

Chapter 10

TRENDS OVER TIME FOR ALL SITES AND ON SELECTED SITES OF CANCER & PROJECTION OF BURDEN OF CANCER

INTRODUCTION

The overall incidence of cancer is known to rise with increasing age. Control of communicable diseases, has increased life expectancy and therefore most of the population live longer resulting in a greater proportion of population in the older age groups. The increase in population due to growth also contributes to the increase in the number of cancer cases. Improved literacy, greater consciousness about health in general and awareness about cancer in particular makes more and more people seek medical advice at an earlier stage. Availability and access to sophisticated and improved diagnostic techniques, aid in detection of tumours that would have been missed at earlier times. The question is whether cancer is on the increase after accounting for these factors and whether that rise is statistically significant.

One measure of determining such an increase would be to examine the age adjusted incidence rates (AAR) over time. This may or may not take into account all of the factors mentioned above. Nonetheless, it would give some indication of the trends in the disease. Cancer being a chronic disease (and unlike acute infectious diseases) with generally a long latent period and a rather prolonged clinical phase, overall year to year variations are slight. Therefore, in assessing time trends in AAR, in this report, single year, average annual AARs of three and five calendar years have been used for the PBCRs that started reporting incidence data from the year 1982 or 1988. The data presented here gives a fair account of the direction in which the incidence rates of the leading sites of cancer are proceeding across the years. Based on this, the report also provides an estimate of the burden of specific sites of cancer for the next five years. Such estimates will greatly facilitate deciding on priorities and planning site specific cancer control activities.

The first report on time trends in incidence rates was published under the NCRP in 2009 comprising data from 1982 to 2005 and the second report covering additional five years of data (2006 to 2010) in 2013. This report covers additional three/four years (2011-2014) with revised population estimates (Census of India, 2011, Registrar General of India).

DATA AND METHODS

The numerical data of all registries has undergone a series of range and consistency checks each year and again before preparing this report. Clarifications were sought wherever required from the respective PBCRs and the data finalised thereafter.

This report is based on the data of six PBCRs, namely Bangalore, Barshi, Bhopal, Chennai, Delhi and Mumbai. The first and earlier report on trends in incidence rates over time (NCRP, 2009) was brought out from the incidence data of only these six PBCRs.

The calendar years of data for which the incidence data has been used for each PBCR are Chennai (1982-2013), Bangalore & Mumbai (1982-2012), Barshi (1988-2014), Bhopal (1988-2013) and Delhi (1988-2012).

In determining the significance of trends, the actual values of the AAR for single year, three year range and five year range has been used. This significance of time trend in each PBCR was assessed based on the methods and formula provided by Boyle and Parkin, 1991. In addition, for single year the Joinpoint Regression Program of the NCI of USA has been used (Kim *et al.*, 2000).

The difference distribution method (Takiar & Shobana, 2009) for estimating the calendar year-wise denominator population by five year age group has been used. This was based on the census data of 1981, 1991, 2001 and 2011.

In general, leading anatomical sites of cancer across all registries have been chosen to depict trends in incidence rates over time. Anatomical sites with small numbers (less than ten cases per year) have been excluded.

For this Chapter, the following format of presentation is followed.

The initial pages describe the salient features of the tables and the graphs according to specific site of cancer. Like the previous report (NCRP, 2009), the first table for each site gives the actual values of the AARs for each calendar year with statistical significance using Slope (b) and p-value based on simple linear regression. In addition, the corresponding statistical significance of trends based on annual average AARs for three and five calendar year groupings are also provided (NCRP, 2013). Like in the previous report (NCRP, 2009, 2013), the Joinpoint Regression has also been worked out and this table (with expected AAR for each calendar year) is also provided with Annual Percentage Change (APC) and statistical significance ($p < 0.05$) as appropriate. The five year annual average AAR graph for PBCRs is given and also the Joinpoint Regression Model Graphs have been depicted.

The statistically significant increase or decrease for a given PBCR and a specified site could be for single year AARs (including Joinpoint regression) and/or the Annual Average AAR for the three and/or five year periods. A consistent significant increase across all methods obviously implies a very stable finding.

In the description below, wherever relevant, the value of the Annual Percentage Change (APC %) as per Joinpoint regression has been provided in parentheses.

All Sites - Tables 10.1, 10.2 and Figs. 10.1, 10.2:

Males: Bangalore (APC: 0.39%), Chennai (APC: 0.93%) and Delhi (0.74%) PBCRs showed a statistically significant increase in trend of AARs. Chennai PBCR showed a significant increase for annual average of AARs for three and five years too. Barshi and Delhi PBCRs showed an increase in year-wise trend by using linear regression model.

Females: Bangalore (APC: 0.38%), Barshi (APC: 0.53%) and Bhopal (0.68%) PBCRs showed a statistically significant increase in trend of AARs. Bhopal PBCR showed a significant increase for annual average of AARs for three and five years too.

Colon - Table 10.3 and Fig. 10.3:

Males: A statistically significant increase in AARs in Bangalore (APC: 2.52%), Chennai (3.96%), Delhi (2.12%) and Mumbai (1.00%) PBCRs were seen. In Chennai the APC was 2.09% for the years 1982-2002 and it was 7.73% for the latter period 2003-2013. Bangalore, Chennai and Delhi showed a significant increase for annual average of AARs for three and five years too whereas Mumbai showed an increase in three years trend.

Rectum - Table 10.4 and Fig. 10.4:

Males: A statistically significant increase in AARs were seen in Bangalore (APC: 1.86%), Chennai (2.57%) and Delhi (1.29%). Bangalore and Chennai showed a significant increase for annual average of AARs for three and five years too.

Lung - Table 10.5 and Fig. 10.5:

Females: A statistically significant increase in AARs in Bangalore (APC: 3.93%), Chennai (4.57%), Delhi (2.83%) and Mumbai (1.24%) PBCRs were seen. All the four PBCRs showed a significant increase for annual average of AARs for three and five years too.

Breast - Table 10.6 and Fig. 10.6:

Females: All the PBCRs namely, Bangalore (APC: 2.84%), Barshi (1.87%), Bhopal (2.00%), Chennai (2.44%), Delhi (1.44%) and Mumbai (1.42%) showed significant increase in trend. All the PBCRs except Barshi showed a significant increase for annual average of AARs for both three and five years whereas Barshi showed an increase in three years trend. In Bhopal the APC was 1.35% for 1988-2007 and it was 5.64% for the latter period 2008-2013. In Chennai the APC was 1.51% for 1982-1993 and it was 2.83% for the latter period 1994-2013. In Delhi the APC was 0.91% for 1988-2007 and it was 5.31% for the latter period 2008-2012.

Cervix - Table 10.7 and Fig. 10.7:

All the PBCRs, Bangalore (APC: -2.26%), Barshi (-2.23%), Bhopal (-1.81%), Chennai (-3.48%), Delhi (-2.73%) and Mumbai (-1.99%) showed a statistically significant decrease in AARs over time. All the six PBCRs showed a significant decrease for annual average of AARs for three and five years. In Bhopal the APC was -1.34% for 1988-2008 and it was -5.37% for the latter period 2009-2013. In Delhi the APC was -3.63% for 1988-2002 and it was -1.26% for the latter period 2003-2012. In Mumbai the APC was -1.44% for 1982-2007 and it was -7.87% for the latter period 2008-2012.

Corpus Uteri - Table 10.8 and Fig. 10.8:

The PBCRs at Bangalore (APC: 5.53%), Chennai (3.81%), Delhi (3.55%) and Mumbai (2.73%) showed a statistically significant increase in AAR over time. All the PBCRs showed a significant increase for annual average of AARs for both three and five years. In Chennai the APC was 2.05% for 1982-2005 and it was 12.56% for the latter period 2006-2013. In Mumbai the APC was 1.77% for 1982-2003 and it was 6.12% for the latter period 2004-2012.

Ovary - Table 10.9 and Fig. 10.9:

The PBCRs at Bangalore (APC: 2.04%), Bhopal (2.38%), Chennai (1.56%), Delhi (0.98%) and Mumbai (0.86%) showed a statistically significant increase in the occurrence of ovarian cancers over time. All the PBCRs except for Bhopal showed a significant increase for annual average of AARs for both three and five years whereas Bhopal showed an increase in three years trend.

Prostate - Table 10.10 and Fig. 10.10:

The PBCRs at Bangalore (APC: 2.82%), Chennai (4.13%), Delhi (3.36%) and Mumbai (1.17%) recorded a statistically significant increasing trend in incidence rates over time. All the PBCRs except for Bhopal showed a significant increase for annual average of AARs for both three and five years. In Mumbai registry the APC was 0.72% between 1982 and 2007.

Table 10.1(a): ALL SITES (ICD-10: C00-C97) - Males
Trends Over Time in AARs

Year	Bangalore	Barshi	Bhopal	Chennai	Delhi	Mumbai
1982	90.7			80.2		115.9
1983	83.5			85.9		109.7
1984	81.6			84.6		115.7
1985	88.8			87.0		119.0
1986	87.2			94.9		116.3
1987	99.1			98.3		116.2
1988	102.2	51.2	88.9	109.1	111.3	113.9
1989	100.8	51.4	95.9	105.2	112.5	113.2
1990	102.1	50.9	96.1	103.1	117.9	124.1
1991	102.8	47.8	100.2	105.9	111.8	114.1
1992	101.0	47.4	99.7	104.6	123.5	114.1
1993	99.8	52.1	100.0	102.5	124.1	113.9
1994	87.7	39.6	102.2	103.6	123.0	111.2
1995	92.2	44.6	102.4	105.4	110.4	109.0
1996	82.3	42.5	103.2	103.2	119.0	112.2
1997	83.0	38.2	101.8	105.4	117.7	103.6
1998	87.4	50.8	100.8	105.4	120.0	106.2
1999	86.3	41.4	103.4	108.3	109.8	103.1
2000	94.6	47.7	102.7	108.6	110.9	101.4
2001	93.4	49.7	102.1	104.9	110.2	100.1
2002	94.1	45.3	101.0	106.5	122.5	99.2
2003	92.7	49.6	98.6	108.4	110.7	95.3
2004	91.8	52.8	100.3	109.7	119.1	96.7
2005	98.3	52.1	100.6	112.0	118.5	97.1
2006	100.1	47.1	101.9	114.1	125.2	102.3
2007	107.8	58.1	99.4	117.8	121.9	97.0
2008	103.1	54.0	95.8	116.4	119.8	96.9
2009	98.5	57.6	101.4	120.1	131.8	101.0
2010	101.4	47.6	101.3	115.7	141.5	98.6
2011	102.2	46.8	97.8	116.7	144.8	105.1
2012	105.4	48.1	101.2	117.9	149.5	113.1
2013		53.4	101.9	114.4		
2014		60.1				
Slope (b)	0.364	0.259	0.128	0.945	0.941	-0.671
P-Value	0.015	0.046	0.123	0.000	0.001	0.000
3 Yrs Trend						
Slope (b)	0.353	0.253	0.124	0.930	0.815	-0.723
P-Value	0.199	0.154	0.308	0.000	0.080	0.002
5 Yrs Trend						
Slope (b)	0.359	0.276	0.101	0.978	0.909	-0.727
P-Value	0.296	0.284	0.534	0.012	0.139	0.016

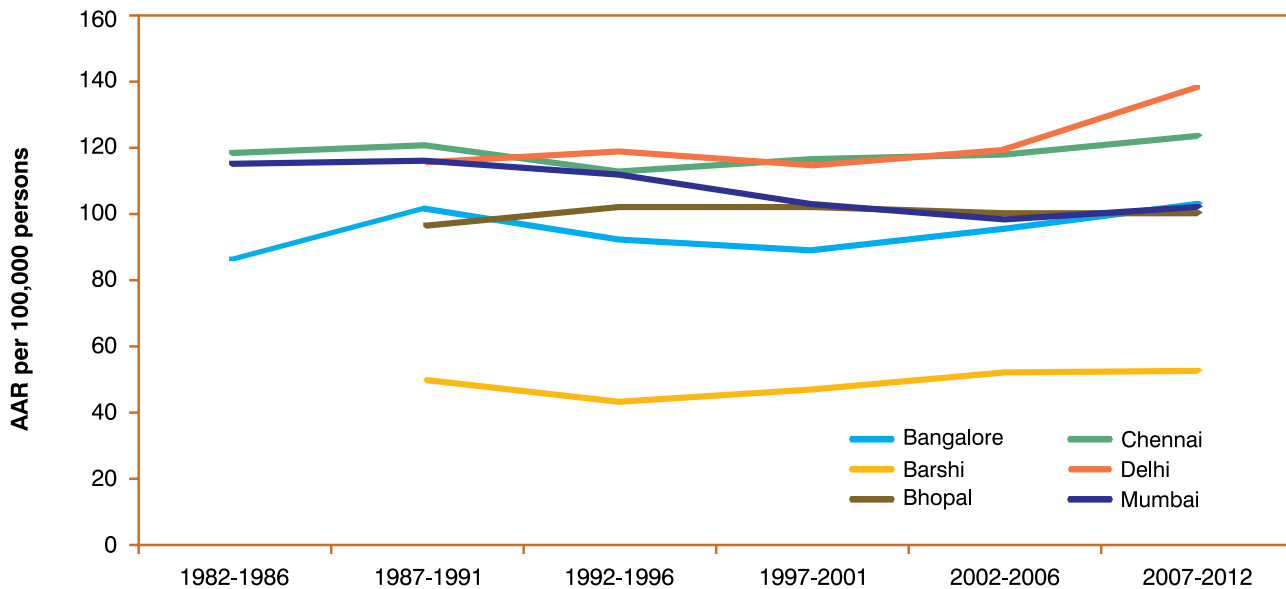
Table 10.1(b): ALL SITES (ICD-10: C00-C97) - Males
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Barshi	Bhopal	Chennai	Delhi	Mumbai
	JP0*	JP1*	JP1*	JP1*	JP1*	JP1*
1982	89.3			79.9		120.7
1983	89.6			83.2		119.7
1984	90.0			86.7		118.6
1985	90.3			90.2		117.6
1986	90.7			94.0		116.5
1987	91.0			97.9		115.5
1988	91.4	52.7	91.6	101.9	115.2	114.5
1989	91.7	51.3	93.6	102.5	115.4	113.4
1990	92.1	49.9	95.8	103.1	115.6	112.4
1991	92.4	48.5	97.9	103.6	115.7	111.4
1992	92.8	47.2	100.1	104.2	115.9	110.5
1993	93.2	45.9	102.4	104.8	116.1	109.5
1994	93.5	44.7	102.3	105.4	116.2	108.5
1995	93.9	43.4	102.1	106.0	116.4	107.6
1996	94.2	44.0	102.0	106.6	116.6	106.6
1997	94.6	44.6	101.8	107.1	116.7	105.7
1998	95.0	45.1	101.7	107.7	116.9	104.7
1999	95.3	45.7	101.6	108.3	117.1	103.8
2000	95.7	46.3	101.4	108.9	117.2	102.9
2001	96.1	46.9	101.3	109.6	117.4	102.0
2002	96.5	47.5	101.1	110.2	117.6	101.1
2003	96.8	48.1	101.0	110.8	117.7	100.2
2004	97.2	48.7	100.9	111.4	117.9	99.3
2005	97.6	49.4	100.7	112.0	118.1	98.4
2006	98.0	50.0	100.6	112.6	118.2	97.5
2007	98.4	50.6	100.5	113.3	118.4	96.7
2008	98.7	51.3	100.3	113.9	124.4	98.9
2009	99.1	51.9	100.2	114.5	130.8	101.2
2010	99.5	52.6	100.0	115.2	137.4	103.6
2011	99.9	53.3	99.9	115.8	144.4	106.0
2012	100.3	54.0	99.8	116.4	151.8	108.5
2013		54.7	99.6	117.1		
2014		55.4				
APC0	0.39*	0.52	0.13	0.93*	0.74*	-0.62*
APC1	-	-2.73*	2.26*	4.14*	0.14	-0.89*
APC2	-	1.29*	-0.14	0.56*	5.09*	2.34

Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.1: ALL SITES - Males (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model

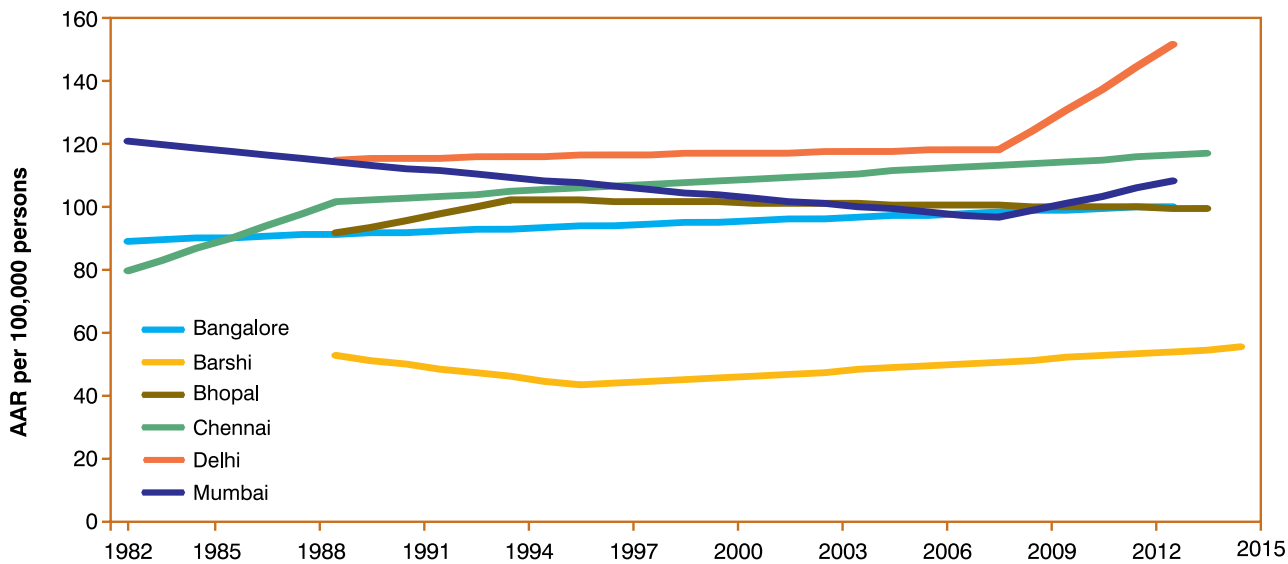


Table 10.2(a): ALL SITES (ICD-10: C00-C97) - Females
Trends Over Time in AARs

Year	Bangalore	Barshi	Bhopal	Chennai	Delhi	Mumbai
1982	117.5			106.2		107.7
1983	105.8			118.6		101.0
1984	106.1			116.4		107.8
1985	98.9			121.8		115.0
1986	106.0			128.9		111.9
1987	118.3			127.1		108.8
1988	120.7	48.9	89.5	119.4	126.9	111.2
1989	114.2	49.7	90.1	121.8	133.0	108.4
1990	128.8	56.3	90.9	121.5	135.3	118.4
1991	131.8	63.3	91.3	116.3	128.0	119.3
1992	117.9	61.8	94.0	114.3	134.3	121.4
1993	126.2	54.4	93.6	113.9	136.9	117.7
1994	107.3	59.2	94.6	110.9	129.2	113.0
1995	110.9	57.3	90.6	110.5	125.5	111.7
1996	97.7	52.1	94.7	114.1	122.0	111.4
1997	100.4	50.0	97.2	117.3	128.3	111.3
1998	104.3	52.9	89.7	117.5	123.8	107.4
1999	104.9	51.9	92.0	115.5	119.1	104.8
2000	111.6	49.7	93.8	114.6	115.9	103.9
2001	112.4	59.9	92.8	117.8	118.4	103.5
2002	113.3	55.7	95.3	113.6	115.5	101.4
2003	113.3	59.3	86.1	114.1	113.9	101.9
2004	118.4	62.5	104.1	118.6	113.4	106.6
2005	117.6	64.1	99.9	119.7	117.8	103.7
2006	125.1	56.0	98.5	123.4	118.2	113.5
2007	134.7	53.8	102.6	120.8	119.3	110.2
2008	125.6	62.6	103.1	117.7	118.4	116.1
2009	123.8	63.8	101.7	123.4	120.1	110.7
2010	122.8	61.1	105.6	126.6	132.6	109.2
2011	122.6	59.6	102.6	124.5	141.6	115.8
2012	126.0	59.3	108.5	123.6	144.8	118.4
2013		61.2	108.1	128.7		
2014		60.6				
Slope (b)	0.431	0.295	0.668	0.180	-0.183	-0.003
P-Value	0.029	0.010	0.000	0.082	0.491	1.000
3 Yrs Trend						
Slope (b)	0.417	0.291	0.691	0.100	-0.324	-0.024
P-Value	0.230	0.086	0.000	0.565	0.454	0.923
5 Yrs Trend						
Slope (b)	0.430	0.283	0.629	0.092	-0.208	-0.043
P-Value	0.296	0.127	0.030	0.643	0.716	0.851

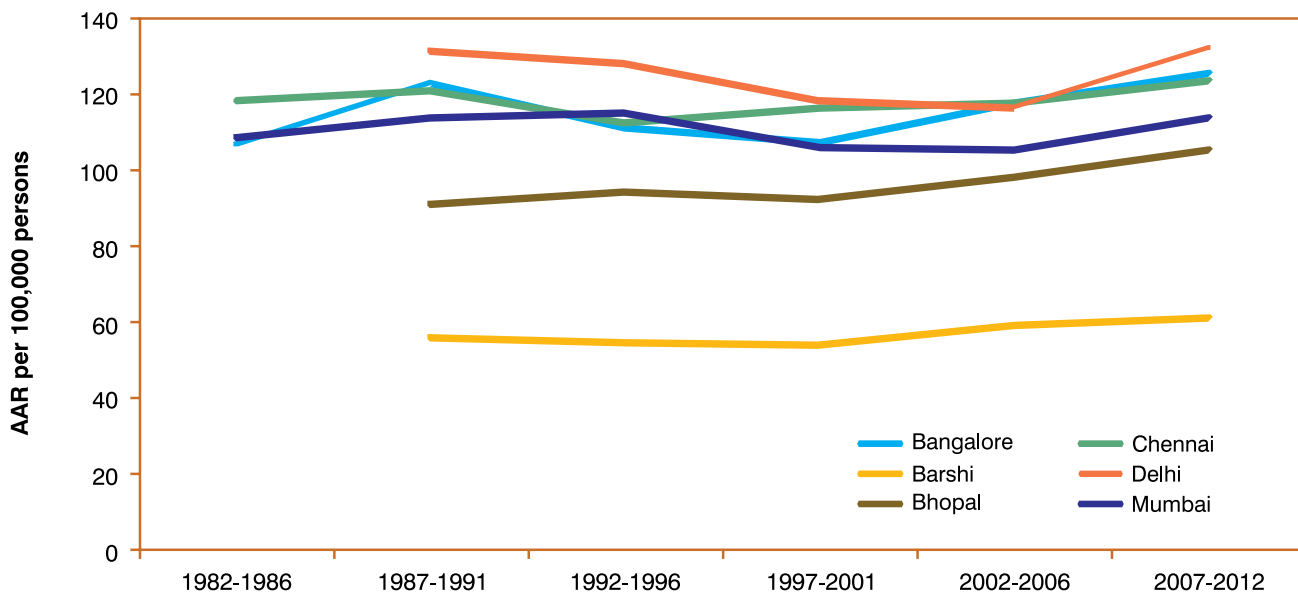
Table 10.2(b): ALL SITES (ICD-10: C00-C97) - Females
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Barshi	Bhopal	Chennai	Delhi	Mumbai
	JP0*	JP0*	JP1*	JP1*	JP1*	JP0*
1982	108.9			119.1		110.4
1983	109.3			118.9		110.4
1984	109.7			118.7		110.3
1985	110.1			118.5		110.3
1986	110.6			118.3		110.3
1987	111.0			118.1		110.3
1988	111.4	53.3	90.9	117.9	134.2	110.3
1989	111.8	53.6	91.1	117.6	133.0	110.3
1990	112.2	53.9	91.4	117.4	131.8	110.3
1991	112.7	54.2	91.7	117.2	130.7	110.3
1992	113.1	54.4	91.9	117.0	129.5	110.3
1993	113.5	54.7	92.2	116.8	128.4	110.3
1994	113.9	55.0	92.4	116.6	127.3	110.3
1995	114.4	55.3	92.7	116.4	126.1	110.3
1996	114.8	55.6	92.9	116.2	125.0	110.3
1997	115.2	55.9	93.2	116.0	123.9	110.3
1998	115.7	56.2	93.5	115.8	122.8	110.3
1999	116.1	56.5	93.7	115.6	121.8	110.3
2000	116.5	56.8	94.0	115.4	120.7	110.3
2001	117.0	57.1	94.3	115.2	119.6	110.3
2002	117.4	57.4	94.5	115.0	118.6	110.3
2003	117.9	57.7	94.8	116.1	117.5	110.3
2004	118.3	58.0	96.1	117.2	116.5	110.3
2005	118.8	58.3	97.5	118.3	115.5	110.3
2006	119.2	58.6	98.9	119.4	114.5	110.2
2007	119.7	58.9	100.3	120.5	113.5	110.2
2008	120.1	59.3	101.7	121.7	119.2	110.2
2009	120.6	59.6	103.1	122.9	125.3	110.2
2010	121.0	59.9	104.6	124.0	131.7	110.2
2011	121.5	60.2	106.0	125.2	138.4	110.2
2012	121.9	60.5	107.5	126.4	145.4	110.2
2013		60.8	109.0	127.6		
2014		61.2				
APC0	0.38*	0.53*	0.68*	0.15	-0.16	0.00
APC1	-	-	0.28	-0.18	-0.88*	-
APC2	-	-	1.41*	0.95*	5.09*	-

Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.2: ALL SITES - Females (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model

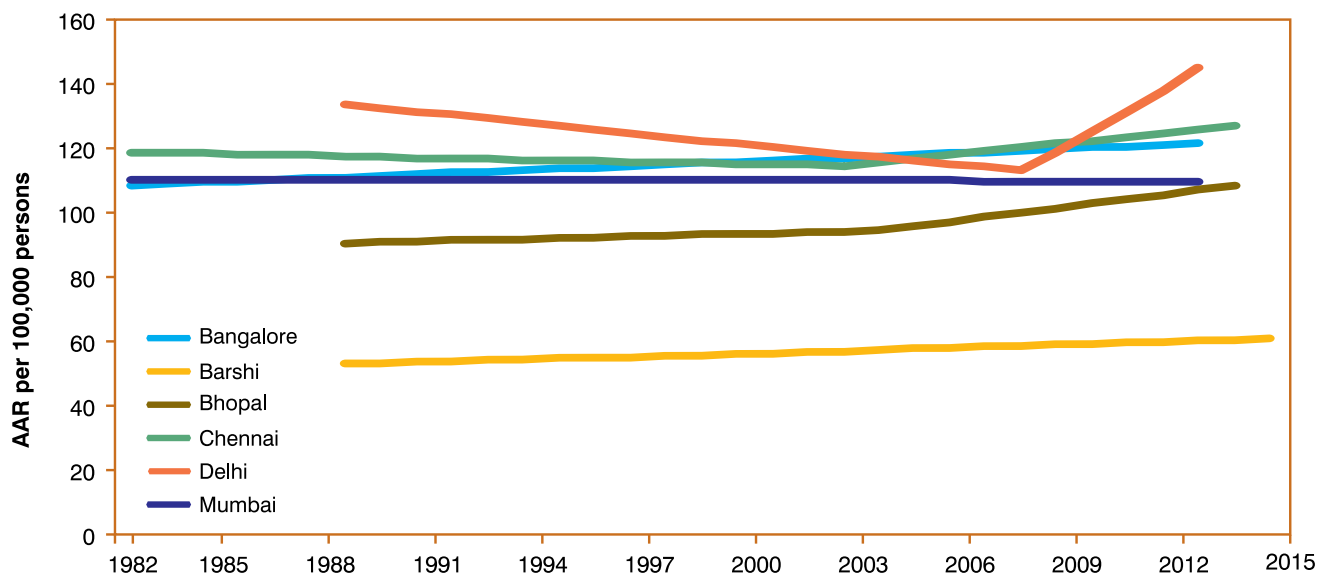


Table 10.3(a): Colon (ICD-10: C18) - Males
Trends Over Time in AARs

Year	Bangalore	Chennai	Delhi	Mumbai
1982	1.8	1.4		2.4
1983	1.8	2.0		2.7
1984	2.2	0.7		2.3
1985	2.4	1.4		2.3
1986	2.1	1.7		3.2
1987	1.9	1.2		4.0
1988	2.2	1.6	2.0	2.6
1989	2.4	1.8	1.9	3.3
1990	2.6	1.3	2.1	3.8
1991	2.6	1.9	1.9	3.2
1992	2.0	1.5	2.5	3.1
1993	2.6	1.9	2.5	3.0
1994	1.8	1.8	2.5	4.2
1995	2.4	1.7	2.9	2.7
1996	2.0	1.9	2.1	3.1
1997	2.0	1.7	2.5	3.4
1998	2.4	1.7	2.3	3.2
1999	2.3	1.6	3.2	2.9
2000	3.2	2.1	2.4	3.3
2001	2.9	2.0	2.3	2.8
2002	4.2	2.1	2.5	3.0
2003	3.1	2.6	2.6	2.8
2004	3.0	2.4	3.0	3.3
2005	3.1	1.7	2.6	3.1
2006	3.8	3.3	3.0	3.7
2007	4.3	3.2	2.4	4.0
2008	3.4	3.5	2.9	3.2
2009	3.4	3.7	3.2	3.5
2010	3.7	3.6	3.6	3.8
2011	4.0	4.6	3.6	3.9
2012	3.8	4.3	3.7	4.1
2013		4.5		
2014				
Slope (b)	0.070	0.092	0.055	0.030
P-Value	0.000	0.000	0.000	0.003
3 Yrs Trend				
Slope (b)	0.070	0.097	0.052	0.028
P-Value	0.001	0.000	0.005	0.023
5 Yrs Trend				
Slope (b)	0.069	0.086	0.056	0.029
P-Value	0.009	0.021	0.020	0.116

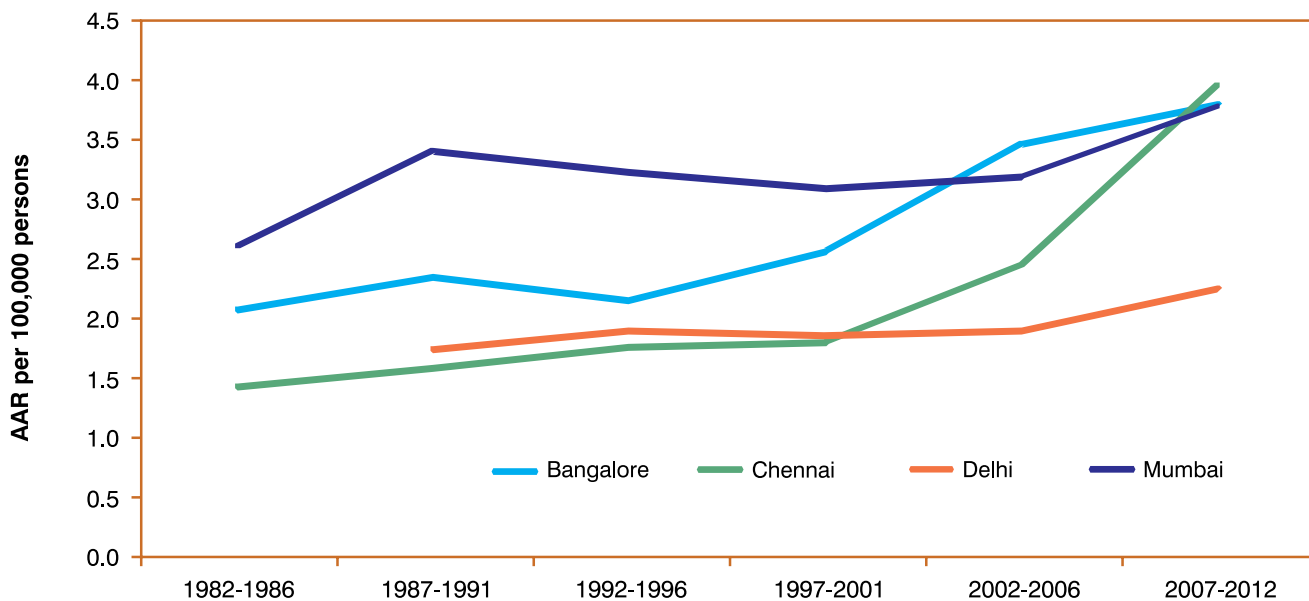
Table 10.3(b): Colon (ICD-10: C18) - Males
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Chennai	Delhi	Mumbai
	JP0*	JP1*	JP0*	JP0*
1982	1.8	1.3		2.7
1983	1.9	1.3		2.8
1984	1.9	1.4		2.8
1985	2.0	1.4		2.8
1986	2.0	1.4		2.9
1987	2.1	1.5		2.9
1988	2.1	1.5	2.0	2.9
1989	2.2	1.5	2.1	2.9
1990	2.2	1.6	2.1	3.0
1991	2.3	1.6	2.2	3.0
1992	2.4	1.6	2.2	3.0
1993	2.4	1.7	2.2	3.1
1994	2.5	1.7	2.3	3.1
1995	2.5	1.7	2.3	3.1
1996	2.6	1.8	2.4	3.2
1997	2.7	1.8	2.4	3.2
1998	2.7	1.8	2.5	3.2
1999	2.8	1.9	2.6	3.2
2000	2.9	1.9	2.6	3.3
2001	2.9	2.0	2.7	3.3
2002	3.0	2.1	2.7	3.3
2003	3.1	2.3	2.8	3.4
2004	3.2	2.4	2.8	3.4
2005	3.2	2.6	2.9	3.4
2006	3.3	2.8	3.0	3.5
2007	3.4	3.1	3.0	3.5
2008	3.5	3.3	3.1	3.6
2009	3.6	3.5	3.1	3.6
2010	3.7	3.8	3.2	3.6
2011	3.8	4.1	3.3	3.7
2012	3.9	4.4	3.4	3.7
2013		4.8		
2014				
APC0	2.52*	3.96*	2.12*	1.00*
APC1	-	2.09*	-	-
APC2	-	7.73*	-	-

Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.3: Colon - Males (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model

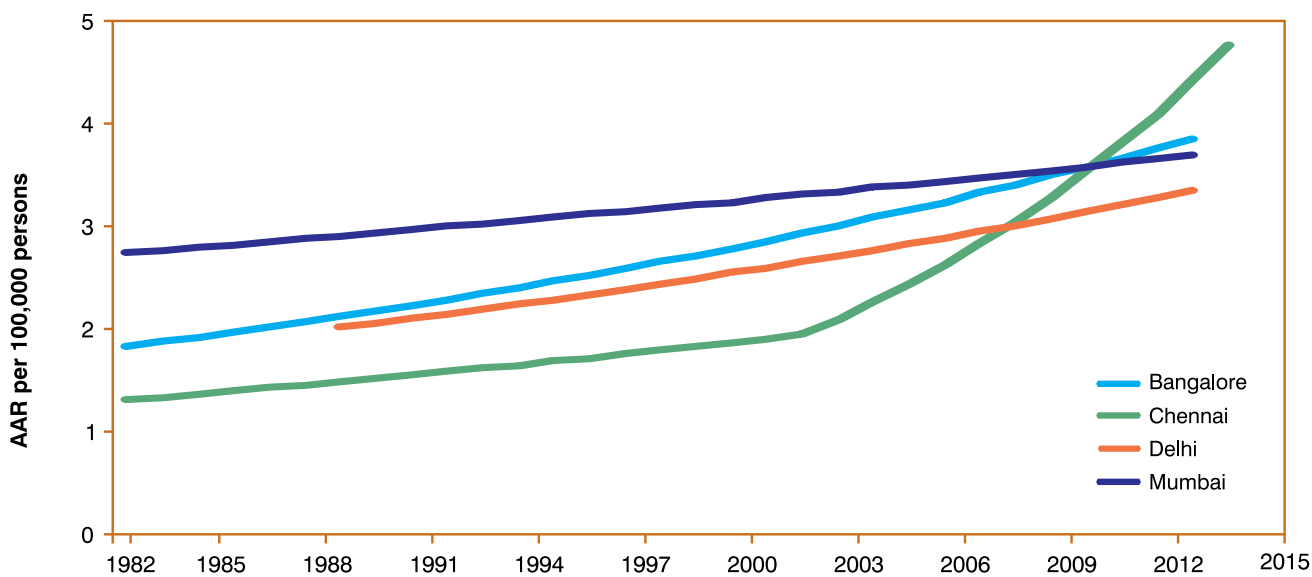


Table 10.4(a): Rectum (ICD-10: C19-C20) - Males
Trends Over Time in AARs

Year	Bangalore	Chennai	Delhi	Mumbai
1982	2.5	2.2		3.1
1983	1.8	1.8		2.2
1984	1.8	2.1		2.9
1985	2.2	1.8		2.6
1986	2.5	2.4		2.2
1987	2.3	2.0		2.3
1988	2.9	3.0	1.8	2.2
1989	3.2	3.2	1.9	2.7
1990	2.9	2.7	2.4	3.3
1991	2.6	2.3	2.1	2.9
1992	3.0	2.7	2.3	2.9
1993	3.1	2.3	2.3	2.6
1994	2.1	2.2	2.6	2.3
1995	2.2	3.1	1.5	2.9
1996	3.0	2.1	1.5	2.9
1997	2.2	3.0	1.6	2.4
1998	3.2	3.3	1.9	2.5
1999	2.8	3.4	1.6	2.4
2000	2.3	3.5	1.9	2.1
2001	3.3	3.4	1.9	2.9
2002	3.1	2.8	2.4	2.8
2003	3.3	3.2	2.2	3.0
2004	2.7	3.4	2.2	2.6
2005	3.4	4.1	2.2	2.7
2006	3.5	3.5	2.0	3.4
2007	4.3	4.4	2.1	2.8
2008	4.3	3.6	2.3	2.5
2009	4.2	4.8	2.5	2.9
2010	3.2	4.5	2.7	2.6
2011	3.4	4.0	2.7	2.6
2012	3.5	3.9	3.3	3.2
2013		4.0		
2014				
Slope (b)	0.053	0.078	0.027	0.007
P-Value	0.000	0.000	0.016	0.280
3 Yrs Trend				
Slope (b)	0.053	0.077	0.023	0.007
P-Value	0.002	0.000	0.161	0.303
5 Yrs Trend				
Slope (b)	0.053	0.078	0.028	0.006
P-Value	0.007	0.002	0.208	0.419

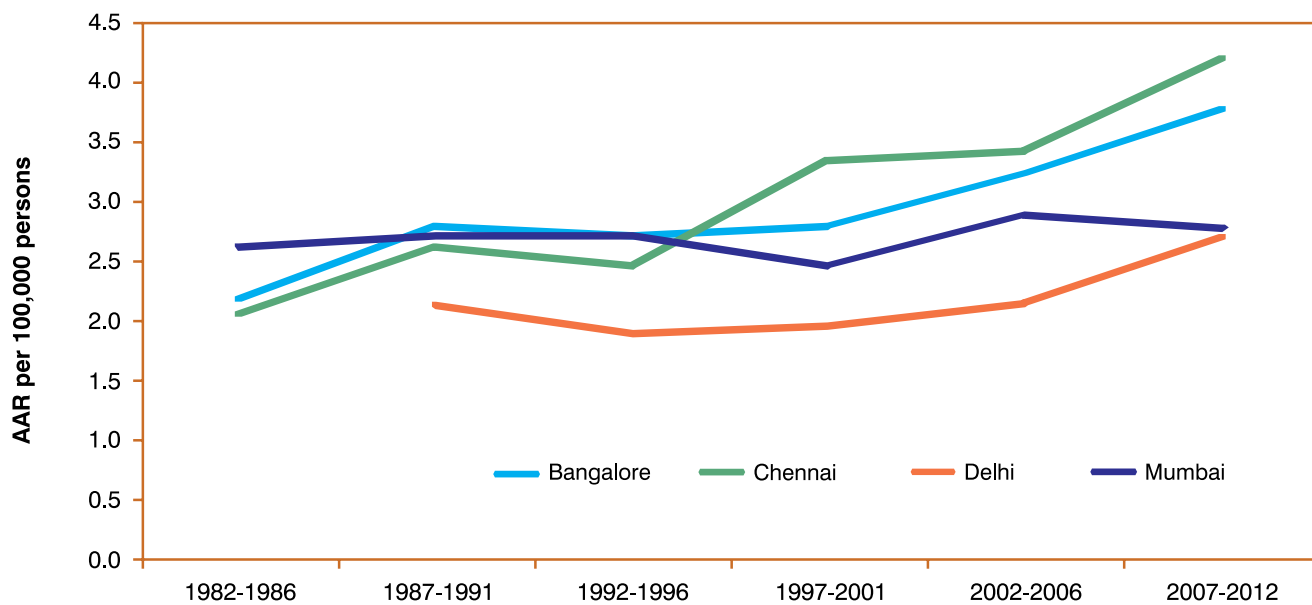
Table 10.4(b): Rectum (ICD-10: C19-C20) - Males
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Chennai	Delhi	Mumbai
	JP0*	JP0*	JP1*	JP0*
1982	2.2	2.0		2.5
1983	2.2	2.1		2.6
1984	2.3	2.1		2.6
1985	2.3	2.2		2.6
1986	2.3	2.2		2.6
1987	2.4	2.3		2.6
1988	2.4	2.3	2.2	2.6
1989	2.5	2.4	2.2	2.6
1990	2.5	2.5	2.1	2.6
1991	2.6	2.5	2.0	2.6
1992	2.6	2.6	2.0	2.6
1993	2.7	2.7	1.9	2.6
1994	2.7	2.7	1.9	2.6
1995	2.8	2.8	1.8	2.7
1996	2.8	2.9	1.8	2.7
1997	2.9	2.9	1.7	2.7
1998	2.9	3.0	1.8	2.7
1999	3.0	3.1	1.8	2.7
2000	3.0	3.2	1.9	2.7
2001	3.1	3.3	2.0	2.7
2002	3.1	3.3	2.0	2.7
2003	3.2	3.4	2.1	2.7
2004	3.3	3.5	2.2	2.7
2005	3.3	3.6	2.2	2.7
2006	3.4	3.7	2.3	2.8
2007	3.4	3.8	2.4	2.8
2008	3.5	3.9	2.5	2.8
2009	3.6	4.0	2.6	2.8
2010	3.6	4.1	2.6	2.8
2011	3.7	4.2	2.7	2.8
2012	3.8	4.3	2.8	2.8
2013		4.4		
2014				
APC0	1.86*	2.57*	1.29*	0.32
APC1	-	-	-2.87	-
APC2	-	-	3.34*	-

Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.4: Rectum - Males (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model

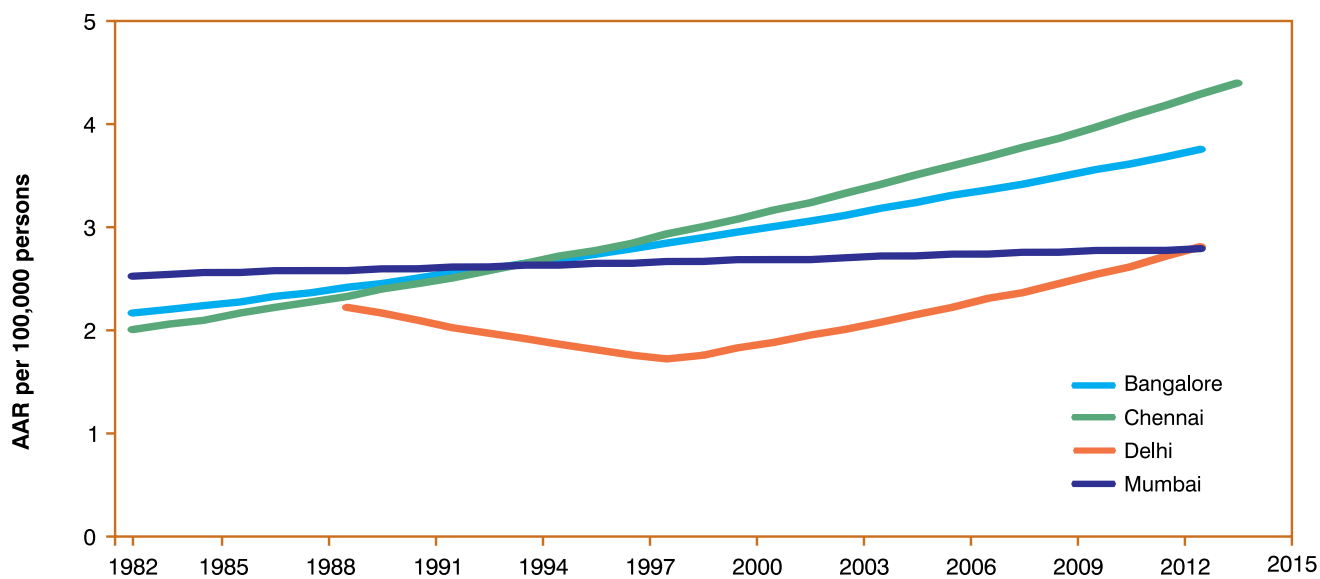


Table 10.5(a): Lung (ICD-10: C33-C34) - Females
Trends Over Time in AARs

Year	Bangalore	Chennai	Delhi	Mumbai
1982	1.2	1.1		3.2
1983	1.6	1.3		3.0
1984	2.0	0.8		3.8
1985	1.6	1.6		2.6
1986	1.3	1.4		1.8
1987	2.1	1.3		2.6
1988	1.4	1.1	2.6	3.2
1989	1.5	1.6	2.1	3.3
1990	2.0	2.7	3.2	2.9
1991	2.0	2.1	2.2	2.9
1992	1.9	3.1	2.9	4.0
1993	2.1	2.1	2.7	3.4
1994	1.3	1.6	2.7	3.2
1995	2.1	1.9	2.5	3.1
1996	1.1	3.1	2.8	3.2
1997	1.2	2.5	2.8	4.3
1998	2.5	1.9	2.8	3.1
1999	1.9	2.3	3.3	3.0
2000	1.8	2.2	2.6	3.2
2001	2.6	3.4	2.9	2.9
2002	2.3	2.8	3.2	3.1
2003	3.4	2.8	3.3	3.7
2004	3.3	2.5	3.4	3.4
2005	2.7	3.6	3.6	2.8
2006	3.2	3.9	3.6	3.6
2007	3.8	4.1	3.5	3.5
2008	4.6	4.3	4.1	4.4
2009	4.1	4.3	4.0	3.5
2010	4.4	4.7	4.6	3.7
2011	3.5	3.1	5.3	4.2
2012	4.9	4.3	4.9	6.0
2013		4.2		
2014				
Slope (b)	0.099	0.107	0.095	0.043
P-Value	0.000	0.000	0.000	0.002
3 Yrs Trend				
Slope (b)	0.095	0.107	0.089	0.040
P-Value	0.001	0.000	0.002	0.023
5 Yrs Trend				
Slope (b)	0.098	0.105	0.096	0.045
P-Value	0.016	0.000	0.026	0.021

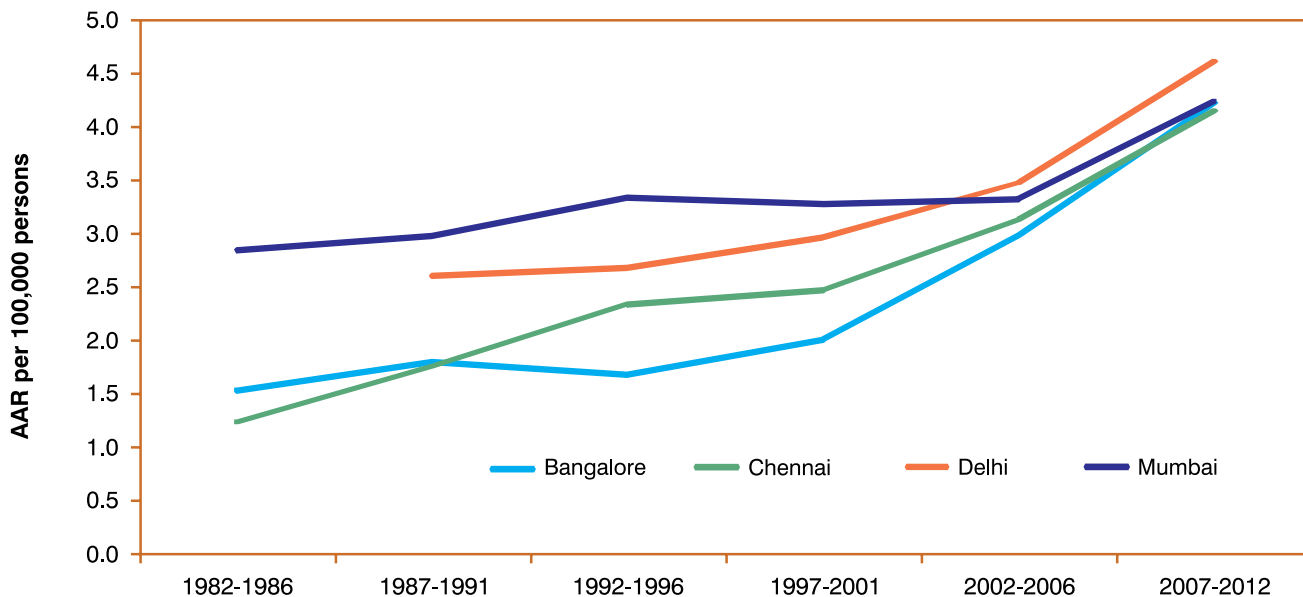
Table 10.5(b): Lung (ICD-10: C33-C34) - Females
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Chennai	Delhi	Mumbai
	JP1*	JP0*	JP1*	JP0*
1982	1.6	1.2		2.8
1983	1.6	1.2		2.8
1984	1.6	1.3		2.8
1985	1.6	1.4		2.9
1986	1.6	1.4		2.9
1987	1.6	1.5		2.9
1988	1.6	1.6	2.5	3.0
1989	1.6	1.6	2.5	3.0
1990	1.7	1.7	2.6	3.0
1991	1.7	1.8	2.6	3.1
1992	1.7	1.9	2.6	3.1
1993	1.7	1.9	2.7	3.2
1994	1.7	2.0	2.7	3.2
1995	1.7	2.1	2.7	3.2
1996	1.7	2.2	2.8	3.3
1997	1.7	2.3	2.8	3.3
1998	1.9	2.4	2.8	3.4
1999	2.0	2.5	2.9	3.4
2000	2.1	2.6	2.9	3.4
2001	2.3	2.8	2.9	3.5
2002	2.5	2.9	3.1	3.5
2003	2.6	3.0	3.2	3.6
2004	2.8	3.2	3.4	3.6
2005	3.1	3.3	3.6	3.7
2006	3.3	3.5	3.7	3.7
2007	3.5	3.6	3.9	3.7
2008	3.8	3.8	4.1	3.8
2009	4.1	4.0	4.3	3.8
2010	4.4	4.1	4.5	3.9
2011	4.7	4.3	4.7	3.9
2012	5.0	4.5	5.0	4.0
2013		4.7		
2014				
APC0	3.93*	4.57*	2.83*	1.24*
APC1	0.56	-	1.23	-
APC2	7.42*	-	4.91*	-

Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.5: Lung - Females (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model

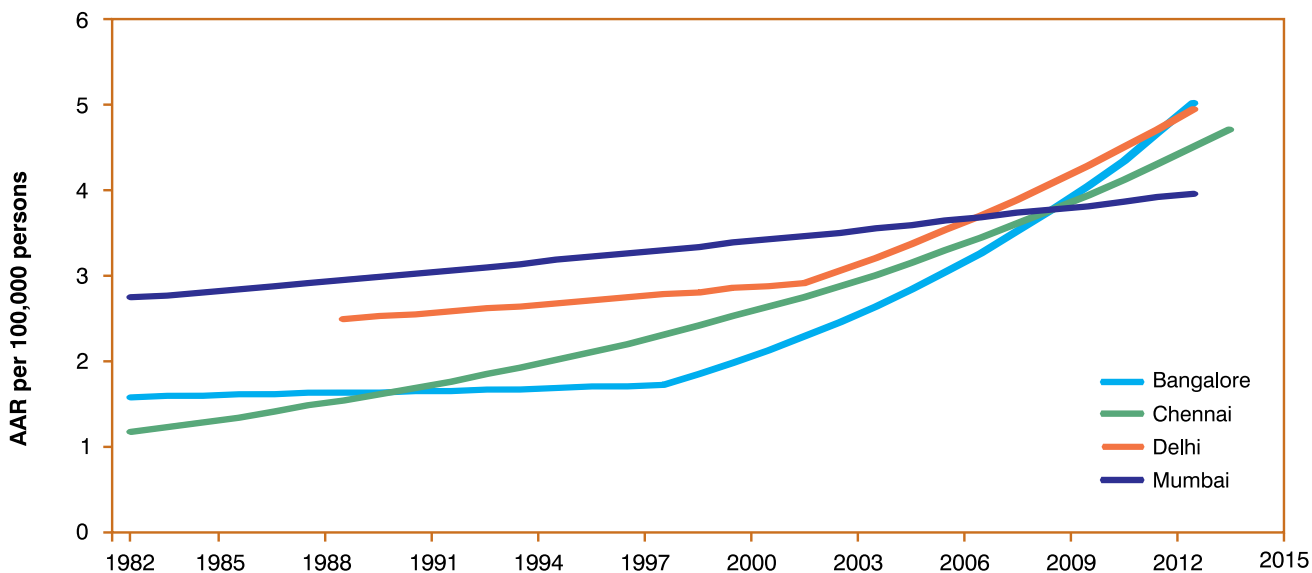


Table 10.6(a): Breast (ICD-10: C50) - Females
Trends Over Time in AARs

Year	Bangalore	Barshi	Bhopal	Chennai	Delhi	Mumbai
1982	15.8			18.4		20.8
1983	16.0			18.2		20.6
1984	17.0			18.7		22.4
1985	16.2			18.7		24.7
1986	14.5			20.1		24.9
1987	19.0			19.9		22.2
1988	18.6	7.2	18.2	22.4	24.8	22.7
1989	20.2	6.6	19.5	22.1	26.9	23.5
1990	20.3	9.8	19.8	21.3	27.1	27.7
1991	24.7	10.6	19.4	20.5	27.7	30.3
1992	21.2	9.4	20.2	20.2	26.3	28.7
1993	22.2	4.4	21.0	21.5	27.1	27.6
1994	19.2	9.0	21.1	22.2	26.9	27.5
1995	21.6	8.2	19.1	21.4	28.2	26.5
1996	20.0	11.0	19.1	23.3	26.5	27.3
1997	20.9	9.4	20.5	26.0	28.0	26.8
1998	24.6	7.3	21.9	24.4	30.0	26.4
1999	22.5	5.5	21.8	25.6	29.4	27.1
2000	25.2	7.5	22.1	25.1	29.3	25.7
2001	27.4	9.9	21.8	28.1	30.3	27.2
2002	26.8	12.4	22.7	29.5	27.9	27.9
2003	27.1	9.1	21.4	30.4	28.9	27.9
2004	28.9	7.7	24.9	32.4	30.2	30.1
2005	32.7	12.0	26.7	33.2	31.6	30.2
2006	32.2	7.2	24.8	31.8	31.6	34.0
2007	36.4	8.4	21.8	31.3	31.7	32.8
2008	33.7	10.7	26.4	30.5	31.0	33.8
2009	33.7	13.1	26.0	32.3	32.2	30.8
2010	31.6	10.7	27.8	34.3	35.3	33.7
2011	33.0	12.5	30.1	35.8	39.1	34.7
2012	34.4	10.0	31.6	36.3	41.0	33.6
2013		13.0	34.4	39.5		
2014		14.0				
Slope (b)	0.674	0.175	0.483	0.632	0.447	0.388
P-Value	0.000	0.002	0.000	0.000	0.000	0.000
3 Yrs Trend						
Slope (b)	0.678	0.173	0.509	0.644	0.422	0.387
P-Value	0.000	0.009	0.001	0.000	0.002	0.000
5 Yrs Trend						
Slope (b)	0.677	0.138	0.476	0.628	0.446	0.373
P-Value	0.001	0.154	0.016	0.001	0.015	0.003

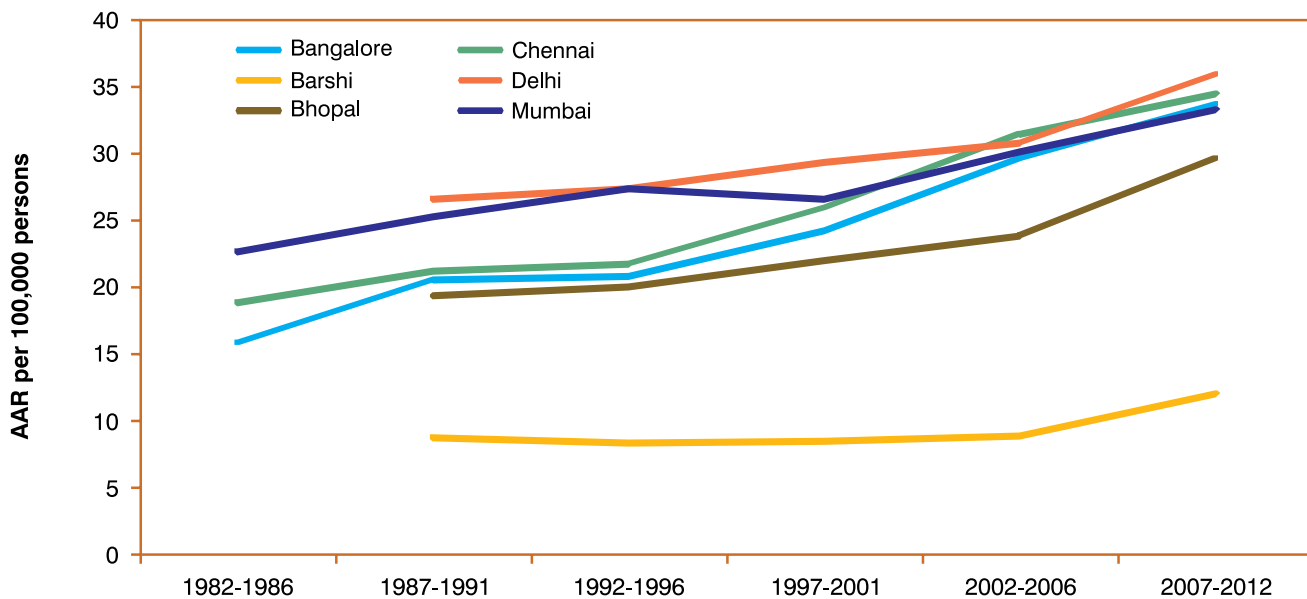
Table 10.6(b): Breast (ICD-10: C50) - Females
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Barshi	Bhopal	Chennai	Delhi	Mumbai
	JP0*	JP0*	JP1*	JP1*	JP1*	JP0*
1982	15.5			18.5		22.2
1983	16.0			18.8		22.5
1984	16.4			19.1		22.9
1985	16.9			19.4		23.2
1986	17.4			19.7		23.5
1987	17.9			20.0		23.8
1988	18.4	7.2	18.7	20.3	26.0	24.2
1989	18.9	7.4	19.0	20.6	26.3	24.5
1990	19.4	7.5	19.3	20.9	26.5	24.9
1991	20.0	7.6	19.5	21.2	26.7	25.2
1992	20.5	7.8	19.8	21.5	27.0	25.6
1993	21.1	7.9	20.0	21.8	27.2	26.0
1994	21.7	8.1	20.3	22.5	27.5	26.3
1995	22.3	8.2	20.6	23.1	27.7	26.7
1996	23.0	8.4	20.9	23.7	28.0	27.1
1997	23.6	8.5	21.1	24.4	28.2	27.5
1998	24.3	8.7	21.4	25.1	28.5	27.9
1999	25.0	8.9	21.7	25.8	28.7	28.3
2000	25.7	9.0	22.0	26.5	29.0	28.7
2001	26.4	9.2	22.3	27.3	29.3	29.1
2002	27.2	9.4	22.6	28.1	29.5	29.5
2003	27.9	9.5	22.9	28.9	29.8	29.9
2004	28.7	9.7	23.2	29.7	30.1	30.3
2005	29.5	9.9	23.5	30.5	30.3	30.8
2006	30.4	10.1	23.9	31.4	30.6	31.2
2007	31.2	10.3	24.2	32.3	30.9	31.6
2008	32.1	10.5	25.5	33.2	32.5	32.1
2009	33.0	10.7	27.0	34.1	34.3	32.5
2010	34.0	10.9	28.5	35.1	36.1	33.0
2011	34.9	11.1	30.1	36.1	38.0	33.5
2012	35.9	11.3	31.8	37.1	40.0	34.0
2013		11.5	33.6	38.1		
2014		11.7				
APC0	2.84*	1.87*	2.00*	2.44*	1.44*	1.42*
APC1	-		1.35*	1.51*	0.91*	-
APC2	-		5.64*	2.83*	5.31*	-

Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.6: Breast - Females (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model

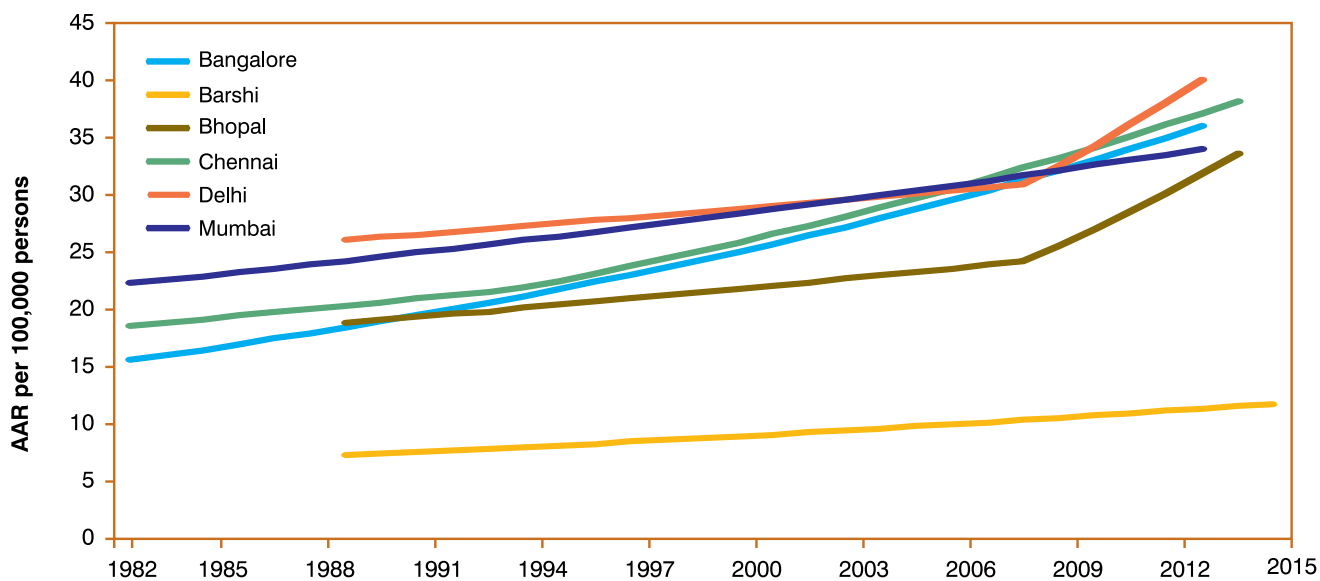


Table 10.7(a): Cervix (ICD-10: C53)
Trends Over Time in AARs

Year	Bangalore	Barshi	Bhopal	Chennai	Delhi	Mumbai
1982	32.4			41.0		17.9
1983	30.6			43.5		17.5
1984	28.2			41.9		18.6
1985	26.8			45.8		18.1
1986	26.2			50.1		18.4
1987	29.3			43.5		17.5
1988	29.1	22.1	21.7	38.8	25.9	19.0
1989	24.0	24.9	21.8	39.2	28.4	17.4
1990	29.2	27.8	21.1	34.7	28.1	17.9
1991	27.3	34.0	24.4	33.4	25.0	19.3
1992	25.5	31.4	20.8	30.7	27.3	18.4
1993	28.2	27.7	21.4	32.1	28.4	16.9
1994	23.2	30.8	22.4	29.7	24.6	15.4
1995	23.3	31.0	21.2	27.6	22.5	14.6
1996	19.8	23.9	22.0	26.7	21.7	15.6
1997	19.8	21.8	21.6	29.0	22.4	16.1
1998	19.0	21.8	19.9	28.2	19.1	15.2
1999	18.6	23.1	21.1	28.8	18.3	15.0
2000	21.8	20.8	20.0	29.8	20.0	14.3
2001	16.9	25.9	18.6	29.1	19.7	14.1
2002	18.4	20.2	19.7	24.1	15.7	13.3
2003	17.7	17.3	17.1	21.1	17.0	11.9
2004	18.5	24.3	20.3	22.5	15.6	14.3
2005	17.7	23.7	16.3	21.7	18.6	12.8
2006	19.9	19.9	17.8	20.4	17.7	14.5
2007	19.5	15.1	17.5	17.7	17.3	14.5
2008	17.3	22.7	18.4	16.9	16.2	13.9
2009	17.0	21.5	16.6	16.7	13.7	10.5
2010	17.3	15.4	15.8	19.2	17.6	10.4
2011	16.1	19.3	14.3	17.7	15.4	9.5
2012	15.3	16.2	13.8	15.7	15.5	9.0
2013		15.9	13.9	16.1		
2014		16.1				
Slope (b)	-0.515	-0.503	-0.336	-0.997	-0.576	-0.286
P-Value	0.000	0.000	0.000	0.000	0.000	0.000
3 Yrs Trend						
Slope (b)	-0.521	-0.510	-0.344	-0.990	-0.594	-0.277
P-Value	0.000	0.002	0.000	0.000	0.000	0.000
5 Yrs Trend						
Slope (b)	-0.514	-0.518	-0.337	-1.026	-0.581	-0.283
P-Value	0.001	0.003	0.005	0.000	0.007	0.001

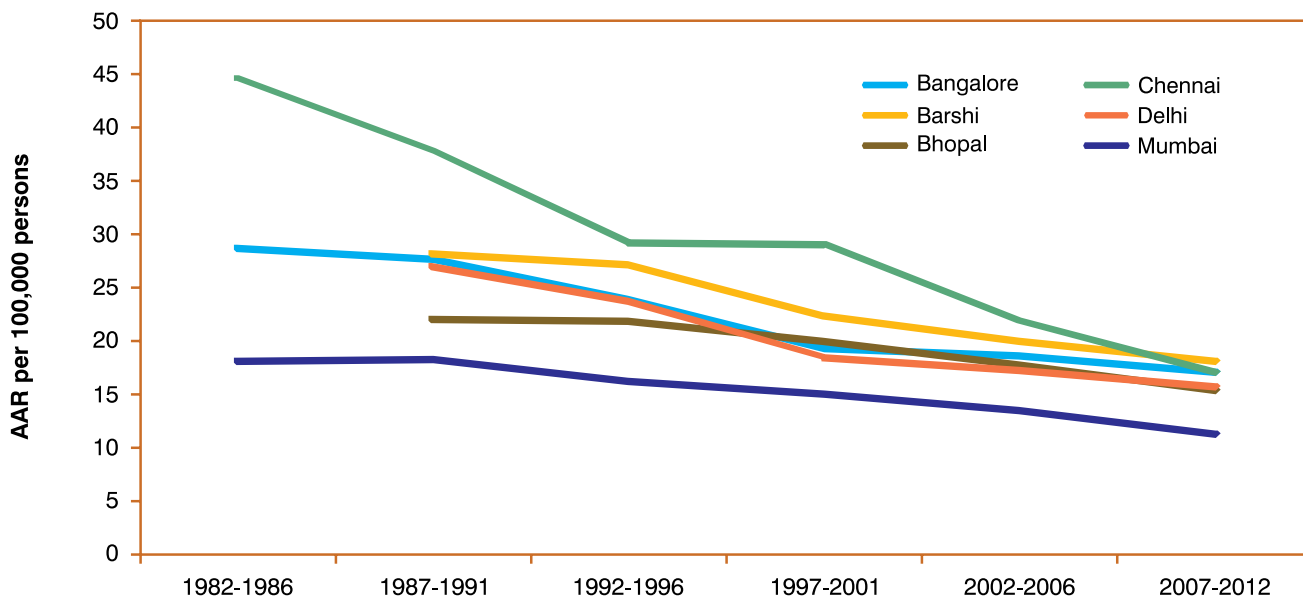
Table 10.7(b): Cervix (ICD-10: C53)
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Barshi	Bhopal	Chennai	Delhi	Mumbai
	JP0*	JP0*	JP1*	JP0*	JP1*	JP1*
1982	30.8			47.7		19.2
1983	30.1			46.1		18.9
1984	29.4			44.5		18.6
1985	28.7			42.9		18.4
1986	28.1			41.4		18.1
1987	27.5			40.0		17.8
1988	26.8	29.7	23.0	38.6	29.5	17.6
1989	26.2	29.1	22.7	37.3	28.5	17.3
1990	25.6	28.4	22.4	36.0	27.4	17.1
1991	25.1	27.8	22.1	34.7	26.4	16.8
1992	24.5	27.2	21.8	33.5	25.5	16.6
1993	23.9	26.6	21.5	32.3	24.5	16.3
1994	23.4	26.0	21.2	31.2	23.7	16.1
1995	22.9	25.4	21.0	30.1	22.8	15.9
1996	22.4	24.8	20.7	29.1	22.0	15.7
1997	21.8	24.3	20.4	28.1	21.2	15.4
1998	21.4	23.7	20.1	27.1	20.4	15.2
1999	20.9	23.2	19.9	26.2	19.7	15.0
2000	20.4	22.7	19.6	25.3	18.9	14.8
2001	19.9	22.2	19.3	24.4	18.3	14.6
2002	19.5	21.7	19.1	23.5	17.6	14.3
2003	19.0	21.2	18.8	22.7	17.4	14.1
2004	18.6	20.7	18.6	21.9	17.2	13.9
2005	18.2	20.3	18.3	21.2	16.9	13.7
2006	17.8	19.8	18.1	20.4	16.7	13.5
2007	17.4	19.4	17.8	19.7	16.5	13.3
2008	17.0	19.0	17.6	19.0	16.3	12.3
2009	16.6	18.5	16.6	18.4	16.1	11.3
2010	16.2	18.1	15.7	17.7	15.9	10.4
2011	15.9	17.7	14.9	17.1	15.7	9.6
2012	15.5	17.3	14.1	16.5	15.5	8.9
2013		16.9	13.3	15.9		
2014		16.6				
APC0	-2.26*	-2.23*	-1.81*	-3.48*	-2.73*	-1.99*
APC1	-	-	-1.34*	-	-3.63*	-1.44*
APC2	-	-	-5.37*	-	-1.26	-7.87*

Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.7: Cervix (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model

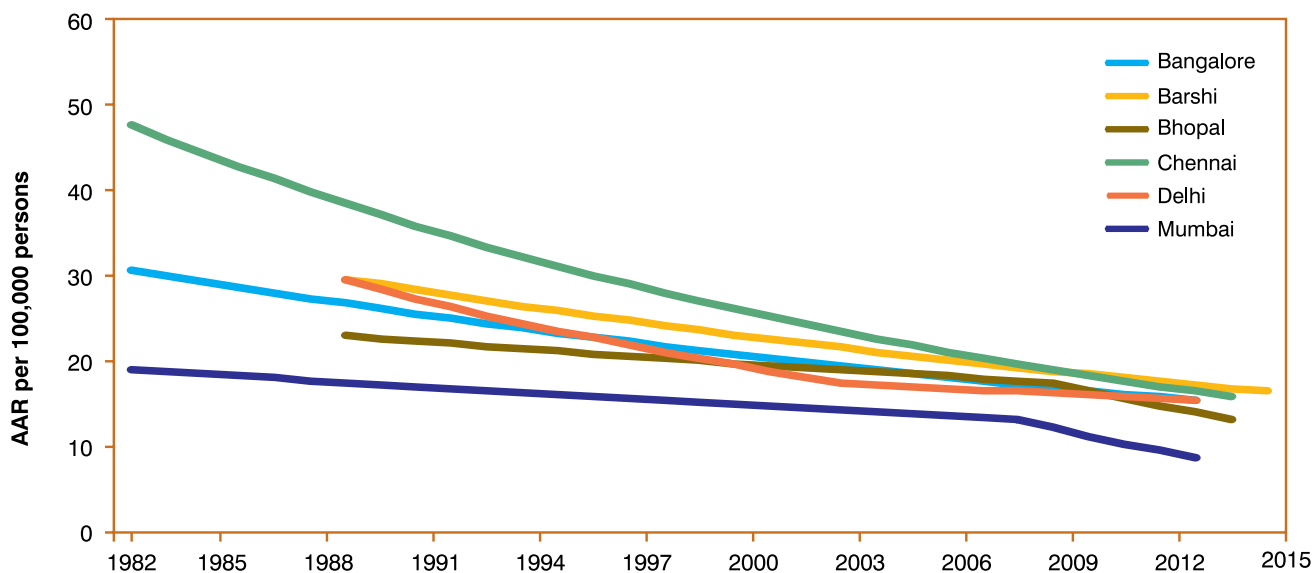


Table 10.8(a): Corpus Uteri (ICD-10: C54)
Trends Over Time in AARs

Year	Bangalore	Chennai	Delhi	Mumbai
1982	1.7	1.3		2.1
1983	2.1	1.0		2.1
1984	1.4	1.8		1.9
1985	0.9	1.6		1.8
1986	1.4	1.4		2.5
1987	1.9	2.4		2.2
1988	0.8	2.4	2.6	2.0
1989	1.7	1.7	2.4	1.9
1990	2.1	1.9	2.4	2.8
1991	2.8	1.8	2.1	2.2
1992	2.1	1.8	2.9	2.2
1993	1.9	2.3	4.2	2.6
1994	3.1	1.7	2.7	2.9
1995	2.2	2.3	2.5	2.2
1996	2.8	2.1	2.2	2.7
1997	2.3	3.6	3.1	2.4
1998	3.2	2.0	3.7	2.7
1999	3.2	2.3	2.7	2.8
2000	3.9	1.9	3.3	2.7
2001	3.4	1.5	3.7	3.0
2002	4.7	2.1	4.4	2.6
2003	4.1	2.8	4.6	2.8
2004	4.3	2.5	3.9	2.9
2005	4.1	2.1	4.7	3.0
2006	4.4	2.6	4.0	3.3
2007	6.2	3.1	4.4	3.9
2008	5.1	3.4	4.1	4.4
2009	6.0	4.2	4.4	4.0
2010	5.5	4.5	4.8	4.5
2011	5.5	4.8	6.0	5.0
2012	4.9	5.2	5.5	4.2
2013		6.8		
2014				
Slope (b)	0.159	0.106	0.126	0.080
P-Value	0.000	0.000	0.000	0.000
3 Yrs Trend				
Slope (b)	0.159	0.115	0.122	0.076
P-Value	0.000	0.002	0.001	0.000
5 Yrs Trend				
Slope (b)	0.159	0.098	0.129	0.077
P-Value	0.000	0.030	0.000	0.014

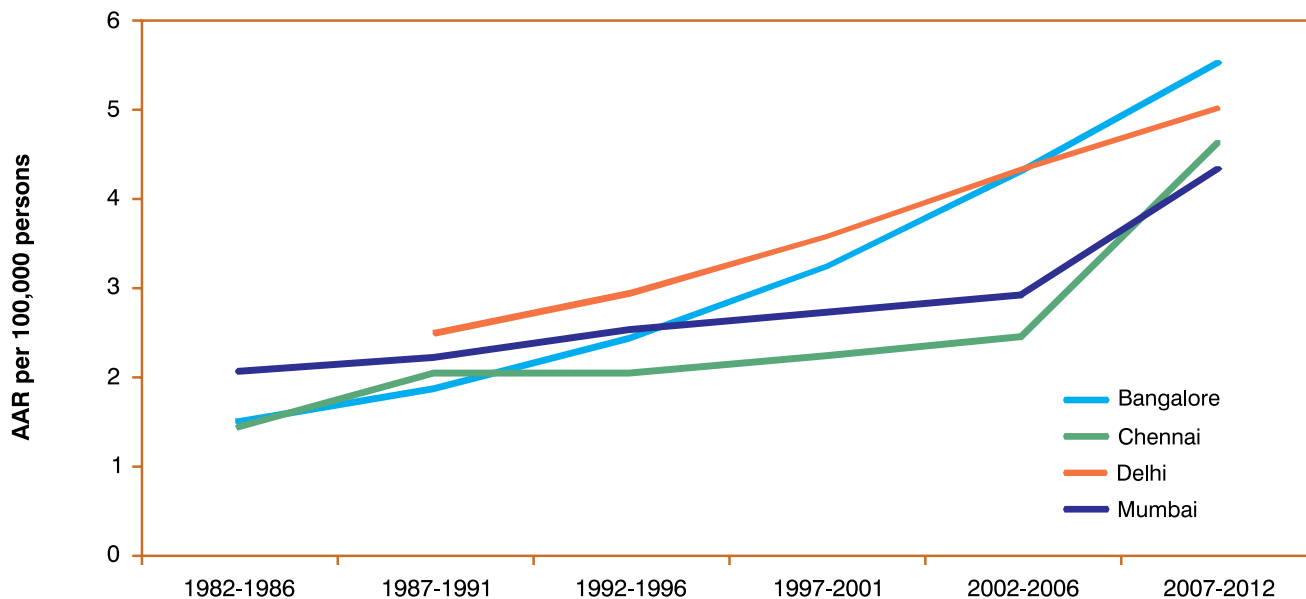
Table 10.8(b): Corpus Uteri (ICD-10: C54)
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Chennai	Delhi	Mumbai
	JP0*	JP1*	JP0*	JP1*
1982	1.3	1.5		2.0
1983	1.3	1.6		2.0
1984	1.4	1.6		2.1
1985	1.5	1.6		2.1
1986	1.6	1.7		2.1
1987	1.7	1.7		2.2
1988	1.7	1.7	2.3	2.2
1989	1.8	1.8	2.4	2.2
1990	1.9	1.8	2.5	2.3
1991	2.0	1.9	2.6	2.3
1992	2.2	1.9	2.7	2.4
1993	2.3	1.9	2.7	2.4
1994	2.4	2.0	2.8	2.5
1995	2.5	2.0	2.9	2.5
1996	2.7	2.0	3.0	2.5
1997	2.8	2.1	3.2	2.6
1998	3.0	2.1	3.3	2.6
1999	3.2	2.2	3.4	2.7
2000	3.3	2.2	3.5	2.7
2001	3.5	2.3	3.6	2.8
2002	3.7	2.3	3.8	2.8
2003	3.9	2.4	3.9	2.9
2004	4.1	2.4	4.0	3.0
2005	4.4	2.5	4.2	3.2
2006	4.6	2.8	4.3	3.4
2007	4.8	3.1	4.5	3.6
2008	5.1	3.5	4.6	3.9
2009	5.4	3.9	4.8	4.1
2010	5.7	4.4	5.0	4.4
2011	6.0	5.0	5.1	4.6
2012	6.3	5.6	5.3	4.9
2013		6.3		
2014				
APC0	5.53*	3.81*	3.55*	2.73*
APC1	-	2.05*	-	1.77*
APC2	-	12.56*	-	6.12*

Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.8: Corpus Uteri (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model

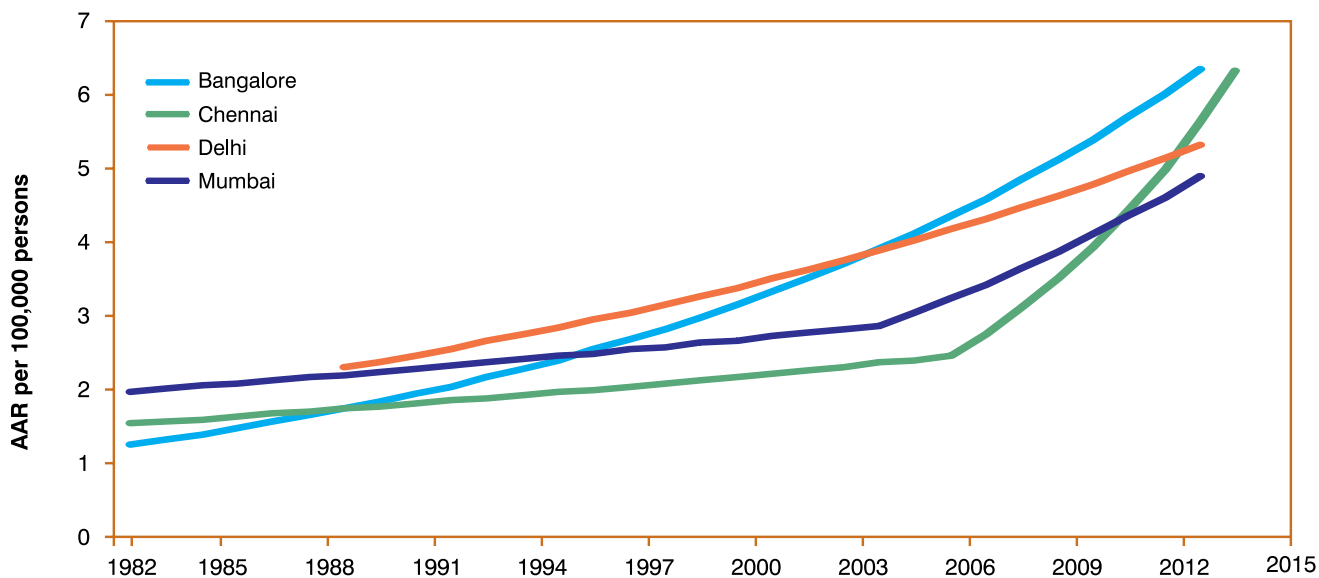


Table 10.9(a): Ovary (ICD10: C56)
Trends Over Time in AARs

Year	Bangalore	Bhopal	Chennai	Delhi	Mumbai
1982	4.6		4.2		5.6
1983	3.9		4.4		6.0
1984	5.0		5.8		5.8
1985	2.9		5.2		6.2
1986	4.7		5.6		5.5
1987	5.5		5.7		6.8
1988	4.3	3.7	4.3	7.3	6.8
1989	4.3	5.5	5.5	8.0	6.3
1990	3.3	4.6	5.0	6.9	6.1
1991	4.4	5.6	5.5	7.9	6.6
1992	3.7	7.2	5.4	7.4	7.3
1993	5.9	5.3	5.8	7.7	8.8
1994	5.3	5.2	4.9	7.9	6.9
1995	4.8	6.2	4.8	8.2	7.0
1996	5.0	5.3	6.4	8.4	7.0
1997	3.9	5.2	4.7	9.0	7.9
1998	4.8	4.7	6.7	9.1	7.4
1999	6.0	4.5	6.4	7.9	6.5
2000	4.6	3.9	5.3	8.5	6.9
2001	6.7	5.7	5.8	7.8	7.9
2002	5.7	6.2	5.7	8.2	6.9
2003	5.1	4.9	6.0	7.8	7.1
2004	6.0	8.5	6.4	8.9	6.4
2005	6.4	6.1	4.5	7.4	6.9
2006	6.8	7.8	7.2	8.5	7.3
2007	7.9	7.5	7.4	9.0	7.5
2008	7.5	6.8	7.5	8.3	7.6
2009	6.5	7.8	8.2	8.0	7.9
2010	7.6	8.3	6.9	10.1	7.2
2011	6.0	8.4	7.2	11.0	8.0
2012	6.5	8.2	8.0	10.0	8.1
2013		8.5	8.4		
2014					
Slope (b)	0.107	0.148	0.096	0.084	0.058
P-Value	0.000	0.000	0.000	0.000	0.000
3 Yrs Trend					
Slope (b)	0.106	0.150	0.098	0.080	0.058
P-Value	0.000	0.002	0.000	0.014	0.005
5 Yrs Trend					
Slope (b)	0.108	0.135	0.088	0.081	0.061
P-Value	0.001	0.068	0.016	0.046	0.040

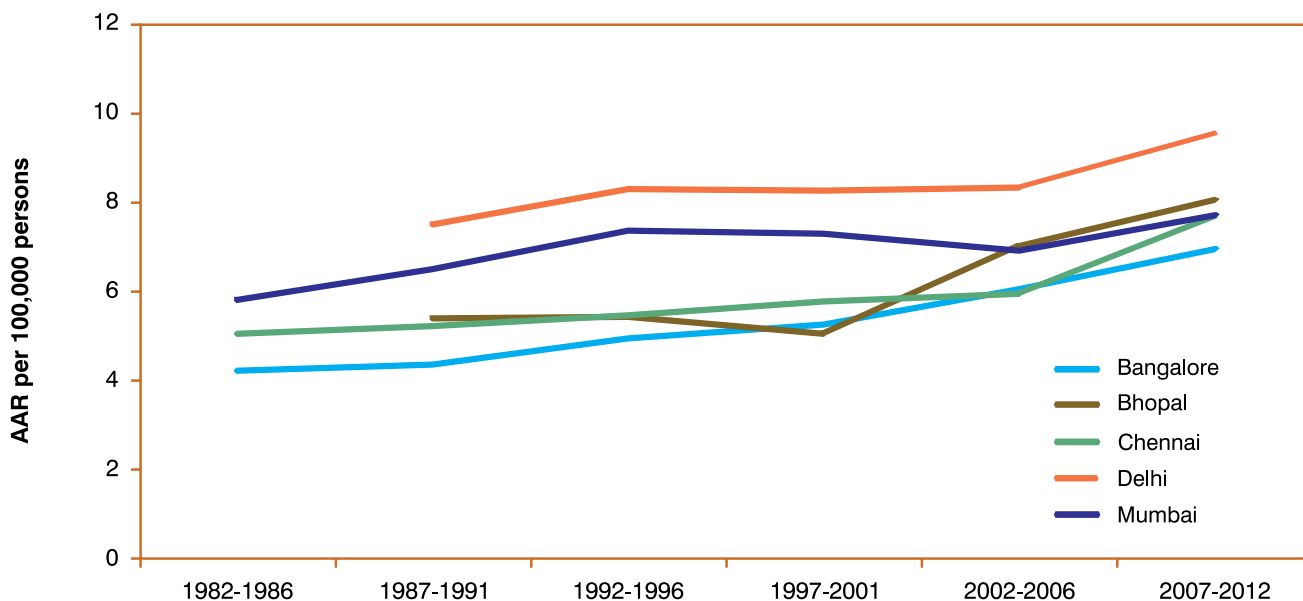
Table 10.9(b): Ovary (ICD10: C56)
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Bhopal	Chennai	Delhi	Mumbai
	JP0*	JP0*	JP0*	JP0*	JP1*
1982	3.8		4.6		5.6
1983	3.9		4.7		5.8
1984	4.0		4.8		5.9
1985	4.1		4.8		6.0
1986	4.2		4.9		6.1
1987	4.2		5.0		6.3
1988	4.3	4.5	5.1	7.4	6.4
1989	4.4	4.6	5.1	7.5	6.6
1990	4.5	4.7	5.2	7.5	6.7
1991	4.6	4.8	5.3	7.6	6.8
1992	4.7	4.9	5.4	7.7	7.0
1993	4.8	5.1	5.5	7.8	7.1
1994	4.9	5.2	5.6	7.9	7.2
1995	5.0	5.3	5.6	7.9	7.2
1996	5.1	5.4	5.7	8.0	7.2
1997	5.2	5.6	5.8	8.1	7.2
1998	5.3	5.7	5.9	8.2	7.2
1999	5.4	5.8	6.0	8.2	7.3
2000	5.5	6.0	6.1	8.3	7.3
2001	5.6	6.1	6.2	8.4	7.3
2002	5.7	6.3	6.3	8.5	7.3
2003	5.9	6.4	6.4	8.6	7.3
2004	6.0	6.6	6.5	8.7	7.4
2005	6.1	6.7	6.6	8.7	7.4
2006	6.2	6.9	6.7	8.8	7.4
2007	6.4	7.0	6.8	8.9	7.4
2008	6.5	7.2	6.9	9.0	7.4
2009	6.6	7.4	7.0	9.1	7.5
2010	6.8	7.5	7.1	9.2	7.5
2011	6.9	7.7	7.2	9.3	7.5
2012	7.0	7.9	7.3	9.4	7.5
2013		8.1	7.5		
2014					
APC0	2.04*	2.38*	1.56*	0.98*	0.86*
APC1	-	-	-	-	2.16*
APC2	-	-	-	-	0.27

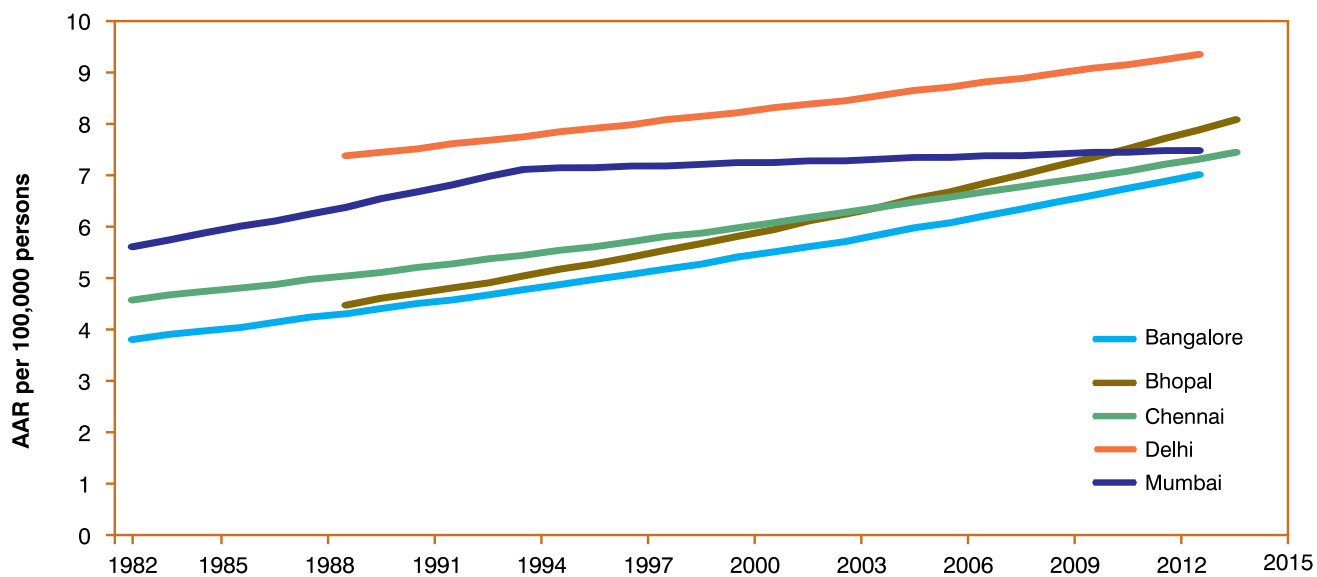
Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.9: Ovary (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model



**Table 10.10(a): Prostate (ICD10: C61)
Trends Over Time in AARs**

Year	Bangalore	Bhopal	Chennai	Delhi	Mumbai
1982	3.7		2.8		5.1
1983	2.9		2.0		5.4
1984	3.7		1.2		6.2
1985	4.9		1.3		7.3
1986	4.4		2.7		5.3
1987	4.9		2.3		6.2
1988	4.2	1.9	2.6	6.3	6.8
1989	6.2	5.0	3.1	5.8	5.6
1990	5.3	6.3	2.6	5.6	7.1
1991	3.8	5.6	3.0	5.8	6.8
1992	5.4	4.3	3.7	6.5	7.2
1993	4.1	5.4	2.5	6.8	6.9
1994	3.5	3.8	4.4	7.3	6.4
1995	4.0	4.8	5.1	5.9	6.4
1996	4.1	5.9	4.6	5.5	7.9
1997	4.5	6.1	5.9	7.6	6.7
1998	4.7	7.6	3.7	9.0	7.2
1999	5.5	6.4	4.3	7.8	7.7
2000	6.9	6.9	4.5	7.4	6.9
2001	6.5	5.3	3.9	7.8	6.7
2002	6.4	6.1	3.4	9.2	5.9
2003	5.9	4.6	5.0	6.9	6.5
2004	6.1	5.4	5.3	11.4	6.3
2005	7.2	5.8	4.9	9.4	7.2
2006	7.8	4.7	5.4	11.7	7.0
2007	8.7	5.1	5.1	10.3	7.5
2008	7.8	4.7	4.1	10.2	7.9
2009	7.3	6.5	7.5	11.4	7.3
2010	8.3	6.0	5.6	11.1	8.2
2011	7.8	5.4	6.1	11.5	9.9
2012	8.2	5.6	6.9	12.4	9.8
2013		5.6	6.4		
2014					
Slope (b)	0.156	0.039	0.147	0.277	0.083
P-Value	0.000	0.174	0.000	0.000	0.000
3 Yrs Trend					
Slope (b)	0.155	0.031	0.152	0.277	0.076
P-Value	0.001	0.351	0.000	0.000	0.005
5 Yrs Trend					
Slope (b)	0.155	0.034	0.147	0.281	0.076
P-Value	0.006	0.482	0.000	0.001	0.040

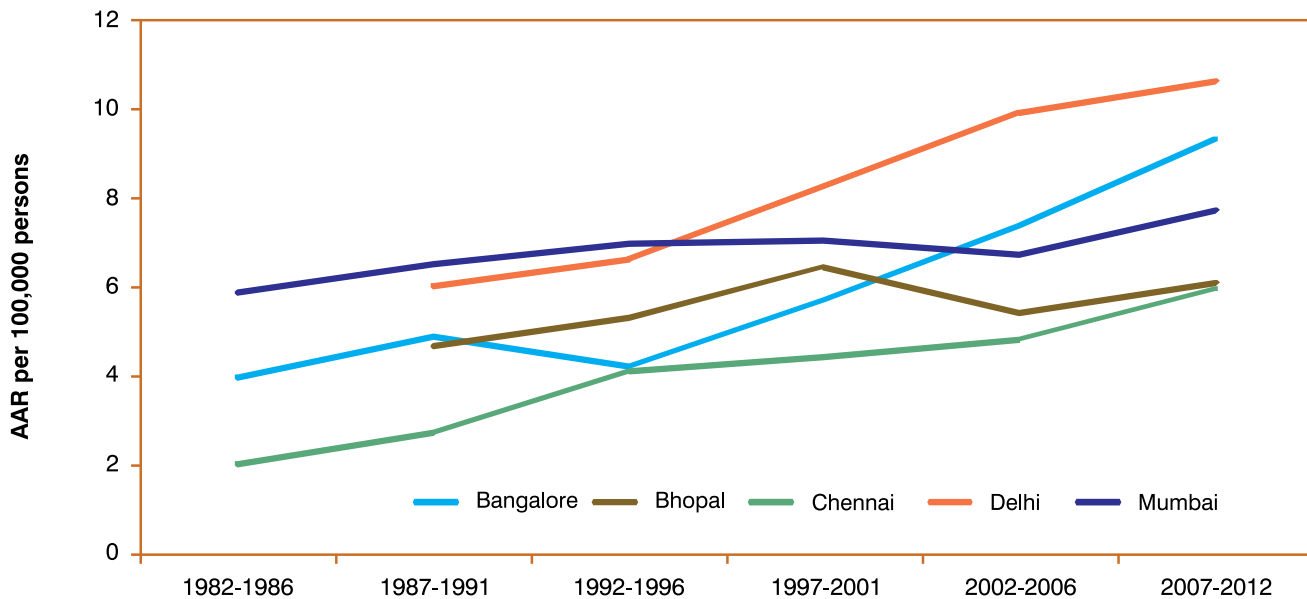
Table 10.10(b): Prostate (ICD10: C61)
Trends Over Time based on
Value of Joinpoint AARs with Annual Percent Change (APC)

Year	Bangalore	Bhopal	Chennai	Delhi	Mumbai
	JP0*	JP0*	JP0*	JP0*	JP1*
1982	3.6		2.0		6.0
1983	3.7		2.1		6.1
1984	3.8		2.2		6.1
1985	3.9		2.3		6.1
1986	4.0		2.4		6.2
1987	4.1		2.5		6.2
1988	4.2	4.6	2.6	5.5	6.3
1989	4.3	4.6	2.7	5.7	6.3
1990	4.4	4.7	2.8	5.9	6.4
1991	4.6	4.8	2.9	6.1	6.4
1992	4.7	4.8	3.0	6.3	6.5
1993	4.8	4.9	3.2	6.5	6.5
1994	5.0	4.9	3.3	6.7	6.6
1995	5.1	5.0	3.4	6.9	6.6
1996	5.3	5.0	3.6	7.1	6.6
1997	5.4	5.1	3.7	7.4	6.7
1998	5.6	5.1	3.9	7.6	6.7
1999	5.7	5.2	4.0	7.9	6.8
2000	5.9	5.2	4.2	8.1	6.8
2001	6.0	5.3	4.4	8.4	6.9
2002	6.2	5.4	4.5	8.7	6.9
2003	6.4	5.4	4.7	9.0	7.0
2004	6.6	5.5	4.9	9.3	7.0
2005	6.7	5.5	5.1	9.6	7.1
2006	6.9	5.6	5.3	9.9	7.1
2007	7.1	5.7	5.6	10.3	7.2
2008	7.3	5.7	5.8	10.6	7.6
2009	7.5	5.8	6.0	11.0	8.1
2010	7.8	5.9	6.3	11.3	8.6
2011	8.0	5.9	6.5	11.7	9.2
2012	8.2	6.0	6.8	12.1	9.8
2013		6.1	7.1		
2014					
APC0	2.82*	1.11	4.13*	3.36*	1.17*
APC1	-	-	-	-	0.72*
APC2	-	-	-	-	6.29

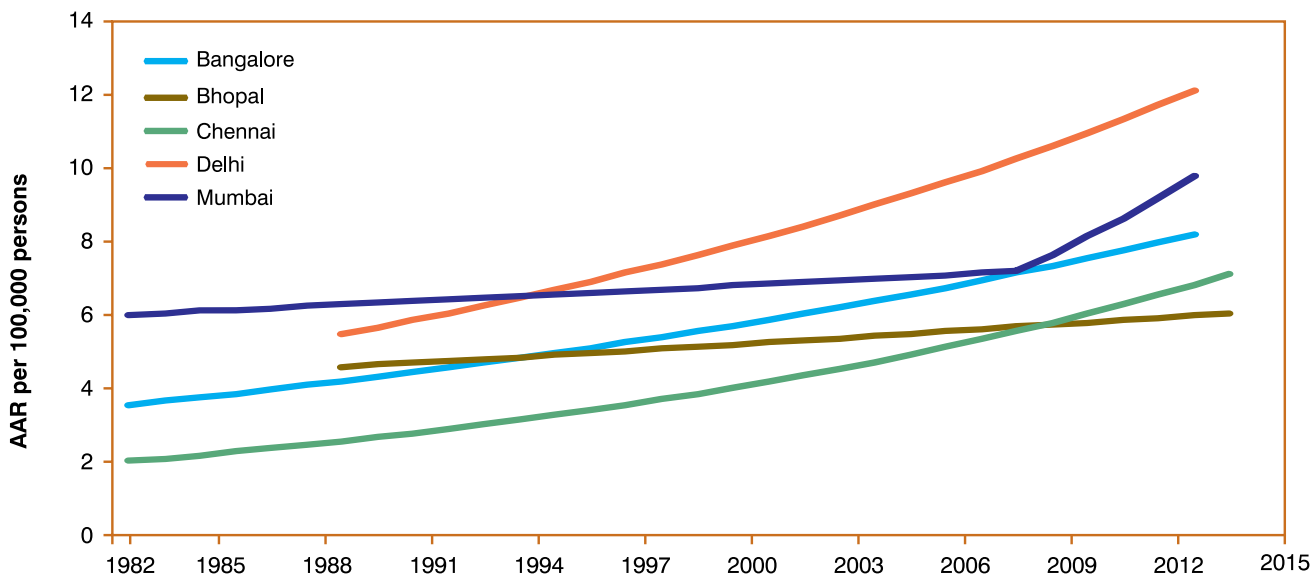
Values of years where a shift in trend is observed have been highlighted; * represents significant Joinpoint Model & APC ($p < 0.05$) values

Fig. 10.10: Prostate (Trends over Time in AARs)

(a): Five Year Trend



(b): Joinpoint Regression Model



PROJECTION OF BURDEN OF CANCER

Cancer projections are useful especially in a developing country like India, to plan and prioritise health care services that would include both diagnostic and treatment facilities. It therefore aids in formulation of government policies and budget allocation. The numbers of cancers by place and type also constitute baseline information and act as indicators of cancer control.

Projection of cancer burden means a systematic way of prediction of number of cancer cases for all anatomical sites or for a specific site and for a specified period of time. One way could be to use the change in incidence rates over time and derive the expected or projected incidence rate and apply the same to the projected population of that year.

Methodology

The following data/assumptions/methods including some of the lines followed in the previous report (NCRP, 2013) were used to provide the table of projection.

1. The Crude Incidence Rate (CR) was considered suitable for assessing the future load (magnitude) of cancer cases in the country. The CR has been preferred to AAR as the latter is more suitable for comparison of rates between areas than for assessing the disease burden for the area.
2. The Pooled Crude Rate (CR) of Three-Year report of Population Based Cancer Registries (2012-2014) was used to estimate the burden of cancer for the year 2013. For North East states (Assam, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim and Tripura) estimated cancer cases were computed by representing corresponding PBCRs crude rate and pooled CR of nine north east PBCRs were assumed to represent Arunachal Pradesh state. For estimating the cancers for the population of the rest of India the pooled CR of 15 (which is combinations of urban, rural and semi urban) PBCRs were used. The data of three newer PBCRs at Naharlagun, Pasighat and Patiala were not taken into account as these were considered preliminary data.
3. The trends in crude incidence rate generated by five older PBCRs at Bangalore, Bhopal, Chennai, Delhi and Mumbai for the years 2003-2012 formed the sources of data for determining the Annual Percentage Change (APC). The Log-Linear Regression method by using Joinpoint regression, SEER program, US National Cancer Institute (Version 4.0.1) was used to assess the APC in crude incidence rates and the statistical significance. (Kim *et al.*, 2000)
4. The percentage change observed in decadal growth rate of the population of India from 2001-2011 as compared to the decadal growth of 1991-2001 (Census of India, Registrar General of India) was assumed to continue. Correspondingly, the growth rate of the population India was calculated separately for males and females and the same applied to obtain the yearly populations for the years 2013 to 2020.
5. The APC was applied to the 2013 India estimates and the population estimate by time was used to arrive at the projection for each of the projected calendar years 2015 and 2020.
6. For sites of cancer where the trend was not found to be statistically significant (either increase or decrease), the crude incidence rate from the recent Three-Year report of Population Based Cancer Registries (2012-2014) was assumed to be constant.
7. The crude incidence rate of cancers of cervix and breast of the rural registry at Barshi was taken into account to represent the rural areas of India and five old urban registries (Bangalore, Bhopal, Chennai,

Delhi and Mumbai) were taken to represent urban areas of India. Using the same methodology listed above, the estimates were derived for cancers of the cervix and breast.

Limitations

The projections of the numbers of cancers give a fair idea of the burden, overall and by specific anatomical site and would certainly help in meeting the objects outlined at the beginning of this chapter. However, there are certain limitations that need to be kept in mind. India being a vast country with diverse cultures, habits, living conditions and environment the PBCRs cover just 8.2% of the population. Though the PBCRs cover 17 states and one union territory, several remaining states are still uncovered. Secondly, in giving projections, one of the assumptions is that the risk factors/behavior, case finding procedure will be the same in the coming years and that no change would take place. Future cancer screening programmes are not considered for projection of cancer cases. Improved techniques for detecting cancer could arise and more importantly in our setting access to diagnosis of cancer could improve. These cannot be factored in the projections. Lastly, only simple statistical methods similar to that followed in the previous report (NCRP, 2009, 2013) have been employed. No sophisticated models, such as the age period cohort models (Bray and Moller, 2006) as used in developed countries have been utilised.

Tables 10.11(a) shows the Projected Cases at India level for selected sites and selected time periods 2015 and 2020 for males.

Table 10.11(a): Projected Cases at India level for selected sites and selected time periods (2015 and 2020)

Males

ICD-10	Site Name	2015	2020
C00-C97	All Sites	692704	871756
C01-C02	Tongue	44791	60669
C03-C06	Mouth	66097	99495
C12-C13	Hypopharynx	15666	16636
C15	Oesophagus	31083	34667
C16	Stomach	29530	35306
C18	Colon	21728	30075
C19-C20	Rectum	21688	27655
C22	Liver	25984	35761
C23-C24	Gall Bladder	13654	19095
C25	Pancreas	10969	11655
C32	Larynx	30316	36079
C33-34	Lung	78252	102300
C61	Prostate	43049	61222
C64	Kidney	12660	16804
C67	Urinary Bladder	21509	27006
C70-72	Brain	19300	20506
C82-85, C96	NHL etc.	25234	29976
C91	Lymphoid Leuk.	13467	17930
C92-94	Myeloid Leuk.	14303	16522

Table 10.11(b) shows the Projected Cases at India level for selected sites and selected time periods 2015 and 2020 for females.

Table 10.11(c) shows the Projected Cases at India level for selected sites and selected time periods 2015 and 2020 for both sexes.

Table 10.12 shows the number of cases and relative proportion of cancer burden projection by anatomical sites for the year 2015 and 2020.

Table 10.11(b): Projected Cases at India Level for Selected Sites and Selected Time Periods (2015 and 2020)

Females

ICD-10	Site Name	2015	2020
C00-C97	All Sites	695693	863130
C01-C02	Tongue	15542	20531
C03-C06	Mouth	23548	28956
C12-C13	Hypopharynx	4034	4312
C15	Oesophagus	17976	19231
C16	Stomach	15468	18802
C18	Colon	15707	21831
C19-C20	Rectum	14602	18772
C22	Liver	10271	14083
C23-C24	Gall Bladder	23907	36046
C32	Larynx	3326	3557
C33-34	Lung	28542	42051
C50	Breast	134214	179790
C53	Cervix	97909	104060
C54	Corpus Uteri	25395	37178
C56	Ovary	45231	59276
C67	Urinary Bladder	5377	6602
C70-72	Brain	11329	12113
C73	Thyroid	27603	33506
C82-85, C96	NHL etc.	17039	21927
C91	Lymphoid Leuk.	7295	9779
C92-94	Myeloid Leuk.	9984	10679

Table 10.11(c): Projected Cases at India Level for Selected Sites and Selected Time Periods (2015 and 2020)**Both Sexes**

ICD-10	Site Name	2015	2020
C00-C97	All Sites	1388397	1734886
C01-02	Tongue	60333	81200
C03-06	Mouth	89645	128451
C12-13	Hypopharynx	19700	20948
C15	Oesophagus	49059	53898
C16	Stomach	44998	54108
C18	Colon	37435	51906
C19-20	Rectum	36290	46427
C22	Liver	36255	49844
C23-24	Gall Bladder	37561	55141
C32	Larynx	33642	39636
C33-34	Lung	106794	144351
C67	Urinary Bladder	26886	33608
C70-72	Brain	30629	32619
C82-85, C96	NHL etc.	42273	51903
C91	Lymphoid Leuk.	20762	27709
C92-94	Myeloid Leuk.	24287	27201

Table 10.12: Number of Cases and Relative Proportion of Cancer Burden Projection by Anatomical Sites for the Years 2015 and 2020

Anatomical Sites	2015		2020	
	No. of Cases	Approx. Relative Proportion (%)	No. of Cases	Approx. Relative Proportion (%)
Tobacco Related Cancers	402641	29	523471	30
Gastro Intestinal Tract	267822	19	341383	20
Cervix	97909	7	104060	6
Breast	134214	10	179790	10
Corpus Uteri and Ovary	70626	5	96454	6
Lymphoid & Haemopoietic Malignancies	122819	9	149845	9
Prostate	43049	3	61222	3
Central Nervous System	30629	2	32619	2
Other Sites	218688	16	246042	14
All Sites	1388397	100	1734886	100