Chapter 2

MATERIALS AND METHODS

The numerator 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.

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 and 2001.

In determining the significance of trends, the actual value of the AAR rate for each year has been used. The significance of time trend in each PBCR was assessed based on the methods and formula provided by Boyle and Parkin, 1991 in the chapter from the IARC publication on Cancer Registration. In addition, the Joinpoint Regression Program of the NCI of USA has been used *(Kim et al, 2001)*.

About Joinpoint Regression Program:

Joinpoint Regression Program, Version 3.0, is statistical software for the analysis of trends using Joinpoint models, that is, where several different regression lines are connected together at the "Joinpoints". Cancer trends reported in NCI publications are calculated using the Joinpoint Regression Program to analyze rates calculated by the SEER. The software takes trend data (e.g. cancer rates) and fits the simplest Joinpoint model that the data allow. The user supplies the minimum and maximum number of Joinpoints. The program starts with the minimum number of Joinpoint (e.g. 0 Joinpoint, which is a straight line) and tests whether more Joinpoints are statistically significant and must be added to the model (upto that maximum number). This enables the user to test that an apparent change in trend is statistically significant. The tests of significance use a Monte Carlo Permutation method. The models may incorporate estimated variation for each point (e.g. when the responses are age adjusted rates) or use a Poisson model of variation. In addition, the models may also be linear on the log of the response (e.g. for calculating annual percentage rate change). The software also allows viewing one graph for each Joinpoint model, from the model with the minimum number of Joinpoints to the model with the maximum number of Joinpoints (Kim et al, 2001). For the report purposes, one Joinpoint model wherever feasible has been fitted to the data. It may be pointed out that whenever a strong linear trend exists in the data the one Joinpoint model results will tally exactly with that of linear regression method.

This report is based on the data of six PBCRs – viz., Bangalore, Barshi, Bhopal, Chennai, Delhi and Mumbai. For the PBCRs at Bangalore, Mumbai and Chennai, the data available is from 1982. Accordingly, the trend in AAR over time is for the 24 year period from 1982 to 2005. The PBCRs at Barshi, Bhopal and Delhi commenced from 1988. Accordingly, the time trend is for the 18 year period from 1988 to 2005.

While depicting the results of specific anatomical sites of cancer in chapter 4, those sites with fewer than 10 cases for any given year have been excluded. This is mostly seen in the case of Barshi and Bhopal PBCRs and in sites of cancer other than the first five or six leading sites.

Among males, cancers of the prostate, colon, rectum and liver, have shown statistically significant increase in incidence. Cancer of the prostate is the leading site of cancer among males in most of the western countries as is cancer of the colon. Among females, cancers of the breast, corpus uteri and lung have shown a rise.

Both males and females have recorded rising incidence rates for cancers of the brain as well as in tumours of the lymphoid and haemopoetic system, especially non-Hodgkin's Lymphoma.

Three other sites of cancer that have shown an increase in incidence rates in women are ovary, thyroid and gallbladder.

Among males in Bangalore, during 1982–83, stomach was the leading site of cancer and it continues to be so twenty four years down the line. In females in Bangalore, cancer of the lung that did not appear among ten leading sites in 1982-83 is the tenth leading site during 2004-05.

In males in Bhopal, cancer of the lung and mouth were the first and third leading sites earlier and have become the first two leading sites in 2004-05.

In males in Chennai, stomach was the leading site of cancer during 1982-83 and this site has been replaced by lung in more recent years.