribute due to different level of obesity and diabetes.

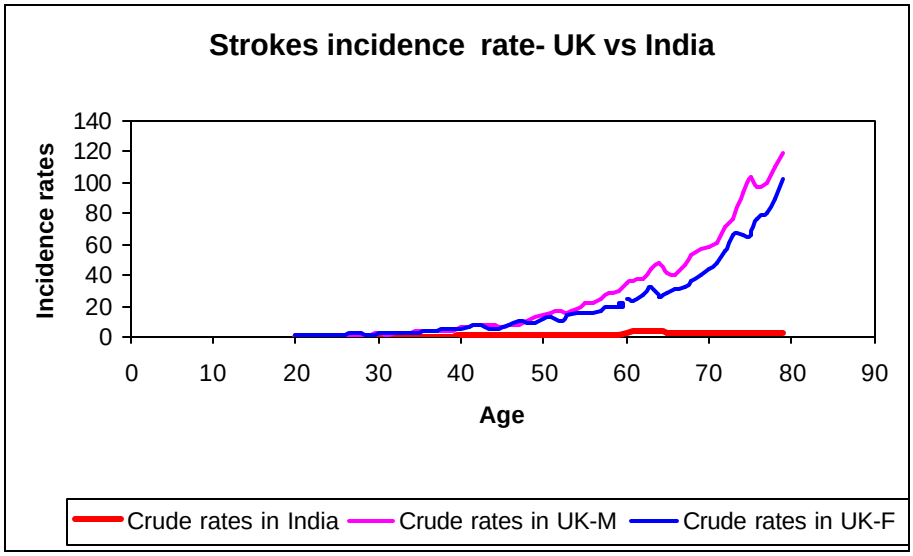
4. Strokes

The WHO defines the strokes as rapidly developed clinical sign of focal disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin. The 24 hours threshold in the definition excludes transit ischaemic attack.

The rate of strokes in India per 10,000 lives is given in the following chart



A comparative rate of strokes per 10,000 lives in India vs UK is shown in the following graph.



It is quite evident that the incidence rates of strokes in India are much lower than in UK. Therefore, if CIBT 93 is used to price a product for strokes in India, the actual experience might be lighter than expected because of heavier assumption used in pricing through CIBT 93.

4.1 Calculation of incidence rates

The data used is of year 2000 and were published in NCMH at the age interval of 20 years. The Stroke incidence rate at each age is calculated using linear interpolation method between the 20-year age bands. This is done due to non-availability of data at each age. The rates are available for age bands of 20 years, there is a every possibility of approximation and the actual trend may not be linear in 20 years gap. However, for the sake of simplicity

linear interpolation is applied. Some attempt is made to cross check the prevalence rate (all ages) of stroke from other sources and it was found to be consistent.
In the CIBT 93 table, two adjustments were made as

- First ever stroke and
- Sudden death adjustments

The first adjustment converts the multiple incidence rates into first ever stroke rate and second adjustment allows sudden deaths that go unreported. For the purpose of comparison I have used these two adjustments from CIBT 93 rates. There are other adjustments, such as prevalence rate adjustments which that I have not used.

Critical Illness Incidence rates- Stroke				**Per 10,000 lives**		
Age	**Crude stroke incidence rates**	**First ever adjustments**	**Sudden death adjustments**	**Crude rates in India**	**Crude rates in UK-M**	**Crude rates in UK-F**
20	0.02	100%	5%	0.02	1.19	1.10
21	0.03	100%	5%	0.03	0.94	1.43
22	0.04	100%	5%	0.05	1.23	1.23
23	0.06	100%	5%	0.06	1.21	1.57
24	0.07	100%	5%	0.08	1.47	1.11
25	0.09	100%	5%	0.09	0.67	1.46
26	0.10	100%	5%	0.11	1.70	1.77
27	0.12	100%	5%	0.12	1.36	2.10
28	0.13	100%	5%	0.14	1.10	2.43
29	0.14	100%	5%	0.15	1.63	1.34
30	0.16	100%	5%	0.17	2.03	2.75
31	0.17	100%	5%	0.18	1.66	1.97
32	0.19	100%	5%	0.20	2.35	2.28
33	0.20	100%	5%	0.21	2.47	2.30
34	0.21	100%	5%	0.23	1.97	2.93
35	0.23	100%	5%	0.24	3.46	2.84
36	0.24	100%	5%	0.26	3.17	3.47
37	0.26	100%	5%	0.27	3.56	3.93
38	0.27	100%	5%	0.28	3.47	4.45
39	0.29	100%	5%	0.30	3.91	4.89
40	0.68	100%	5%	0.71	5.65	5.43
41	1.10	100%	5%	1.16	6.48	6.15
42	1.13	100%	5%	1.19	7.00	6.85
43	1.16	100%	5%	1.22	6.81	5.69
44	1.19	100%	5%	1.25	6.98	4.84
45	1.22	80%	5%	1.03	6.12	6.50
46	1.25	80%	5%	1.05	7.70	7.76
47	1.28	80%	5%	1.08	7.90	9.84
48	1.31	80%	5%	1.10	9.44	8.01
49	1.34	80%	5%	1.13	12.12	8.05
50	1.37	80%	5%	1.15	12.86	10.77
51	1.40	80%	5%	1.18	14.78	11.64
52	1.43	80%	5%	1.20	15.70	9.42

53	1.46	80%	5%	1.23	15.08	13.49
54	1.49	80%	5%	1.26	17.05	14.21
55	1.52	80%	5%	1.28	21.53	14.31
56	1.55	80%	5%	1.31	22.21	15.20
57	1.58	80%	5%	1.33	24.56	16.17
58	1.61	80%	5%	1.36	27.79	19.34
59	1.63	80%	5%	1.37	29.74	19.85
60	2.94	80%	5%	2.47	34.64	24.24
61	4.24	80%	5%	3.56	35.75	23.45
62	4.24	80%	5%	3.56	38.18	26.63
63	4.24	80%	5%	3.56	44.17	31.34
64	4.24	80%	5%	3.56	47.97	25.29
65	4.24	60%	5%	2.67	41.33	27.92
66	4.24	60%	5%	2.67	40.18	29.83
67	4.24	60%	5%	2.67	46.21	31.97
68	4.24	60%	5%	2.67	52.42	34.95
69	4.24	60%	5%	2.67	56.13	40.03
70	4.24	60%	5%	2.67	58.81	43.98
71	4.24	60%	5%	2.67	61.29	47.36
72	4.24	60%	5%	2.67	70.92	54.28
73	4.24	60%	5%	2.67	76.90	65.54
74	4.24	60%	5%	2.67	92.11	65.84
75	4.24	60%	5%	2.67	103.32	65.50
76	4.24	60%	5%	2.67	97.32	77.22
77	4.24	60%	5%	2.67	100.42	80.20
78	4.24	60%	5%	2.67	109.15	89.46
79	4.24	60%	5%	2.67	119.85	102.47

Conclusion

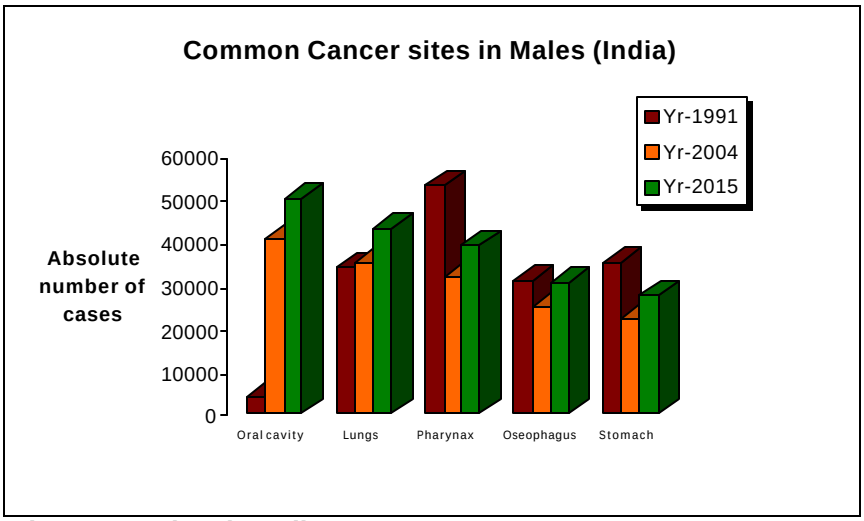
The incidence rate of Strokes in India is substantially lower as compared to UK (both males and females) at all ages. This further leads us to believe that CIBT 93 requires major modification to use in India.

5. Cancer

A cancer is defined as 'A malignant tumour characterized by the uncontrolled growth and spread of malignant cells and invasion of tissue.

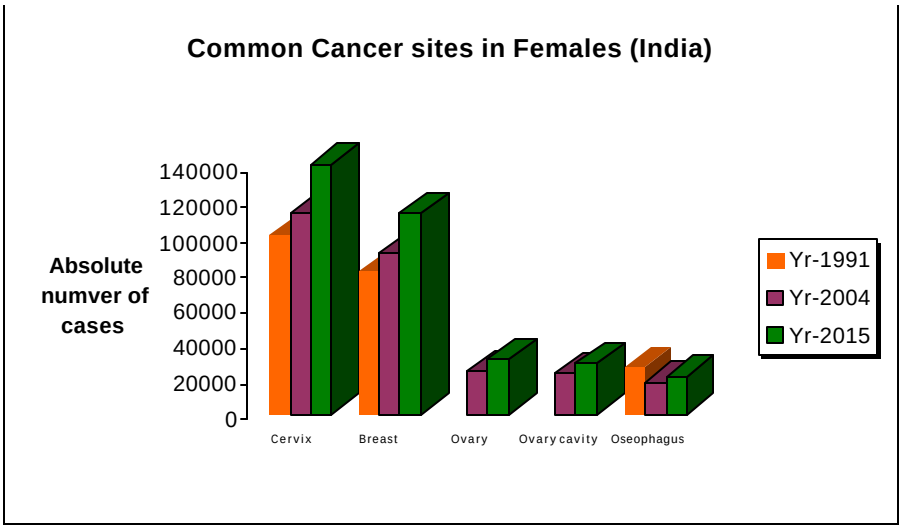
Prominent male cancer sites in India

The following graph shows the most common sites of cancer in males in India from 1991 to projected 2015.



Prominent female cancer sites in India

The following graph shows the most common sites of cancer in males in India from 1991 to projected 2015.



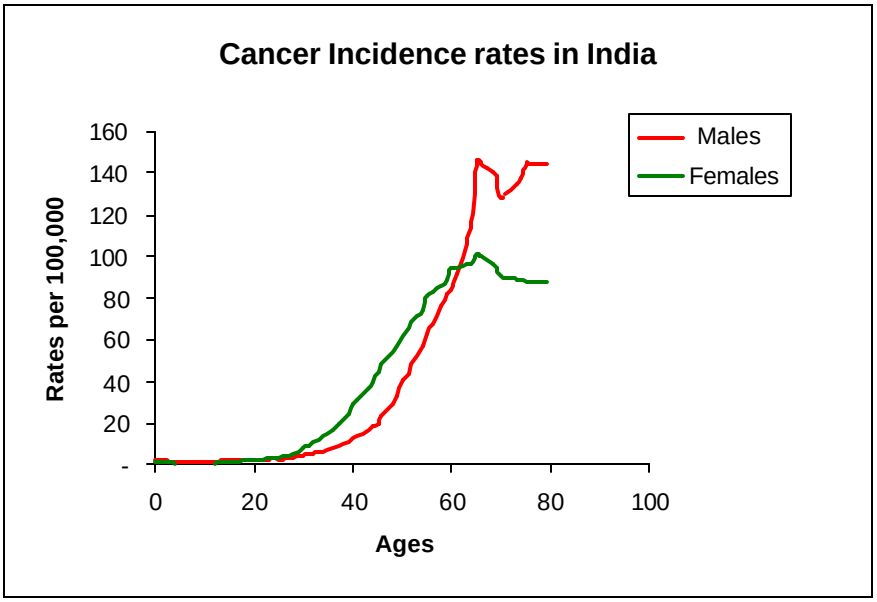
From the period of 2004 to 2015, there is around 23% of increase in cancer incidences cases for both males and females.

Calculations of incidence rates

The data used to calculate the incidence rates is taken from the biennial report 1988-89of National Cancer Registry Programme (Population based Cancer Registries). The Indian Council of Medical Research, New Delhi, brings out this report. The cancer registry program was conducted in seven centers in India, such as, Banglore, Mumbai, Chennai, Bhopal, Delhi and one rural center of Barshi in Maharastra.

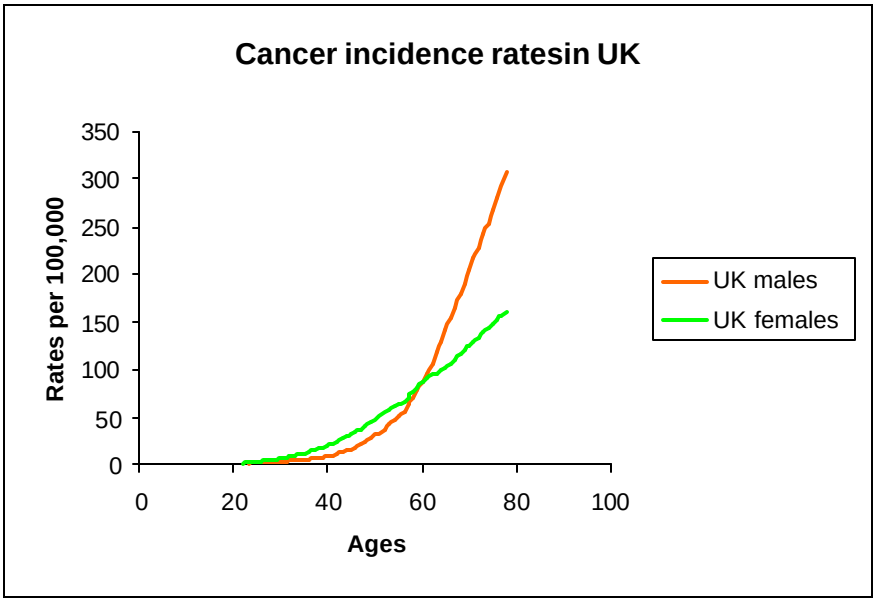
The following data is used to calculate the cancer incidence rates. Clubbing together the cases of seven registry centers arrives at this all India data.

Cancer incidence cases			India	1989		
India - 1989	Population		Cancer cases		Incidence rates per 100,000	
Age	Males	Females	Male	Female	Male	Female
0-4	1462803	1431054	166	104	11.35	7.27
5-9	1576328	1512862	147	85	9.33	5.62
10-14	1509104	1402500	151	90	10.01	6.42
15-19	1451133	1242781	206	135	14.20	10.86
20-24	1642658	1337563	235	203	14.31	15.18
25-29	1455475	1188200	270	289	18.55	24.32
30-34	1145161	873228	322	456	28.12	52.22
35-39	982333	766287	446	747	45.40	97.48
40-44	824441	576875	643	985	77.99	170.75
45-49	668278	500796	884	1283	132.28	256.19
50-54	525739	389557	1268	1331	241.18	341.67
55-59	347633	257590	1254	1090	360.73	423.15
60-64	275862	244071	1361	1163	493.36	476.50
65-69	148998	143354	1060	703	711.42	490.39
70-74	110581	110167	733	494	662.86	448.41
75+	105114	115100	762	505	724.93	438.75
Total	14231641	12091985	9908	9663	69.62	79.91

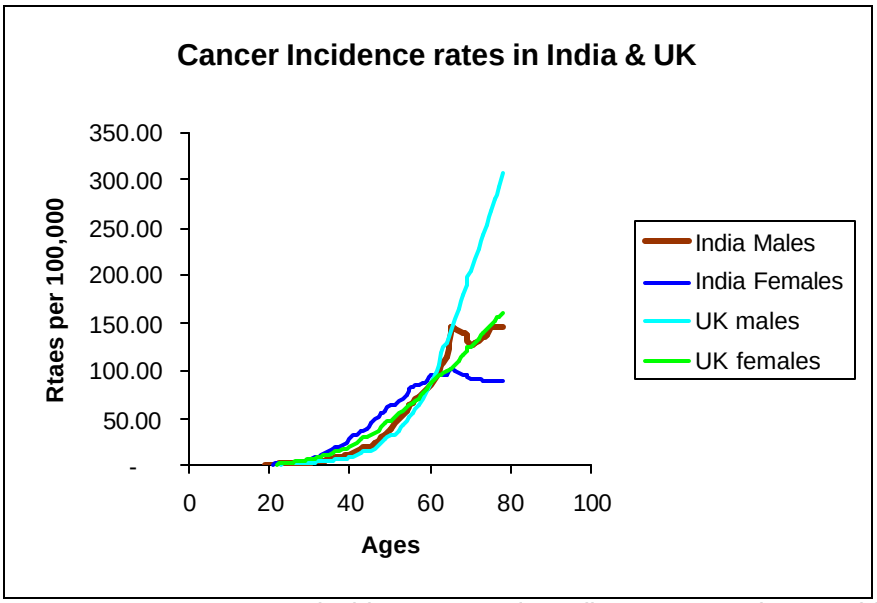


It may be seen that the cancer female incidence rates are lower than male rates up to age 20; from age 20 to 60, female cancer incidence rates are higher and then from age 60 onwards-female cancer incidence rates drops.

A Cancer incidence rate in UK is shown in the following graph.



The shape of the graph of UK is similar to the shape in India. From age 20 to 60 female cancer incidence rates are higher and after age 60 the female rates are lower. As far as CIBT 93 tables is concerned, it is a good sign that the shape of curves of cancer incidences in India and UK are similar. The only point of interest is to compare incidence rates in two countries.



From age 19 to 58 years, Cancer incidence rates in India among males are higher than males in UK; and from 59 onwards, the cancer incidence rates in India are lower except at age 65. This means that on using CIBT 93 rates for pricing cancer products in India will have lower premium than it should have been. Similarly, female cancer products will also be under priced if CIBT 93 rates are used. One of the consequences of using CIBT 93 rates is to more than expected claims on the cancer portfolio of critical illness.

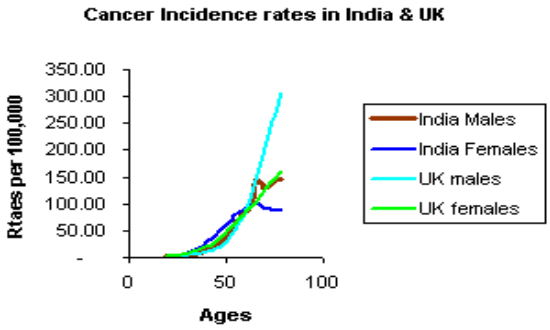
The incidence rates of cancer in India are given in the following table.

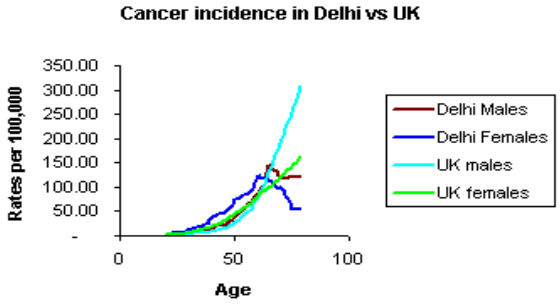
Cancer incidence rates in India and UK				per 100,000 lives
Age	India Males	India Females	UK males	UK females
19	2.85	2.47	2.15	2.09
20	2.56	2.45	2.3	2.27
21	2.71	2.74	2.45	2.45
22	2.86	3.04	2.66	2.81
23	3.01	3.33	2.87	3.16
24	3.16	3.62	3.07	3.52
25	3.08	3.33	3.28	3.88
26	3.39	4.10	3.48	4.23
27	3.71	4.86	3.7	4.99
28	4.03	5.63	3.92	5.74
29	4.34	6.39	4.13	6.49
30	4.51	7.76	4.35	7.24
31	5.07	9.10	4.57	8.00
32	5.62	10.44	4.92	9.16
33	6.18	11.79	5.28	10.33
34	6.73	13.13	5.64	11.49
35	7.05	14.99	6	12.66
36	8.07	17.24	6.36	13.82
37	9.08	19.50	7.19	15.41
38	10.09	21.75	8.02	17.00
39	11.11	24.00	8.84	18.59
40	12.20	28.45	9.67	20.19
41	13.90	31.30	10.49	21.78
42	15.60	34.15	11.96	24.34
43	17.30	37.00	13.42	26.91
44	19.00	39.85	14.88	29.48
45	19.90	45.21	16.34	32.04
46	23.18	48.22	17.81	34.61
47	26.46	51.24	20.99	37.9
48	29.73	54.25	24.17	41.19
49	33.01	57.27	27.35	44.49
50	40.26	62.38	30.53	47.78
51	44.25	65.36	33.17	51.07
52	48.24	68.33	38.13	54.23
53	52.23	71.31	42.55	57.4
54	56.22	74.28	46.97	60.56
55	62.89	80.57	51.39	63.72
56	67.52	82.60	55.81	66.88
57	72.15	84.63	63.59	71.67
58	76.77	86.66	71.37	76.47
59	81.40	88.69	79.16	81.26
60	83.85	94.20	86.94	86.05
61	91.26	94.75	94.72	90.84
62	98.67	95.30	106.59	93.89
63	106.08	95.85	118.28	96.94
64	113.50	96.40	130.07	99.99

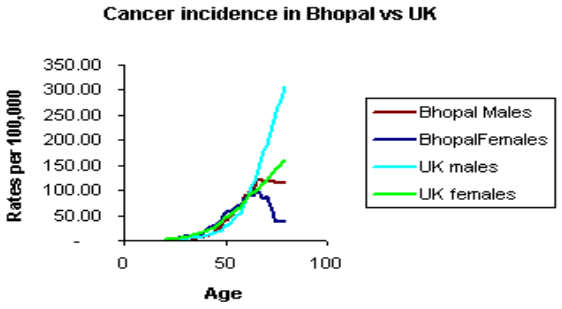
65	146.28	101.56	141.85	103.04
66	144.28	99.82	153.63	106.09
67	142.28	98.08	165.99	110.91
68	140.29	96.34	178.35	115.74
69	138.29	94.60	190.71	120.56
70	127.79	90.46	203.71	125.38
71	130.18	90.07	215.42	130.2
72	132.57	89.68	228.3	134.53
73	134.97	89.29	241.18	138.86
74	137.36	88.90	254.06	143.18
75	144.99	87.75	266.94	147.51
76	144.99	87.75	279.82	151.84
77	144.99	87.75	293.55	156.77
78	144.99	87.75	307.27	161.69

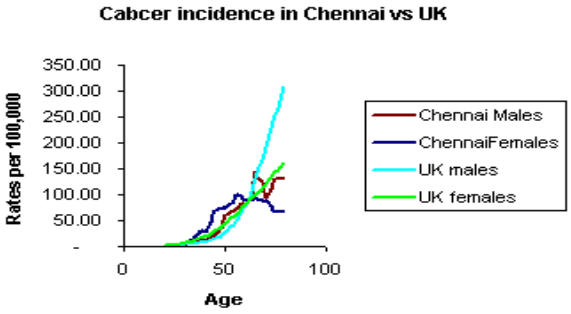
Regional cancer incidence rates

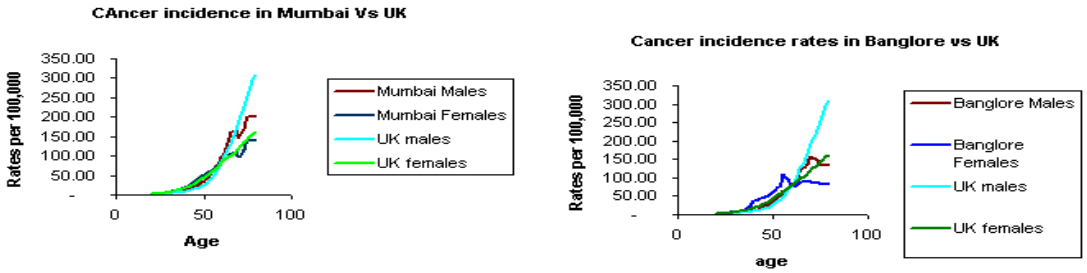
The following couple of graphs explain the cancer incidence rates in the seven centers in India as compared to CIBT 93 rates.











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2. Biennial report 1988-89of National Cancer Registry Programme (Population based Cancer Registries).
3. A critical review: Report of the critical illness healthcare study group, presented to The Staple Inn Actuarial Society, March 2000.

About the Author:

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Sonjai is currently working with Max New York Life for around 10 months and involved in the pricing and internal reporting process. He was earlier with Sahara India Life Insurance Company Ltd for around a year where he was involved in pricing and valuation exercise. Before joining Sahara, Sonjai worked with Watson Wyatt Insurance consulting for around three and a half year. He has also served Life Insurance Corporation of India for over little six years.

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