

Epidemiological profile of India: Historical and contemporary perspectives

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Knowledge and understanding of the epidemiological profile is an essential pre-requisite to assess and address public health needs in the country and to enable efficient programme planning and management. The need for adequate and accurate health information and data to undertake such an exercise cannot be over-emphasized. The present effort is a modest attempt to critically analyse the epidemiological profile of India from the historical and contemporary perspective. In order to assess the successes achieved as well caution against the daunting challenges awaiting the country, parameters such as disease burden and health status indicators, are increasingly being used. Changes in the population age structure, improvements in the nation's economic status, altered life-styles of people and duality of disease burden testify to the demographic, development and health transition occurring in the country. Population stabilization, poverty alleviation, life-style modification, surveillance and control of communicable and non-communicable diseases constitute the major challenges demanding urgent attention in the future.

1. Introduction

The health profile of India at the close of the 20th century appears promising. Impressive improvements in the socio-economic, nutrition and health status of people as well as the successful eradication, elimination and control of major killer diseases have contributed largely to the resultant epidemiological and demographic transition observable in the country.

These achievements notwithstanding, a heavy burden of disease (BOD) consequent to a "growing" and "greying" population, large scale poverty and unemployment resulting from gross development disparities, marked social and lifestyle changes influenced by modernization and technological advancement, widespread gender discrimination and inequities induced by socio-cultural and economic pressures appear to threaten and avert the progress achieved

so far unless timely and appropriate remedial measures are instituted.

The design and implementation of efficient and effective mechanisms for redressal of these problems demand a critical appraisal of the epidemiological profile of India from a historical, contemporary and futuristic perspective. What follows therefore is an analysis of the trends and determinants of the successes achieved and the challenges faced by the country during the pre and post independence eras. In addition, the emerging implications for policy formulation or reorientation and programme strategy redesign will also be discussed.

2. Burden of diseases

In epidemiological terms BOD pertains to the nature and magnitude of the public health problem posed by diseases

Keywords. Demography; disease burden; epidemiology; health transition; surveillance

Abbreviations used: BOD, Burden of disease; CD, communicable diseases; DALY, disability adjusted life years; CHD, coronary heart disease; CSW, commercial sex workers; EPI Expanded programme of immunization; NCD, non-communicable diseases; MDT, multi-drug therapy; RHD, rheumatic heart disease; UIP, universal immunization programme.

and injuries – their determinants and associated risk factors.

Conventionally, BOD has been measured in terms of morbidity, mortality and disability. Different regions of the world have adopted different measures for assessing health status and disease burden. Paucity of adequate, accurate and appropriate statistical data have often led to over-estimations in some instances and under-estimations in others. Further, the lack of uniformity in assessments has led to considerable difficulties in effecting global comparisons of health needs and BOD as well as planning and implementing cost effective and efficient intervention measures for health promotion and disease prevention and control.

There was thus an urgent need to identify a single, acceptable and appropriate yard stick of measurement. The large scale global BOD study initiated by WHO in 1990 provided the much needed answer to the above problem by developing an index called disability adjusted life years (DALY). The DALY expresses years of life lost to “premature death” and years lived with disability of specified severity and duration. One DALY thus equals to one lost year of healthy life (Murray and Lopez 1996). The DALY concept however, is not totally free of limitations since it involves decisions on values attached to health and human life at different ages of people’s life span. However, the DALY has come to be regarded as the best alternative available and is hence used internationally for assessments of disease burdens, health needs and cost effectiveness of instituted interventions.

2.1 *Distribution of disease burden*

Globally the distribution of disease burden appears heavy with DALY losses equalling 1,382,564,000. Communicable diseases (CD) account for 41% of DALY losses, non-communicable diseases (NCD) for 43% and injuries account for 16% of DALY losses. Sex differentials suggest that women experience higher DALY losses (45%) than men (37%) due to CD and are nearly equally vulnerable to men with regard to NCDs. Men, however, seem to be more prone to injuries (20%) compared to women (11.6%). Comparisons between high, low and middle income countries reveal that low and middle income countries shoulder over six times (43.8%) the burden of CD as compared to high income (7.2%) countries. Consequently, high-income countries experience over twice the burden of NCD compared to low and middle income countries (39.8%). Ironically, low and middle-income countries reveal a greater per cent (16.4%) of DALY losses due to injuries compared to high income countries (11.8%).

With regard to India, the DALY losses (268,953,000) incurred as a result of disease burden is second only to that observed in Africa (325,198,000). Losses due to CDs

account for over 50% of DALYs compared to 33% for NCDs and 17% for injuries (WHR 1999).

Infections and parasitic diseases (67,619), respiratory infections (25,556), diarrhoeal diseases (22,005) and childhood diseases (14,463) are major contributors to the burden of CDs. Among the NCDs, cardiovascular diseases (26,932) and neuro-psychiatric disorders (22,944) account for the large disease burden. Falls (10,898) and road traffic accidents (7,204) contribute to the largest disability burden among injuries (WHR 1999).

Wide inter- and intra-state differentials exist with regard to CD burden in the country. For example, the prevalence rate of leprosy was 5.2/10,000 people by March 2000. Of the total leprosy patients in India, 70% were found to be concentrated in the states of Bihar, Uttar Pradesh, West Bengal, Orissa and Madhya Pradesh (NIHFW and NIE 2000). Similarly the ten major states housing malaria positive cases include Orissa, Maharashtra, Madhya Pradesh, Karnataka, Gujarat, Rajasthan, Assam, Tamil Nadu, Andhra Pradesh and Uttar Pradesh. Seven of the north-eastern states accounted for 10.2% of total incidence, though the area housed only 4% of the population (Ghai and Gupta 1999). The large reduction in CDs is due to the sharp decline in mortality caused by killer diseases such as smallpox, malaria and plague that assumed epidemic proportions in the early to mid 19th and 20th centuries. While the burden from CDs is reduced by 50%, NCDs as well as accidents and injuries are on the rise – typifying a country in demographic and epidemiological transition.

Several factors contribute to the BOD in India. With regard to CDs in general, the interplay of agent, host and environment factors lead to a dynamic state of health and disease. New or emerging illnesses are often caused by organisms already in the environment and which become infectious due to altered conditions in the ecology. In India, given the poor or reduced host defence mechanisms (as a result of malnutrition, poor living conditions, inadequate environmental sanitation, etc.) one can not remain complacent even with diseases that have been reportedly controlled. A good example is malaria. Drug resistant strains of organisms are emerging which are variants of the existing strains of the infectious agents, are more virulent and cause a more severe form of the previous illness. The emergence of drug resistant tuberculosis and cholera is a case in point. Environmental changes caused by man’s interference with the bio-ecology in which he lives, as well as pollution due to depletion of natural resources coupled with the large influx and dumping of industrial effluents and toxic vehicular emissions contribute to the heavy burden of respiratory infections suffered in this country.

In addition to the classic epidemiological triad determining disease, other factors that predispose towards the emergence or re-emergence of diseases are:

(i) International travel which has promoted the worldwide movement of people, goods and food by air, sea or land have contributed to increase in the spread of diseases such as “Airport” malaria, dissemination of 0139 *Vibrio cholera*, and influenza.

(ii) Economic development programmes that have led to changes in the water eco-systems, roadways projects that have led to many becoming homeless, deforestation that has ultimately promoted floods, droughts, and famines as well as climatic changes. A huge canal system established in the Rajasthan desert has resulted in establishing different anopheline species leading to huge malaria epidemics (Tyagi 1995).

(iii) Technological and industrial revolutions that have brought about changes in food processing and packaging and globalization of food supplies. These have led to food contamination which has spread globally.

(iv) Natural/man-made disasters leading to deaths, disabilities and economic losses as has been experienced with the Orissa cyclone, Gujarat earthquake and wars in the past.

In the case of NCDs burden, the major factors that contribute to the high prevalence of cardiovascular diseases as well as neuro-psychiatric disorders include the increase in life expectancy, changes in lifestyles, stressful living and working conditions and general lack of support systems that enable better coping mechanisms. In the ensuing deliberations we briefly discuss selected CDs and NCDs of public health importance.

2.2 Communicable diseases

2.2a Smallpox: A highly contagious, disfiguring and often fatal disease, smallpox was endemic in India with characteristic epidemic spells ranging from 4–7 years and accounted for nearly a third of all deaths in the 18th and 19th centuries. During this time around 80% of the country’s population remained completely unprotected with case fatalities in the vicinity of 25–30% among unprotected populations, of which nearly 85–90% of the deaths occurred in infants and children.

Although vaccination was introduced in India in 1802 from England, its adoption was very slow and some impact was felt only beyond the 1880s. Though the disease was largely controlled, it was capable of flaring up and thus claimed over 150,000 lives in the late 1950s in India. The final eradication of smallpox came about, with the last case recorded in Assam in 1975, through the adoption of a revised strategy of revaccination, isolation of infected individuals, greater levels of infant primary vaccination and improved outbreak reporting and containment. Global and concerted efforts by World Health Organization (WHO) finally succeeded in eradicating

smallpox from the entire world in 1980 (with the last case of smallpox occurring in Somalia in 1977) thus igniting the hope of eradicating other such dangerous killer diseases (Banthia and Dyson 1999).

2.2b Dracunculiasis (Guinea worm): India has been home to dracunculiasis since ancient times with nearly 7 states being endemic (Tamil Nadu, Madhya Pradesh, Maharashtra, Andhra Pradesh, Rajasthan, Karnataka and Gujarat) from where nearly 40,000 cases were reported in 1984. In fact India was the only country in the WHO South East Asia Region (SEAR) where Guinea worm disease was present. However, since the launching and implementation of the WHO supported National Guinea worm Eradication Programme in 1984, the number of cases has fallen from 40,000 (in 12,840 villages spread across 89 districts of the above seven states) to only 9 cases recorded in three villages of Jodhpur district of Rajasthan by 1996. The last reported case was in August 1996. Thus the goal of achieving “zero incidence” of Guinea worm disease in India is within reach, with the WHO (1999) establishing an International Commission for certification of Guinea worm eradication. Important contributors to the success of this programme are the adoption of a primary health care approach to service delivery, vector control measures using abate, health education efforts which promoted filtration of drinking water and prioritizing provision of safe drinking water supply to people.

2.2c Plague: Epidemics of plague have been reported since Biblical and Puranic times. India has suffered several outbreaks of plague with the first in 1031–32 up to the Pali plague of 1812–21. In 1895–96, however, India was caught in the major pandemic with Calcutta and Bombay being the major cities which housed the infection. The sea ports of these cities are believed to have provided the portals of entry for the infection from where it spread to other parts of the country. This major pandemic reached its peak in 1907 and continued for about 11 years till 1918 with the annual mortality totaling over 500,000 deaths between 1898 and 1908. Plague was considered a major public health problem until the mid 1940s and subsided thereafter presumably due to large scale spraying of DDT meant for malaria control (table 1). The last laboratory confirmed human cases in India were reported in 1966 from Karnataka.

India which was presumed to be free of plague, was beset by 876 cases and 54 deaths – characteristic of presumptive plague between August and October 1994. Most of the reported cases were from Maharashtra (596) and Gujarat (151). Cases were also reported from Delhi (68), Karnataka (50), Uttar Pradesh (10) and Madhya Pradesh (12). Fifty-two of the 54 fatal cases were reported

from Gujarat, one from Delhi and Karnataka each (WHO 1999). None of these episodes had definite evidence to substantiate the diagnosis of plague. Further, the clinical, epidemiological as well as microbiological/serological findings were found to be inconsistent with the diagnosis of plague (Sathe and Sathe 1997). Such controversial evidences reinforce the importance and urgent need for evolving and installing an effective and efficient disease surveillance system in the country that would enable quick identification of outbreaks and their containment.

2.2d Vaccine preventable diseases: The vaccine preventable diseases which will be discussed here are (i) poliomyelitis, (ii) measles, (iii) diphtheria, (iv) pertusis, and (v) tetanus.

Prior to the launching of the government of India's Expanded Programme of Immunization (EPI) and Universal Immunization Programme (UIP) in 1978 and 1985 respectively, most of the infant and under-five morbidity and mortality was attributed to the childhood illnesses mentioned above.

In 1988 the World Health Assembly passed a resolution calling for the eradication of poliomyelitis from the world by the year 2000. Over the last nine years, the WHO has certified America as being polio free. The South East Asia region recorded a 96% reduction in polio cases in 1996 (WHO 1999). India accounts for 40% of the globally reported poliomyelitis cases. The National Polio Surveillance Project (NPSP) was established in 1997, which improved surveillance capability of the country. In less than a year, India achieved international standards for Acute Flaccid Paralysis Surveillance, which was a remarkable achievement. The number of polio cases associated with isolation of wild polio virus decreased from 1934 to 1126 during 1998 to 1999. By 3rd February 2001, the reported wild polio cases during 2000 came down to 263 (NPSP, February 2001). It is anticipated that eradication of polio from India will be achieved by 2002 and will be certified by 2005.

Effective surveillance machinery established for polio is expected to be the vehicle for an efficient disease surveillance system for the country in the future.

Incidence of measles has drastically declined from 199,000 cases in 1988 to 35,000 cases in 1995. Likewise the average incidence of tetanus in India is estimated to be 60/100,000 people. In 1995 around 5000 tetanus cases were reported with neonatal tetanus accounting for 50% of the cases. Although diphtheria is found to be endemic in India its prevalence has been on the decline with only about 2,000 cases being reported in 1995 compared to the 15,686 cases reported in 1985. This decline has largely been attributed to the widespread vaccination of children under-five in the country. This is also the case with the incidence of pertusis in India which had declined from 185,000 cases in 1985 to 22,000 cases in 1995.

Thus it is clear that the EPI and UIP in India have brought down the incidence of these vaccine preventable childhood illnesses, thereby lowering the infant and child mortality rates in the country. However, vaccine preventable diseases continue to constitute nearly 6.7% of DALY losses due to communicable diseases in the country. According to the NFHS II (1997–1998) data, the total vaccine coverage appears to have improved to 42% from the previous level of 36% reported in the NFHS I data (1992–1993). A further decline in infant and child mortality and morbidity will need a greater coverage of vaccination in the country.

2.2d Leprosy: Leprosy is a disease known to mankind since ancient times. More than the disease *per se*, the suffering experienced by its victims due to permanent progressive deformities and social stigma, far outweigh its epidemiological consequences. In the pre-independence era, much of the relief work on leprosy was undertaken by missionaries on religious, philanthropic and compassionate grounds. The post-independence period however has been witness to a different attitude and approach to the leprosy problem. In addition to the introduction of sulphones – which has revolutionized the concept of leprosy chemotherapy – the idea of domiciliary and outpatient care of leprosy patients in endemic areas mooted by ICMR in 1949 was actualized by the Gandhi Memorial Leprosy Foundation in 1951. This paved the way for recognition of leprosy as a national health problem and the launching of the National Leprosy Control Programme in 1955. In India there has been a steady increase in estimated leprosy cases from 2.5 million cases in 1961 to 4 million in 1981, thus accounting for nearly 25% of the world total of 10–12 million leprosy cases at that time.

Leprosy cases in India dropped by nearly 80% of the 1981 figure to 0.68 million in 1996 due to the

Table 1. Plague in India.

Period	Total deaths due to plague	Percentage of total deaths
1898–1908	6,032,693	4.32
1909–1918	4,221,529	2.32
1919–1928	1,762,718	1.34
1929–1938	422,880	0.33
1939–1948	368,596	0.21
1949–1958	59,059	0.55
1959–1966	211	–
1994	54	–

Source: Nath (1998).

introduction of multi-drug therapy (MDT). Prevalence has thus declined from 57.6 per 10,000 in 1981 to 5.0 per 10,000 in 1995 and it has remained at that level till March 2000. Interestingly, despite this remarkable achievement, India represents 67% of the global prevalence and 73% of case detection statistics. Prevalence at the state level ranges from 15.2 per 10,000 in Bihar to below 1 per 10,000 in 10 states. Presently 70% of the total leprosy cases in India are concentrated in the states of Uttar Pradesh, Bihar, Orissa, Madhya Pradesh and West Bengal (WHO 2000). It was clear that the elimination target of prevalence of less than 1 case per 10,000 population could not be achieved by the year 2000 at the national level. The National Programme would now strive to achieve this goal by 2005. However, in view of the dramatic decline in the disease burden, the programme will now be integrated with general health services, by shifting ownership of the programme to state and district levels with increased community participation. Based on epidemiological trends, it is predicted that the chances of resurgence of leprosy following integration would be negligible.

2.2e HIV/AIDS: Thirty new infectious diseases have been reported over the last two decades worldwide, and amongst them HIV/AIDS has assumed the most importance. In India, the first case of HIV/AIDS was reported from Chennai in April 1986 and later from Mumbai in the same year among commercial sex workers (CSWs). Since then according to UNAIDS/UNICEF (2000) the HIV prevalence has increased considerably and India presently houses about 3.6 million people affected with HIV/AIDS (UNAIDS/UNICEF 2000)

HIV prevalence has risen to over 1% among women attending antenatal clinics (supposedly representative of the general population) in Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka, Manipur, and Nagaland. In these states the HIV epidemic is considered as to be generalized. Gujarat, Goa and Haryana have a concentrated epidemic, which means a HIV prevalence of below 1% in antenatal clinic attenders, but more than 5% among STD clinic attenders. A large number of other states have shown low percentages of HIV positive individuals. Approximately 89% of reported cases occur among the sexually active and economically productive age group of 18–40 years, with over 50% of all new infections observed among those below 25 years, and 21% among women, the majority of whom exhibit no other risk factor than being their husband's spouses. It is further reported that nearly 22,837 newborns of the HIV infected mothers are infected with HIV and about 15,072 die due to HIV/AIDS (UNICEF/UNAIDS 2000). In addition to the high levels of morbidity and mortality associated with HIV/AIDS, the health, social, demographic and economic

impacts of this fatal disease are devastating and threaten to reverse much of the progress achieved over the last 30 years in the developing world. The African experience bears testimony to the fact that AIDS has sharply reduced life expectancies, nearly doubled mortality of the under-fives and increased infant mortality between 29% to 79% (UNICEF 1997). Further as of the end of 1999, with the death of AIDS infected men and women, approximately 11.2 million children were orphaned. In addition, high mortality among the 20–40 year age group leads to economic losses to the family, industry and countries. It is estimated that approximately 30,000 skilled workers in the urban sector are lost each year to the AIDS epidemic. In addition the costs to the individual society and nation with respect to providing healthcare to those with HIV/AIDS is phenomenal and place a heavy demand on the already over-burdened health services. Moreover, the death of the breadwinners and home-carers in the family due to HIV/AIDS epidemic, causes a demographic void that leaves behind a highly dependent and vulnerable population whose survival chances and quality of life are greatly lowered.

Sexual transmission accounts for 80% of all new infections followed by perinatal transmission (8%), injecting drug use (6%) and blood transfusion (5%) (UNAIDS/UNICEF 2000). In a given country and in a country like India, within individual states, there is no single HIV epidemic. There are different localized focal epidemics. In the intravenous drug users (IDUs) spread of the epidemic could be explosive. HIV in men having sex with men (MSM) may have varying intensity. Heterosexual transmission (HET) is the main mode of transmission in men and women with multiple partners involved in unprotected sex. Extensive spread in HET is rarely reported outside sub-Saharan Africa or outside the commercial sex network. Presently, there are no clear indications regarding the size of the HIV epidemic in India in the future. Experts believe that the present epidemic should stabilize soon in the context of HIV/AIDS being mainly a sexually transmitted disease (J Chin, personal communication). Sentinel surveillance data generated in the last few years is expected to provide useful information for the future.

The factors contributing to the spread of the HIV/AIDS epidemic include: (i) Poverty and low socio economic status. (ii) Greater risk of those suffering from STDs – particularly women. (iii) Gender differentials, with women being more susceptible to the infection with nearly 25% of all infections occurring among women. (iv) Rapid urbanization, migration and slum proliferation. A study of male truck drivers in Assam reported that 82% of men had regular sex with CSWs, none used condoms regularly, 15% had homosexual contact, 36% were treated for STDs, 40% used cannabis and 2.4% injected heroin.

A study conducted in Wasipur industrial area near Delhi reported prevalence of paid multi partner sex and low condom use. This clearly testifies to high risk behaviour practiced by industrial workers and their consequent increased vulnerability to HIV/AIDS infection (Singh 1999). (v) Societal norms, taboos, etc. that preclude discussion of sexual matters (even among spouses), seeking information and knowledge about safe sex practices, etc. with the result that knowledge of preventive measures remain low. This consequently adversely affects people's health seeking behaviour such that nearly 90% of infected people remain ignorant of their HIV infected status (UNAIDS/UNICEF 2000). Further, because of the stigma attached to the disease as well as the non-acceptance and "criminal" nature of homosexuality and intravenous drug use, much of the HIV infections resulting from these risk behaviours go under cover resulting in further unchecked spread of the infection. (vi) The age structure in India indicating a large proportion of young and reproductively active population. (vii) The lack of standardization of blood transfusion norms and safe storage practices. (viii) Inadequate human rights protection leading to the exclusion of women, children and underprivileged from getting access to knowledge about STDs/HIV/AIDS, and to adequate treatment – even if only palliative.

2.2f Tuberculosis: Several infectious diseases once considered to be controlled have re-emerged to become major public health problems of a greater magnitude than was previously the case. These are tuberculosis, malaria and diarrhoeal diseases. Tuberculosis has been endemic to India for centuries and continues to pose a major public health problem. Even today India bears nearly 25% of the global burden of tuberculosis (Ghai and Gupta 1999). The ICMR National Sample Survey (NSS) in 1955–1958 as well as other subsequent studies revealed that nearly 1.5% of the population suffers from radiologically active pulmonary tuberculosis of whom 25% are sputum positive. Presently it is estimated that there are 14 million cases of active tuberculosis in the country. Of these 3.5 million are sputum positive and therefore infectious (9th Plan document). It is further estimated that annually nearly 1.5 million to 2.2 million cases are added, of whom 20–25% are sputum positive. It is also believed that with the HIV–TB co-infection, the incidence of tuberculosis may increase significantly from the present 1.8 per 1000 (9th Plan). It is estimated that in India nearly 60% of AIDS cases have evidence of active tuberculosis. Further, it is observed that those infected with HIV are 25 times at greater risk of developing tuberculosis. This may be due to either new infection or reactivation of pre-existing tuberculosis infection in the HIV infected person (Chakraborty 1998).

Though mortality rates have fallen considerably from 800/100,000 people in 1920, to 462/100,000 in the mid-1950s and between 40–80/100,000 at present, the number of people dying due to TB annually continues to be high at over half a million. Morbidity continues to remain high with TB constituting nearly 3.7% of DALY losses due to communicable diseases in the country (World Development Report 1993).

Global drug resistance to tuberculosis shows wide variations. The logistic and operational difficulties/inefficiencies has been implied to be the cause of the variations. On account of this the magnitude of the problem of drug resistant tuberculosis in the world remains unknown. In India drug resistant tuberculosis has been encountered and associated with the introduction of anti-tuberculosis treatment, initiation of short-course chemotherapy (SCC) and MDT. Prevalence of primary drug resistance to streptomycin and isoniazid as single drugs ranged from 3–13%. Resistance to rifampicin was recognized in the 1990s and was 1.2%. Prevalence of acquired drug resistance appears higher than primary drug resistance. Studies on acquired drug resistance from Gujarat, North Arcot district in Tamil Nadu and New Delhi suggest that overall prevalence rates range between 34.5 to 67% for isoniazid, 26.0–26.9% for streptomycin and 2.8 to 37.3% for rifampicin. Compared to global prevalence of 48%, multi-drug resistant tuberculosis has been found to vary from 0–6% in most regions of India (Paramasivan 1998).

With regard to the containment of the TB problem, the government of India initiated a National Tuberculosis Control Programme in 1962 as a centrally sponsored scheme with the aim of early detection, effective domiciliary treatment and incorporation of BCG vaccination at birth into the immunization programme. In 1993, a Revised National Tuberculosis Control Programme (RNTCP) was implemented as a pilot project covering 13.85 million and later scaled up in 1999 to cover over 130 million people. An important component of RNTCP is Directly Observed Treatment – Short Course (DOTS). The results of the DOTS programme in India are reported to be comparable to those of other countries. An analysis of smear positive cases under the DOTS programme revealed a treatment success rate of 80% and death rates of 4% whereas with those not in the DOTS programme, treatment success rates were only 40% and death rates 29% (Khatri and Frieden 2000). As per WHO (1999) estimates, if DOTS were implemented throughout the country, the economic benefits would equal US\$ 800 million to 4 billion and the cost per capita would not exceed US\$ 0.10.

2.2g Malaria: Right from the pre-independence era malaria has not only been a major public health problem

but also an obstacle to developmental endeavours in the country. However, spraying of DDT in the late 1940s on an experimental basis in hyper-endemic areas proved a turning point in the history of malaria control and also raised hopes of the possibility of its elimination. Thus in 1953 at the time of the launching the National Malaria Control Programme, malaria incidence was of the order of 75 million new cases and 0.8 million deaths annually. Under this national programme marked success was achieved thus raising hopes of eradicating malaria. This led to the conversion of the National Malaria Control Programme to an Eradication Programme in 1958. Under this scheme within 5–7 years malaria was successfully controlled from nearly 3/4th of the country and incidence rates fell from 75 million new cases in 1953 to 0.05 million cases in 1961 (Ghai and Gupta 1999).

The reduction in malarial cases indicated that malaria could be controlled and was no longer considered a threat to public health. However owing to operational, technical and administrative problems as well as refractory behaviour of vectors to insecticide and parasites to anti-malarial drugs, India experienced a resurgence of malaria (particularly *Plasmodium falciparum*) with new cases touching the 6.47 million mark in 1977. In 1977, therefore, a modified plan of operation was launched. This led to the stabilization of the incidence of malarial cases to approximately 2.5 million cases since 1984 to the present and about 1122 deaths in 1994.

Malaria thus continues to pose an important public health problem not only from the point of its contribution to the country's disease burden but also the economic losses associated with it (Sharma 1998). For example in a study of the economic burden of malaria in India it was observed that malaria in 1991 was responsible for economic losses of US\$ 0.5 to 1 billion annually. In another World Bank study on malaria morbidity and mortality, DALY losses were estimated at 0.9 million (World Developmental Report 1993). In monetary terms with DALYs computed at a constant of 2 million cases, the economic loss due to malaria amounts to US\$ 507–631 (Sharma 1998). In addition to the indirect economic losses due to disability associated with malaria infection, the cost of treatment per capita, obtained from the private sector is quite high with average costs in the rural areas reaching Rs 200–300 and rising to as much as Rs 20,000 to 30,000 in complicated cases. Further the cost of treatment for drug resistant malaria may increase 20–30 times over the costs of chloroquine and this precludes affordability of treatment by poor people among whom the infection is generally very high.

A revised strategy to control malaria was launched by National Malaria Eradication Programme (NMEP) in 1995. In addition to early detection and prompt treatment, it entailed adoption of an integrated and intersectoral

approach to malaria control supported by promotion of IEC and community participation. The total plan outlay for the 8th plan period for malaria control has been budgeted at Rs 425 crores. Under the revised strategy malaria control has been further strengthened with the World Bank assistance of US\$ 215 million for 5 years i.e. 1997–2002 and it is anticipated that over 200 million people from 100 districts in 7 states would benefit from this project.

2.2h Acute diarrhoeal diseases: At the time of independence only 4.5% of the total population of India had access to safe water supply and only 2% enjoyed adequate sanitation. Recognizing the importance of safe water supply and adequate sanitation as an essential pre requisite to assure environmental and health safety, a holistic view was adopted during the first three five year plans wherein these components were integrated into and included as part of the health budget. However, such a holistic view did not sustain for long and by the fourth five-year plan, health was dissociated from water supply and sanitation (Bajaj 1998). Table 2 provides clear evidence for the low priority accorded to the provision of safe water supply and adequate sanitation during the five-year plan periods (Nath 1998).

Apart from the rural areas experiencing poor sanitary facilities, rapid urbanization and mushrooming of slums have left the sanitary conditions in the urban sector in a dismal state. For example out of 4000 towns and cities only a mere 200 have a sewerage system, which incidentally is also only partial in many cases. Still fewer have sewerage treatment plants and these are also poorly maintained. To date less than 50% of the urban population have adequate sewerage systems. The existence of four lakh scavengers and 72.1 lakh dry latrines spread over 2587 towns provide ample testimony to this dismal fact (Nath 1998).

Coverage of safe water has improved considerably from a meagre 4.5% in 1947 to 80% in 1997. Further, statistics reveal that the distance needed to be travelled to fetch water has been reduced from 1.6 km to 1 km in the plains and 50 metres in the hilly areas. However, even one kilometre is a long distance to fetch water – an essential commodity necessary to sustain life – considering it is the women who perform this activity. When long distances have to be travelled to fetch water, adequate supply and optimal quality of water have to be assured if water borne disease are to be kept at bay. Adequate and safe environmental sanitation is an essential prerequisite if optimal benefits of safe and adequate drinking water supply are to be accrued. Provision of adequate sanitation has only improved from 2% to 29% in 1997 indicating thus that more than 70% of the population is denied basic amenities and are exposed to the hazards of diseases incidental to

Table 2. Health investment in India during five year plans (Rs crores).

Five year plan periods	Total (all heads of development)	Education	Health	Family welfare	Water supply and sanitation
I Plan (1951–56)	1960.00 (100.0)	133.00 (6.79)	65.20 (3.3)	0.10 (–)	11.00 (0.56)
II Plan (1956–61)	4620.00 (100.0)	208.00 (4.50)	140.80 (3.0)	2.20 (0.1)	74.00 (0.56)
III Plan (1961–66)	8576.50 (100.0)	418.00 (4.87)	225.90 (2.6)	24.90 (0.3)	458.90 (2.9)
IV Plan (1969–74)	15778.80 (100.0)	822.66 (5.21)	335.50 (2.1)	278.00 (1.8)	458.90 (2.9)
V Plan (1974–79)	39426.20 (100.0)	1285.00 (3.26)	760.80 (1.9)	491.80 (1.3)	1091.60 (2.8)
VI Plan (1980–85)	97500.00 (100.0)	2523.74 (2.59)	1821.05 (1.9)	1010.05 (1.0)	3922.00 (4.0)
VII Plan (1985–90)	180000.00 (100.0)	6382.65 (3.55)	3392.89 (1.88)	3256.26 (1.80)	6522.47 (3.62)
VIII Plan (1992–97)	434100.00 (100.0)	21319.02 (4.91)	7575.92 (1.75)	6500.00 (1.49)	16711.03 (3.85)
1992–93 (RE)	77127.40 (100.0)	2993.33 (3.88)	1276.29 (1.65)	1041.02 (1.35)	2194.53 (2.85)
1993–94 (BE)	100120.16 (100.0)	3983.59 (3.98)	1622.18 (1.62)	1270.00 (1.27)	2944.96 (2.94)

Source: University News Spread Sheet, June 19, 1995.

Table 3. Burden of water related diseases in India, 1990 (in millions of DALYs/1).

Diseases	Female	Male	Total
Diarrhoeal helminthes	14.39	13.64	28.03
Intestinal helminthes	1.00	1.06	2.06
Trachoma	0.07	0.04	0.11
Hepatitis	0.17	0.14	0.31
Total water related diseases	15.63	14.88	30.51

Source: Nath (1998).

poor sanitation. Table 3 profiles DALY losses due to the burden of water related diseases in India. Diarrhoeal diseases which have been a major problem in the past continue to remain so even today. It is estimated that each year children below 5 years suffer from 2–3 episodes of diarrhoea and 0.7 million die from it.

2.3 Non-communicable diseases, accidents and injuries

Affluence, progressive aging of the population, freedom from many dreaded infectious diseases and upward social and economic mobility have presently paved the way for increases in the prevalence of diseases/disorders associated with increasing life expectancies and altered lifestyles (such as cardio vascular diseases, diabetes mellitus, blindness, accidents, obesity, trauma and injuries and psycho-emotional problems). While DALY losses due to infectious diseases are expected to decline from 56% in

1996 to 25% by 2020, the same due to non-communicable diseases on the other hand is projected to increase from 29% in 1990 to over 57% in 2020 (Rajagopalan 2000). Some of the major NCDs of public health importance as well as accidents and injuries in India are described briefly in the following section.

2.3a Rheumatic heart disease, coronary heart diseases and hypertension: Rheumatic heart disease (RHD) continues to pose an important public health problem in India with nearly 0.5–3% of all sore throats resulting in rheumatic fever and 80% culminating in RHD. It is estimated that the prevalence of RHD is about 2 per 1000 people.

Approximately 50 million people above the age of 30 years, are estimated to be suffering from hypertension which appears to be higher among the urban population (20–25%) as compared to the rural population (8–13%).

Community-based epidemiological studies suggest that the prevalence of coronary heart diseases (CHD) as well as hypertension is higher (65–97/1000) in urban population as compared to rural populations (10–27/1000). It is further estimated that CHD are likely to double by the year 2015 as compared to 1985. Table 4 gives the prevalence rate of CHD based on a Delhi study (Chadha *et al* 1990). According to a New Delhi health survey (1989–94), every 10th person aged 64 years has ischemic heart disease and every 4th person suffers from hypertension.

Thus CHD with 800,000 deaths and stroke with 600,000 deaths emerge as major causes of mortality in

India. Both stroke and ischemic heart disease constitute 2.1% and 2.8% of DALY losses due to NCDs in the country (World Developmental Report 1993).

2.3a Cancer: Approximately 12% of all deaths in the world is attributed to cancers of various forms. Of the estimated 51.3 million deaths in 1996 in the world, 7.1 million were due to cancer and according to WHO estimates, this figure is likely to increase to 8 million annually by 2000. In India the increase of cancers in Bangalore, Bombay and Madras in 1992 was 80/100,000 people as compared to 289/100,000 in developed countries (WHO 1996). About 15 lakh new cases and 3 lakh deaths are estimated annually in the country, with the average survival extending to a mere 3 years after diagnosis. Thus cancer is one of the 10 leading causes of mortality in the country and constitutes 4.1% of DALY losses due to NCDs (World Developmental Report 1993). The leading sites of cancer continue to remain the same over the years with oral, lung, oesophagus and stomach cancers among men and breast, oral and cervix in women (ICMR 1994–95). Oral cancers account for 50 to 70% of all cancers in India compared to 2–3% in the UK and USA (Warnakulasuriya *et al* 1984). The second most common among cancers in women is cervical cancer followed by breast cancer. In India lung cancer accounts for 6.8% of all malignancies in the country.

Change in life-style, chewing of tobacco, smoking, air-pollution, occupational exposure to asbestos, arsenic, genital warts, prostitution, oral contraceptive pills, early pregnancies and a family history of breast cancer are some of the risk factors contributing to cancer in India.

2.3b Diabetes mellitus: Globally the problem of diabetes mellitus shows an alarming upward trend. In 1997, approximately 143 million people were estimated to be suffering from diabetes globally with 10 million new cases being recorded. This figure is expected to rise to 800 million by the year 2025 with 45% of the increase occurring in developed countries. Further, contrary to

what is widely believed, approximately 63% of the diabetics reside in developing countries. In India, the prevalence of diabetes mellitus (DM) is estimated between 2 and 3% in rural and urban populations, respectively. A multicentric ICMR study revealed that the prevalence for the country as a whole was 1.73% for those over 15 years of age. Prevalence in urban populations was estimated to be between 0.95% to 3.8% while that for rural areas ranged between 0.60% and 1.93% (Gupta *et al* 1984).

In a recent ICMR–VHS (1999) collaborative study of known diabetes in Chennai, prevalence of known diabetes was 2.9% for all ages and sexes combined (Asha Bai *et al* 2001). The prevalence was 4.9% for those aged over 20 years and 10.5% for those aged over 40 years with a significantly higher prevalence among females. As of 1995, 19 million Indians were detected as being diabetics and the numbers are rising steadily. According to WHO, India has the dubious distinction of being called the “diabetic capital of the world” and is likely to house the highest number of diabetics (over 57 million) by the year 2025.

Insulin resistance, impaired glucose tolerance, syndrome X, hypertension and obesity are factors reported to be associated with both diabetes mellitus and cardiovascular diseases in India. In addition, life style changes in terms of improper eating habits, consumption of fast and fatty foods, marriages among close blood relatives and stressful living conditions appear to predispose not only the rich but also the poor population to risks of developing diabetes.

2.3c Accidents and injuries: Accidents and injuries are rapidly on the increase and appear to emerge as the leading causes of morbidity and mortality in the age group of 15 to 34 years.

Between 1957 and 1979 there has been an increase of 461% in deaths due to traffic accidents in Delhi. From 1971 to 1991 India recorded a 277% increase in road traffic fatalities (WHO 1996). India has a fatality rate in road accidents that is 20 times that of developed countries – perhaps the highest accident rate in the world. According to the Registrar General of India, the recorded data for all injury related fatalities only reflect 20–30% of actual injury related deaths. Accidents and injuries account for 17% (World Health Report 1999) of DALY losses in the country.

Table 4. Coronary heart disease prevalence rate per 1000 adults (Delhi study).

Sex	Urban			
	All	Socio-economic status		Rural
		High	Low	
Male	39.5	61.0	20.0	7.4
Female	25.3	30.2	8.5	5.1
Total	31.9	46.1	14.0	5.9

Source: Chadha *et al* (1990).

3. Health status profile

Discussion on health status will focus on: (i) nutritional status, (ii) infant and child health, (iii) maternal health, (iv) health services facilities, (v) health finances outlay, and (vi) health policies.

3.1 Nutritional status

The provision of optimal food and nutrition is an important responsibility of the state towards its citizens. It is redundant to say that healthy people enhance the human resources of a nation which ultimately contribute to a healthy economy.

Data from table 5 suggest that the net availability of food grains has trebled in the last 40 years from 52.4 million tonnes in 1950–51 to 150.2 million tonnes in 1991–92 and this has reached an all time high of 203 million tonnes in 1997–98 (Rajagopalan 2000). In addition, net per capita availability of food grains has oscillated between 394 g in 1951 to 465 g in 1992. However the per capita net availability of pulses which stood at 60 g in 1951 has in fact dropped to a low of 36.3 g in 1993.

In terms of food intake (Figures 1 and 2) though there has been a decline in consumption of cereals and millets it is above or equal to the Recommended Daily Allowance (RDA). However intake of pulses remains lower than recommended levels. Green leafy vegetable intake was only a third of the RDA. Consumption of other vegetables was also marginally lower. While intake of fruits showed a slight increase, milk and milk product consumption was only slightly over 50% of RDA.

In general availability of iron in Indian diets is poor (3%), vitamin A consumption is around 30–60% of the RDA, riboflavin 2/3rd of RDA, and vitamin C satisfactory (NNMB 1997–2000).

Another important aspect discernible from table 5 is that the per cent share of food per capita household consumption expenditure has continued to remain high ranging between 55–66% in 1951 to 55–64% in 1990 for both urban and rural areas. The fact that 36% of the population continues to remain below the poverty line clearly suggests that lack of food security is likely to be a major issue for the country and although hunger levels have reportedly come down from 16% to 8%, it still means that 75 million people go hungry each day.

Reports from the NNMB (2000) on the distribution of the weight and age of children of 1–5 years suggest that the population of normal and mildly undernourished children has decreased from 15% to 9% and 45% to 41% respectively (figure 3). Consequently commensurate increases in moderately malnourished children have been observed, and the proportion of severely malnourished children fluctuated between 7% and 11%. It is well known that the risk of death from common childhood diseases is double for mildly malnourished children, triple for moderately malnourished children and as high as eight times for severely malnourished children (Mukhopadhyay *et al* 1997).

Table 5. Nutrition statistics – all India.

Indicators	1950–51	1960–61	1965–66	1970–71	1973–74	1978–79	1979–80	1980–81	1984–85	1989–90	1990–91	1991–92	1992–93	1997–99
Net availability of food grains (millions of tonnes)	52.4	75.7	78.5	94.3	114.9	101.4	114.3	124.3	144.8	158.6	148.9	150.2	–	203.0
PDS as a per cent of net availability of food grains	15.3	5.3	19.2	8.3	11.3	10.2	14.8	11.4	12.7	11.0	13.1	12.5	10.1	
Per capita net availability of food grains (g)	394.9	468.7	408.1	468.8	451.2	476.5	410.4	454.8	454.0	476.4	510.1	469.9	465.6	
Per capita net availability of pulses	60.7	69.0	48.2	51.2	40.8	44.7	30.9	37.5	38.4	41.1	41.6	34.3	36.3	
Per capita household consumption expenditure based on NSS rounds (Rs)	(1954–55)													
Rural – Total	15.0	20.0	26.4	34.7	53.0	68.9	–	–	112.5	189.5				
– Food	9.9	14.1	19.3	25.6	39.7	44.3	–	–	73.7	121.8				
Urban – Total	24.7	27.5	36.0	50.4	70.8	96.2	–	–	164.0	298.0				
– Food	13.7	16.9	22.7	33.1	47.9	57.7	–	–	97.0	165.0				
Share of food per capita household consumption expenditure in per cent	(1954–55)													
Rural	66.0	70.5	73.1	73.8	74.9	64.3	–	–	65.5	64.3				
Urban	55.5	61.5	63.1	65.7	67.7	60.0	–	–	59.1	55.5				

Source: *Economic and Political Weekly*, May 14, 1994 'Social Indicators of Development in India', vide Univ. News, July 29, 1996. *Health Edn. in SEA*; Jan., Vol. XV, No.1, Jan. 2000, p. 31 (Rajagopalan M S).

The NFHS survey of 1992–93 revealed 53% of children below four years were underweight with 21–29% being severely malnourished. Further, stunting (in 52%) and wasting (in 17.5%) was also observed in children under four years of age. From this it is clear that a large population of children under 5 years are at high risk for morbidity and mortality due to varying degrees of malnourishment.

It is thus evident that a large percentage of the Indian population enjoys neither food nor nutrient security and that both macro- and micro-nutrient deficits are prevalent. In addition to poverty, considerable lack of knowledge particularly about appropriate foods to be eaten due to high levels of female illiteracy (60%), unscientific cooking methods, and cultural patterns of eating within the house, contribute to the prevalent nutritional deficits in the country.

In addition the public distribution system (PDS) whose main objective is to provide food to the poor and those

below the poverty line has fallen short of its goals. This is evident by the fact that while the PDS as a per cent of net availability of food grains was a meagre 15% in 1950–51, the same in 1992–93 fell further to a low of 10.3%. Operational and administrative inefficiencies of the PDS have further precluded optimal and effective utilization of the same by those for whom it was initiated.

3.2 Infant and child health

Infant and child health status constitute sensitive indices of the socio-economic status of a country. In this regard India has made considerable progress.

The infant mortality rate (IMR) that was typically high (222/1000 live births) in 1911 has registered a steady decline through the years to rest currently at 79/1000 live births in 1998 (figure 4). The sharp declines are attributed to strengthening of the Maternal and Child Health (MCH)

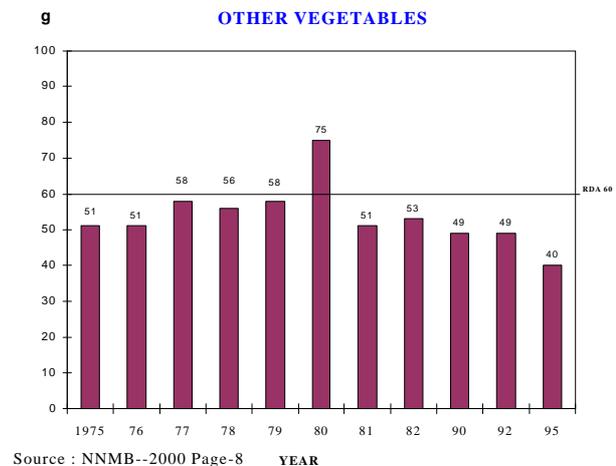
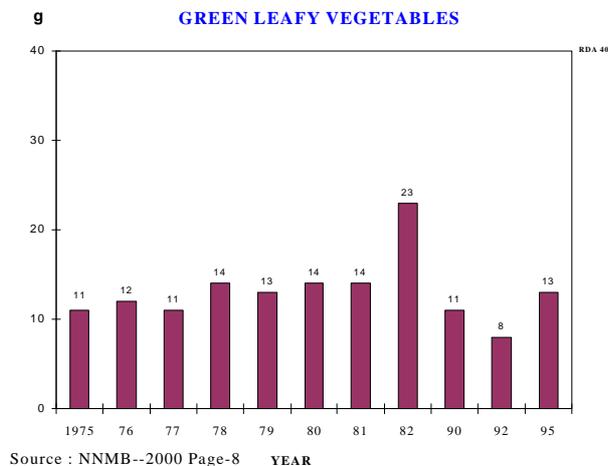
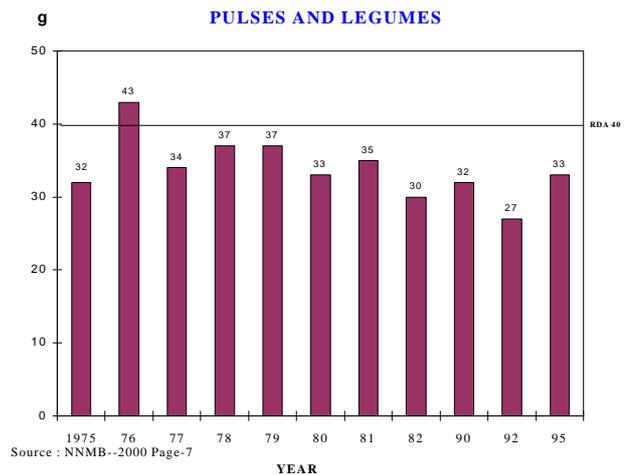
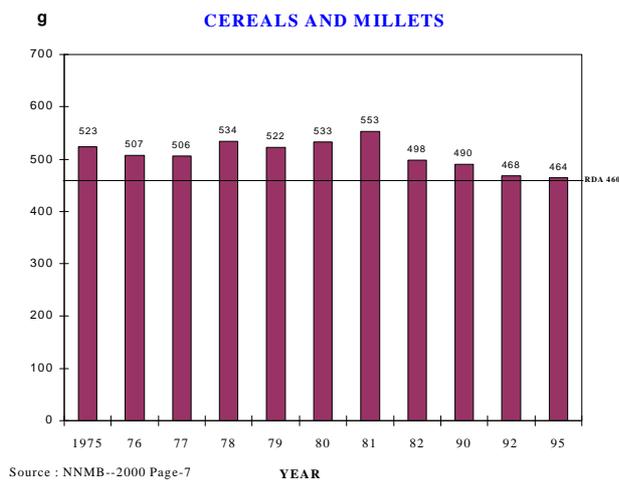


Figure 1a. Intake of foods (CU/day).

programmes in the country as part of the nation's and WHO's 'health for all' strategy.

Though the overall IMR has come down to nearly a third of the 1911 figure, newborn and neonatal mortality continue to constitute 62% of IMR. Nearly 52.3% of births fall under the category of being "high risk" (Rajagopalan 2000) More than 60% of these deaths occur in Assam, Bihar, Madhya Pradesh, Uttar Pradesh, Orissa and Rajasthan. Wide intra- and inter-state differentials prevail with rural Madhya Pradesh registering an IMR of 109/1000 as opposed to urban Kerala, whose IMR is just 13/1000. Further, low birth weight (LBW) constitutes 33% of all newborns and 25% of these are premature. Although IMR has declined considerably the current figure of 79/1000 live births is still high.

Child or under fives mortality (UFM) is another important indicator not only of the socio-economic status but also nutrition security among children. Table 6 depicting the percentage distribution of deaths by age and

sex in India clearly suggests that mortality is highest among the 0-4 years across decades. Sex differentials further indicate that deaths in this age group consistently remain higher among female children compared to male children.

The UFMR which was 53/1000 children below five years of age in 1971 has declined to 35/1000 in 1987 (Reddy *et al* 1993) and 26.5/1000 in 1991 (CSSM, GOI 1994). Further, rural-urban differentials suggest wide variations, with the urban UFMR being substantially lower (20/1000) compared to the rural figure (36/1000). Major factors contributing to the present levels of IMR and UFMR include maternal malnutrition, poor intra-natal care (only 35% of deliveries are attended to by trained personnel), low birth weight, pre-maturity, energy and protein malnutrition, afflictions with vaccine preventable disease (total vaccine coverage for all doses is still only 45% as per NFHS 1997-98), poor socio-economic and environmental conditions accompanied by high levels of female illiteracy and poor personal hygiene.

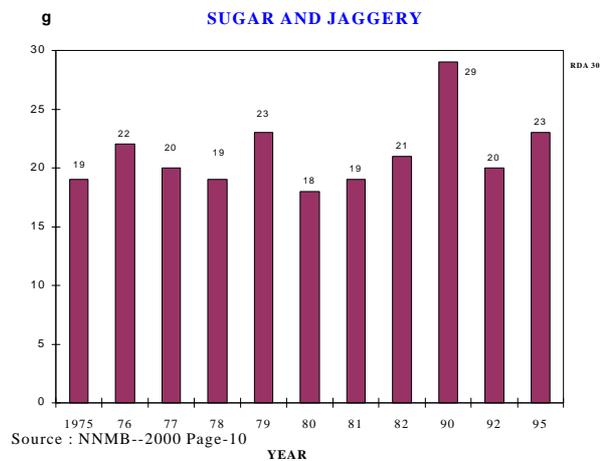
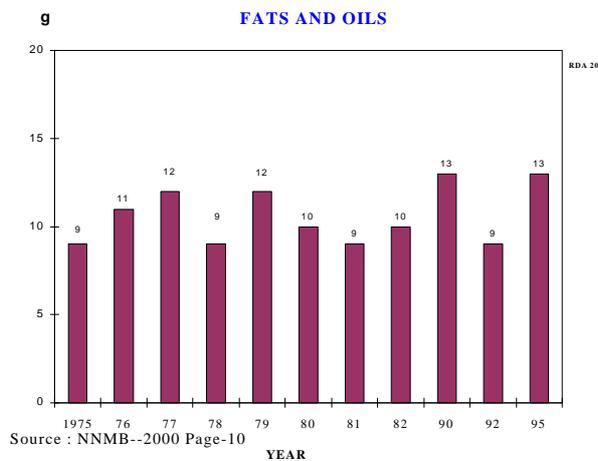
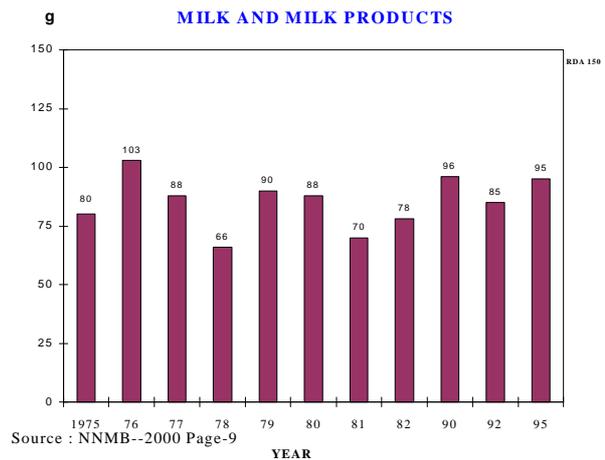
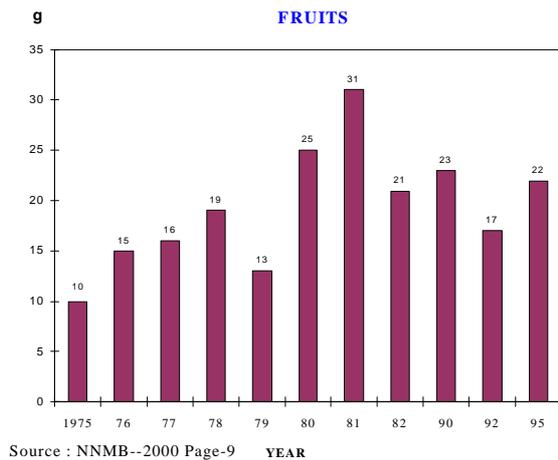


Figure 1b. Intake of foods (CU/day).

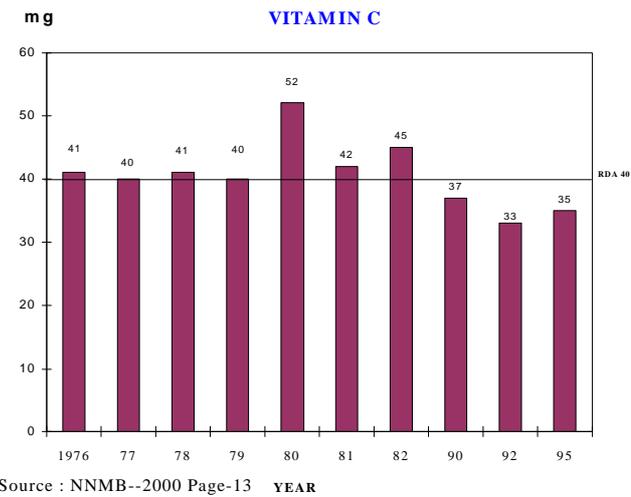
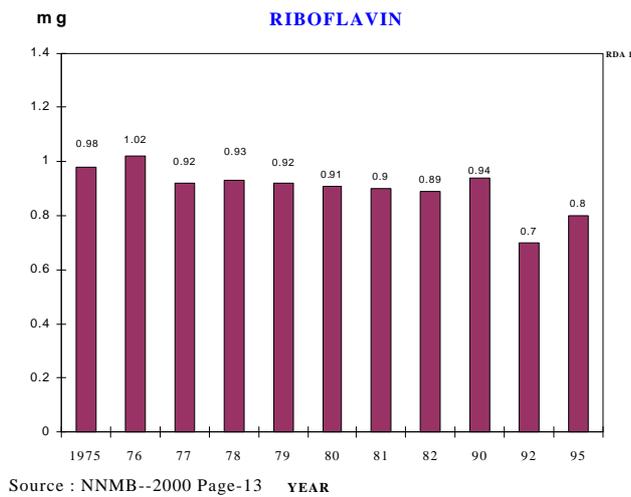
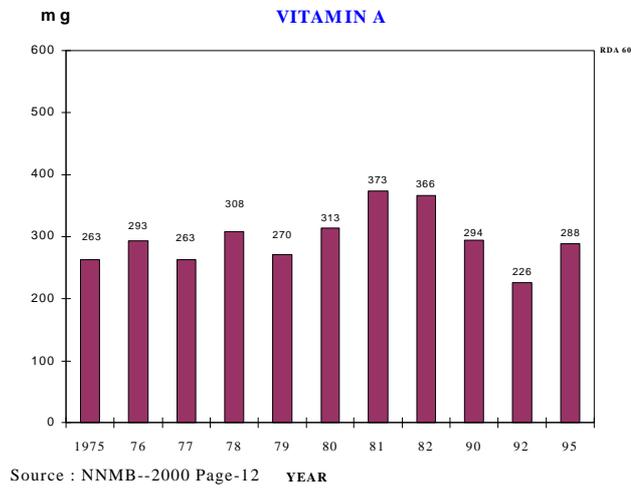
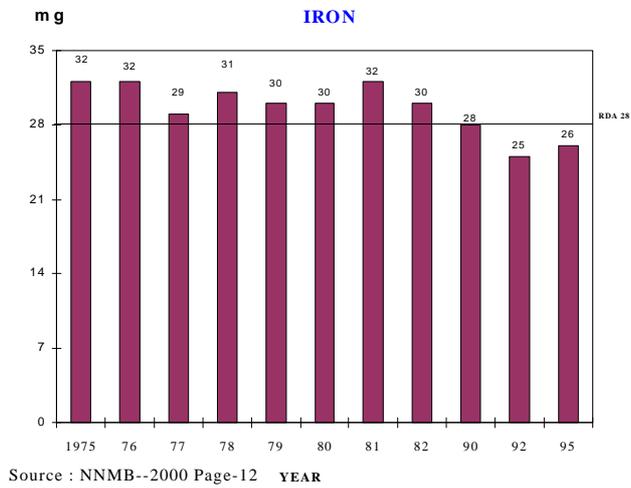
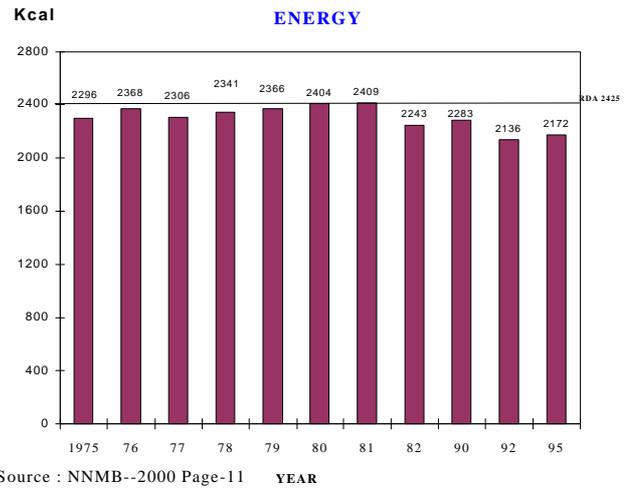
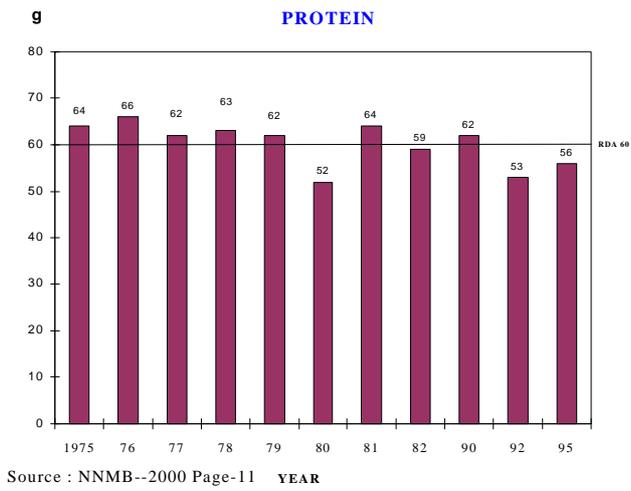


Figure 2. Intake of nutrients (CU/day).

3.3 Maternal health

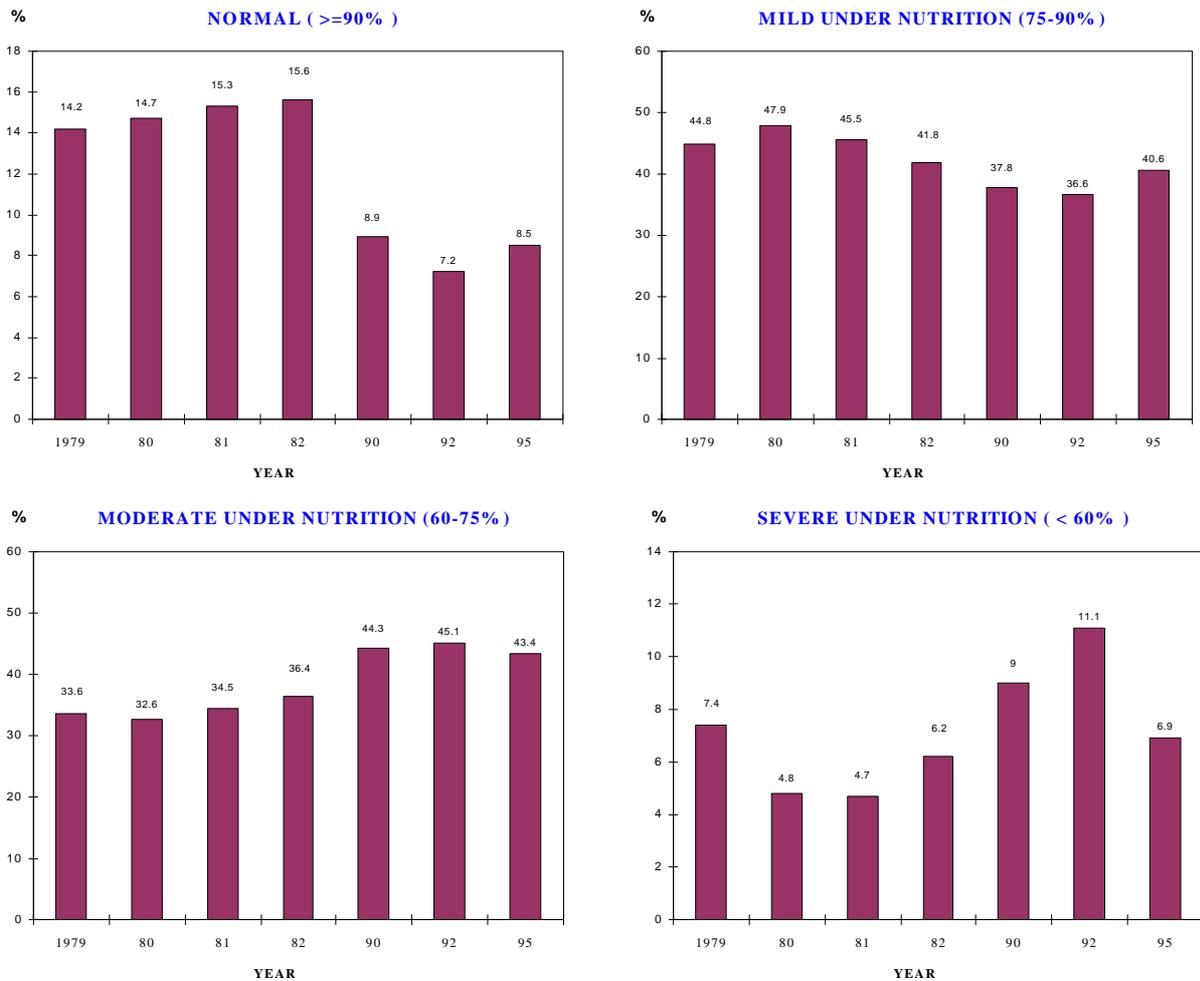
An important indicator of the quality of health services and gender equity is maternal mortality rate (MMR). At the time of independence the MMR in India was very high (20.2/1000 live births). As of 1991 it has dropped to 1/5th of that level (4.6/1000) indicating that considerable improvements have been instituted with regard to health service delivery for pregnant women in the country. Various proportionate causes of maternal mortality are profiled in figure 5. Major factors contributing to the observed declines in MMR include strengthening of MCH services, the World Bank assisted India population project, the government of India's child survival and safe motherhood (CSSM) programmes in the country through the last 3 decades. Despite these programmes and improvements in maternal care, the lifetime risk of dying for women due to maternal/obstetric related causes in India is

1 in 37 – which is still very high, compared to the lifetime risk of 1 in 1800 observed in developed countries.

Factors which contribute to this continued high MMR include persistent, chronic and intergenerational malnutrition among women, poor access to and utilization of antenatal and other health services, high levels of female illiteracy, early age at marriages and first conception, short birth intervals due to poor contraceptive practice and frequent reproductive loss, inadequate knowledge and experience about child bearing and child rearing norms, and submission to socio-cultural and family norms.

3.4 Health services facilities

During the pre-independence era, health services in India under the British rule, mainly catered to the health needs of the Armed Forces and European civil servants. Allopathy with a “curative” bias was promoted and practiced



Source : NNMB--2000 Page-13

Figure 3. Distribution of 1–5 year children by weight for age.

(to the neglect of other Indian systems of medicine) but was inaccessible to the vast majority of rural people. Health programmes as well as medical education were not tuned to the health needs of people. Subsequently the Government of India Act of 1919 shifted the emphasis from curative to preventive services. However, medical relief tended to be concentrated in towns. In 1937, a Central Advisory Board was constituted with the Public Health Commissioner as its Secretary. In 1940, the Planning Committee of the Indian National Congress called for the training of one health worker for every 1000 population within a space of 5 years. However, not much was achieved due to official apathy.

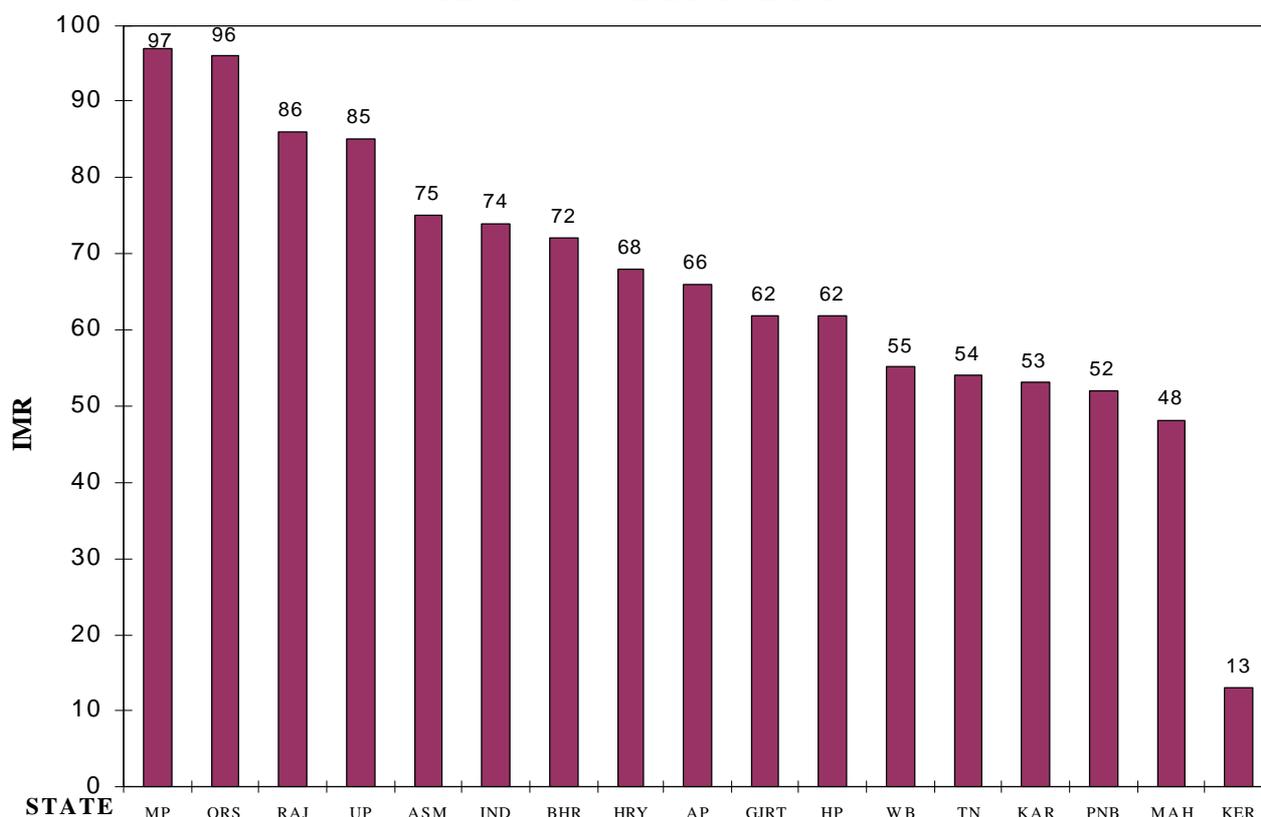
The constitution of the Health Survey and Development Committee under the Chairmanship of Sir Joseph Bhore in 1943 and their recommendations witnessed the dawn of the planning of health services in India. At the periphery, Primary Health Centres were responsible for provision of basic and essential health services. To effect democratic decentralization according to the Mehta Committee, the

country was divided into over 5000 Community Development Blocks (CDBs). The major mandate of CDBs was the adoption of an integrated multi-sectoral approach to community health and development. Active community participation was declared as an essential pre-requisite to programme success.

In keeping with the Mehta Committee recommendations, Panchayat Raj institutions were established to actualize decentralization and people's participation in local self-governance and development programmes at grass-root levels. The 73rd Constitutional Amendment has enabled representation of the socio-economically disadvantaged and women in elected bodies through the policy of reservation. A share of the state's finances have also been allocated to the Panchayats. These changes notwithstanding and as is akin to any democratic endeavour, variations in delegation of powers between and within states is not uncommon.

Discussions on the health services facilities will entail descriptions of existing health manpower and

Inter State Differentials



Source : PUBLIC HEALTH IN INDIA FIVE DECADES (1998) Page-73

Figure 4. Infant mortality rate – SRS 1996.

infrastructure facilities, the nature of their distribution and the impacts of these on the health status of people.

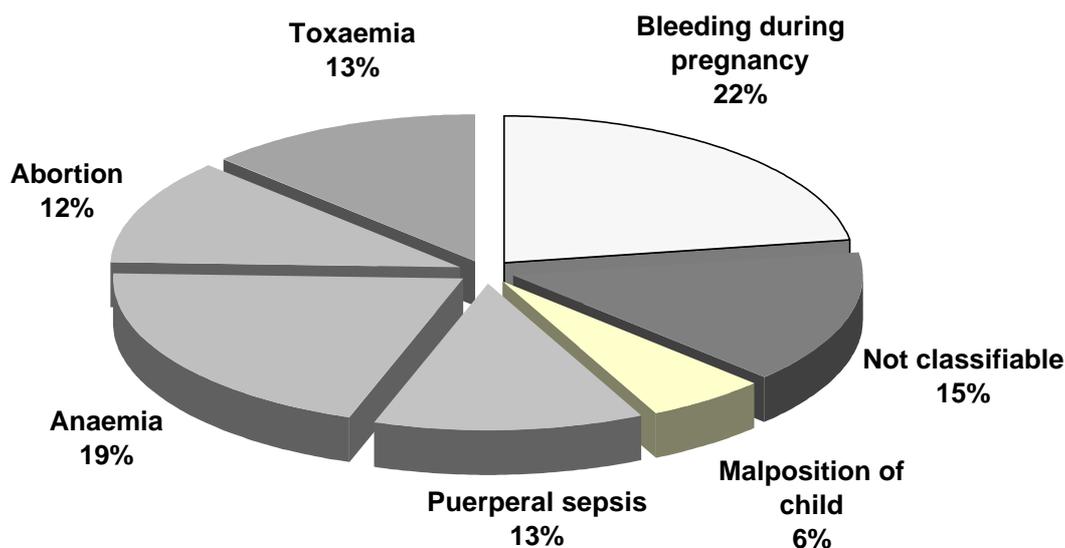
Considerable progress and improvements have been achieved in manpower and infrastructural profiles (table 7) since independence from the first Five Year Plan period in (1951–1956) to the 8th Plan period (1992–1997). Until the 6th Plan, the ratio of physicians to nurses was inverse to that recommended by WHO (i.e. the proportion of doctors to nurses must be at least 1:2) with doctors outnumbering nurses. However, after the 6th Plan and in more recent times this situation appears to be

slowly changing to provide a doctor–nurse ratio of approximately, 1 : 1.1 as observable from table 8. There is a gross inadequacy of infrastructure facilities and health manpower. For example, of the 21,802 PHCs operating in 1995, 416 were functioning with four doctors, 777 with three, 4,062 with 2 and 7,804 with one doctor which meant that the remaining 7,607 PHCs were perhaps functioning with no doctor (Mukhopadhyay and Choudhury 1997). Similarly of the 132,285 sub centres functioning in 1995, 6,530 did not have any ANMs; 26,961 had no male health workers and 3,621 had no male health workers or

Table 6. Percentage distribution of deaths by age and sex – India, 1971–86.

Age group	1971			1976			1981			1986		
	Male	Female	Total									
0–4	45.24	50.83	48.07	44.15	51.99	47.49	38.00	43.21	40.50	36.80	42.70	39.66
5–9	4.45	4.60	4.52	4.02	5.11	4.53	4.10	4.83	4.46	3.52	4.50	3.99
10–14	1.80	1.60	1.70	1.94	2.03	1.98	1.87	1.76	1.77	1.71	1.74	1.72
15–19	1.12	1.58	1.35	1.40	1.62	1.50	1.48	2.18	1.82	1.71	2.18	1.94
20–24	1.52	2.19	1.85	1.29	2.22	1.73	1.60	2.60	2.09	1.75	2.74	2.23
25–29	1.43	2.08	1.75	1.40	2.37	1.85	1.48	2.41	1.93	1.68	2.28	1.97
30–34	1.67	2.19	1.93	1.70	2.16	1.92	1.83	2.11	1.97	1.63	1.95	1.78
35–39	2.22	2.21	2.22	1.72	1.97	1.83	2.10	1.97	2.04	2.35	1.93	2.15
40–44	2.61	1.87	2.24	3.17	1.56	2.42	2.69	2.03	2.37	2.76	2.12	2.46
45–49	3.07	2.09	2.58	3.34	2.10	2.76	3.35	2.51	2.94	3.71	2.16	2.96
50–54	4.95	3.18	4.07	4.80	2.98	3.95	4.85	3.06	3.98	5.20	3.11	4.19
55–59	3.97	2.46	3.22	4.36	2.77	3.62	4.64	3.25	3.96	4.38	3.18	3.80
60–64	6.49	5.32	5.91	7.80	5.53	6.74	7.82	6.28	7.07	8.25	6.50	7.40
65–69	4.59	3.40	4.00	4.64	3.92	4.30	5.69	4.71	5.21	5.73	5.12	5.43
70 +	14.87	14.29	14.58	14.59	12.00	13.38	18.48	17.15	17.83	18.83	17.76	18.32
N(1000s)	4266	4235	3501	5187	4565	9189	4355	4136	8492	4588	4299	8432

Source: India, Registrar General, Sample Registration System 1970–75, 1976–78, 1981, 1986; Registrar General India, Census of India 1971 and 1981, Series I, Part II. C (ii), Social and Cultural Table, C1 to C4.



Source: NATIONAL FAMILY HEALTH SURVEY 1992-93

Figure 5. Causes of maternal deaths – 1993.

Table 7. Health manpower and infrastructure achievement during selected five year plan periods.

Health manpower and infrastructure	1st Plan (1951–56)	6th Plan (1980–85)	8th Plan (1992–97)
Primary health centres	725	11,000	21,854
Sub centres	NA	83,000	1,32,730
Total beds	1,25,000	5,14,989	5,96,203
Medical colleges	42	106	148
Annual admission in medical colleges	3,500	8,000	11,389
Dental colleges	07	25	54
Allopathic doctors	65,000	2,97,228	410,800
Nurses	18,500	1,64,421	4,49,351
ANMs	12,780	85,630	2,03,451
Health visitors	578	13,612	22,144
Health workers (male)	–	80,000	1,24,680
Health workers (female)	–	80,000	63,871
Village health guides	–	3,72,190	4,10,904

Source: Ghai and Gupta (1999).

ANMs (1997). Similarly of the sanctioned 6,282 Block Extension Education posts, 666 remain vacant. Likewise 2,405 male health assistant posts of the sanctioned 18,284 posts and 2,646 of the sanctioned 21,665 Female Health Assistants/ LHV's posts remained vacant (1997).

With regard to specialists, once again wide disparities with regard to required posts, sanctioned posts and filled posts prevail. For example, the number of surgeons required are 2,401, while those sanctioned are 1,353; number of filled posts are 710 and with 643 posts remaining vacant. The disparities exist for all categories of doctors such as obstetricians, physicians and pediatricians (table 8).

In addition to the observed disparities, manpower shortages in rural area, worsens the malady further. For instance, 80% of the trained health manpower in all categories appear to service 20% of the urban population while a meagre 20% of manpower strive to provide essential services to 80% of the rural and poor urban population in the country. This lop-sided distribution further augments the problem of manpower shortage in the rural areas, where the need for services of such personnel is very high and urgent. Thus we see that first there is a gross inadequacy of health infrastructure facilities, compared to prescribed/suggested norms. Secondly, the existing infrastructure is poorly manned by trained personnel. Thirdly the existing health units are also inadequately equipped with drugs, supplies of consumables and other essential accessories, and lastly in many instances, the health facilities are situated in such locations that deny easy and quick access to people. Under these circumstances it is little wonder that the utilization levels of these health services facilities is very poor.

Table 8. Health manpower specialists profile (1995).

Specialist	Required	Sanctioned	In position	Vacant
Surgeons	2401	1353	710	643
Physicians	2401	1104	574	490
Obstetricians and gynaecologists	2401	1139	548	591
Pediatricians	2401	845	498	347

Sources: *Bulletin on Rural Health Statistics in India*, December 1995.

Health for the Millions, The Independent Commission on Health in India, December 1997, p. 17.

India's position in the healthcare sector (manpower and infrastructure) can be summarized as follows:

At the time of independence when the situation was very dismal, people had little or no access to health care services. Since then with improvements in the health manpower and infrastructure facilities the people of India at least had access to some sort of health services – even if it was more of a curative nature. Awareness of the availability of services has also increased and with it the utilization of the same to some extent. However even after 50 years of independence the lacunae evidenced in the facilities have resulted in the provision of less than optimal services both in quantitative and qualitative terms. The fact that nearly 42.4% of pregnant women in rural areas received no antenatal care, with nearly 84% of deliveries in the rural areas being conducted at home and 47.5% of women reporting that their children received no vaccination against any of the 6 vaccine preventable diseases, bears ample testimony to the poor/low impact of the existing health services provided to the rural areas in the country.

Table 9. Distribution of health expenditure: all India (1950–1995).

Items of revenue and expenditure	1950–51	1955–56	1960–61	1965–66	1970–71	1975–76	1980–1981	1985–86	1991–92	1992–93	1993–94 RE	1994–95 BE
Amount in Rs (million)												
Health	218.55 (100.0)	509.83 (100.0)	1076.82 (100.0)	1685.90 (100.0)	3351.18 (100.0)	6111.66 (100.0)	11888.12 (100.0)	27153.91 (100.0)	52010.57 (100.0)	62034.06 (100.0)	71825.18 (100.0)	78666.34 (100.0)
Disease programme	23.73 (10.86)	89.49 (17.55)	280.51 (26.05)	263.40 (15.62)	456.86 (13.63)	824.95 (13.50)	1540.33 (12.96)	3174.14 (11.69)	5505.76 (10.59)	6722.49 (10.84)	7479.62 (10.41)	7477.53 (9.51)
Per capita expenditure	0.07	0.22	0.64	0.53	0.83	1.34	2.25	4.15	6.37	7.60	8.27	8.09
Hospitals and dispensaries	96.15 (43.99)	193.87 (38.03)	427.92 (39.74)	654.07 (38.80)	1249.59 (37.29)	2768.22 (45.29)	5147.53 (43.80)	10270.37 (37.82)	13926.80 (26.78)	17161.34 (27.66)	19724.31 (27.46)	20255.54 (25.75)
Per capita expenditure	0.27	0.48	0.97	1.32	2.28	4.49	7.51	13.43	16.10	19.41	21.82	21.91
Medical education, training and research	10.91 (4.99)	12.73 (2.50)	60.31 (5.60)	126.19 (7.49)	239.60 (7.15)	534.05 (8.74)	1077.90 (9.07)	2353.92 (8.67)	5299.40 (10.19)	6818.85 (10.99)	7845.83 (10.92)	6046.26 (7.69)
Family welfare	–	–	–	–	–	787.70 (12.89)	1419.47 (11.94)	4871.83 (17.94)	10085.36 (19.39)	10264.17 (16.54)	12122.46 (16.88)	13586.78 (17.27)
MCH services	–	–	–	–	–	23.66 (0.39)	60.38 (0.51)	136.14 (0.50)	1056.21 (2.03)	1117.25 (1.80)	1397.52 (1.95)	599.35 (0.76)
Health administration	30.62 (14.01)	51.78 (10.16)	119.65 (11.11)	266.14 (15.79)	671.90 (20.05)	330.19 (5.40)	583.99 (4.91)	1285.00 (4.73)	2335.95 (4.49)	2771.20 (4.47)	3228.89 (4.50)	3309.04 (4.20)
Health (cap. revenue)	– (2.69)	– (4.36)	– (5.13)	– (3.28)	– (3.84)	673.23 (3.49)	969.00 (3.29)	2507.22 (3.29)	4385.05 (3.11)	2604.89 (2.71)	3358.05 (2.71)	3507.89 (2.63)
Per capita expenditure	0.61	1.27	2.45	3.41	6.11	9.91	17.35	35.22	60.13	70.15	79.44	85.10

Source: Duggal R *et al*, Health expenditure across states, Part I; *Economic and Political Weekly*, 15th April 1995; in *University News*, 14 August 1995.

3.5 Health financing

The health investment profile of India across the Five-Year Plan periods clearly suggests that investment levels have hovered around 5–6% of the total GDP (table 2). Only 13% of this figure constitutes public expenditure, while 87% comprises private expenditure. In addition, out of pocket expenditure as a per cent of total expenditure on health amounts to 84.6% and public expenditure on health as a per cent of total public expenditure is a meagre 3.9% (WHO Report 2000).

From the above distribution patterns and profile it is clear that though planners and policy makers have recognized for a long time the importance of providing optimal health as a means to optimal productivity, such awareness has not found expression in increased health financing or adequate budget allocations in the health sector. Further, curative care continues to receive higher budgetary allocations over the years followed by family welfare and disease programmes (table 9) compared to preventive health care giving rise to wide inter and intra-sectoral disparities in health financing and budget allocation policies and practices. According to the World Development Report (1995), a comparison of the central government expenditure on health, education and defence among the South East Asia Region (SEAR) countries

Table 10. Government expenditure on health education and defence in selected countries 1993.

Country	Percentage of central government expenditure		
	Health	Education	Defence
India	1.9	2.2	14.5
Indonesia	2.7	10.0	6.2
Myanmar	7.4	17.0	32.7
Nepal	4.7	10.9	5.9
Sri Lanka	5.2	10.4	11.4
Thailand	8.2	21.1	17.2

Source: *World Development Report*, New York, 1995.

revealed that India had the lowest (1.9%) expenditure on health as compared to 7.4% in Myanmar, 5.2% in Sri Lanka and 8.2% in Thailand (table 10).

This low figure is self explanatory in that the private sector shoulders the lion share of health expenditure in the country. Moreover with the cost of health and medical care escalating by leaps and bounds, a vast majority of people in need of health care will be unable to utilize it due to poverty, high cost of health and medical care and poor access as well as sub-optimal quality of services and/or care provided by the government sector. This situation if left uncorrected will consequently have adverse impacts on the health status of people in the long run.

3.6 Health policy

Although a National Health Policy was formulated only in 1983 in India, several committees, provided useful and timely guidelines for planning and implementation of health services in the country starting with the Bhore Committee and its famous report in 1946 to the Shrivastava Committee in 1974–1975. These policies provided the basic framework for health and medical services infrastructure development as well as medical and paramedical manpower planning and management. They also included principles for management of vertically sponsored health programmes with a view to rendering them comprehensive and efficient.

The primary objective of the National Health Policy was the attainment of WHO's Health For All (HFA) goals by 2000 AD through the establishment of an efficient and effective health care system that would take cognizance of

and address the basic health needs of all Indians. A coordinated, intersectoral equitable, community participatory approach utilizing appropriate technology was advocated as a means to achieving the HFA goals.

In order to achieve the HFA goals in a phased manner, several targets were set in 1983. The targets set relate to demographic, maternal and child health, communicable diseases, contraception, water supply, sanitation and nutrition. While the setting of targets is an essential prerequisite for an efficient programme, subsequent strategy, implementation and evaluation of these targets, particularly contraception has proved to be counter productive. The urgency with which the set targets had to be achieved, tended to promote a hierarchical approach to health programme management and this further multiplied the problems for programme managers at the grass roots. Operationalizing an intersectoral approach called for exquisite coordination and commitment by all sectors

Table 11. Demographic trends and transition.

Indicators	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	1999
Total population (in millions)	238.4	252.1	251.3	279.0	318.7	361.1	439.2	548.2	683.2	846.3	998.056
Density per km ²	77	82	81	90	103	117	142	177	216	273	
Sex ratio	972	964	955	950	945	946	941	930	934	927	
Average annual growth rate (%)	–	0.56	–0.03	1.04	1.33	1.25	1.96	2.20	2.22	2.12	1.8
Crude birth rate (CBR)/1000 popn.	–	49.2	48.1	46.4	45.2	39.9	41.7	41.1	37.2	32.6	
Crude death rate (CDR)/1000 popn.	–	42.6	47.2	36.3	31.2	27.4	22.8	18.9	15.0	11.1	
Life expectancy at birth (yrs)	–	22.9	20.0	26.8	31.8	32.1	41.3	45.6	50.5	57.3	
Infant mortality rate/1000 live births	–	222	212	176	168	148	139	129	110	96	79
Mean age of brides at census – synthetic cohorts (yrs)	13.1	13.2	13.4	12.7	14.7	15.6	15.8	17.2	18.3	19.0	
General fertility rate (live births/1000 women of child bearing age)	–	–	–	–	–	–	201.0	192.0	154.0	140.9	
Total fertility rate (TFR)	–	5.77	3.75	5.86	5.98	5.96	5.87	5.94	5.13	4.20	3.0
Couple protection rate (CPR)	–	–	–	–	–	–	–	11.5	24.4	44.10	
Dependency rates											
Total	75.82	75.69	78.77	77.33	78.08	78.29	87.60	92.33	85.31	74.69	63.0
Young	66.89	66.48	69.14	68.27	67.77	68.49	76.96	80.82	73.29	63.20	
Old age	8.93	9.21	9.63	9.06	10.31	9.80	10.64	11.51	12.02	11.49	
Total labour force (millions)	–	–	–	–	–	140.00	188.70	230.70	270.80	314.90	
Worker participation rates (%)	–	–	–	–	–	–	43.00	34.00	36.80	37.60	
Literate to total population (%)											
Total	5.35	5.92	7.16	9.50	16.10	16.67	24.02	29.46	36.23	52.10	
Male	9.83	10.56	12.21	15.59	24.90	24.95	34.44	39.45	46.74	64.13	
Female	0.69	1.05	1.81	2.93	7.30	7.93	12.95	18.69	24.88	39.29	

Source: Srinivasan (1996).

WHO Report 2000; *University News*, July 1, 1996; vide *Economic and Political Weekly*, March 1994.

which was sadly lacking. Hence while in principle the Health For All ideology was sound, the practical implementation of the same was no easy task, particularly at the peripheral levels. Hence, despite sincere and concerted efforts by the health sector, the desired results were not achieved.

Several studies in Tamil Nadu suggested that the imposition of targets for achievement particularly with the family planning programme showed that not only was it unable to meet the targets but it also proved counter productive on account of the punitive action taken against the non-achievers. Hence in the summer of 1995, Tamil Nadu was the first state to declare its "Target Free" status. This approach was later adopted by the government of India in April 1996.

Parallely, as a result of the International Conference on Population and Development (ICPD) in Cairo in September 1994, a comprehensive Programme of Action (POA) for integrating population control with the Nations Development Agenda was mooted. This programme known as the Reproductive and Child Health Policy was formally launched in India on October 15th 1997. The main features of this policy not only strengthen the Health For All Strategy but also stress the importance of Community Needs Assessment, participatory planning and a decentralized "bottom-up" approach, that is sensitive to people's problems not only at the macro/national level but also at the micro/household level. The RCH strategy also insists on the provision of "quality" health care services. It further envisages the protection of human rights, promo-

tion of women's development, reduction of gender disparities, a greater involvement of males in health programmes, delivery of a comprehensive package of service, which includes among other services, facilities for diagnosis, treatment and counselling of STD/HIV/AIDS patients in the community.

It is clear thus that India's policies in the health and development sectors have undergone reforms and refinement over the years. Much has been achieved but much more remains to be done.

4. Community participation in health

An important contributor to sustained improvements in the health status and/or decline in disease burden, is adequate and effective community participation. Since independence, in the wake of community development, health services made significant inroads into the community – both urban and rural – thus bridging the yawning gaps to some extent between the public and health professionals. People's acceptance and participation in maternal and child health, and other national control programmes bear ample testimony to this fact. For instance, in the late 60's and early 70's health professionals were viewed with suspicion, when they visited the houses of people either to vaccinate children or mothers. Today, however, the scene has changed considerably with the public voluntarily coming to the health centre for getting their children immunized, as also with the antenatal examinations undergone by pregnant women.

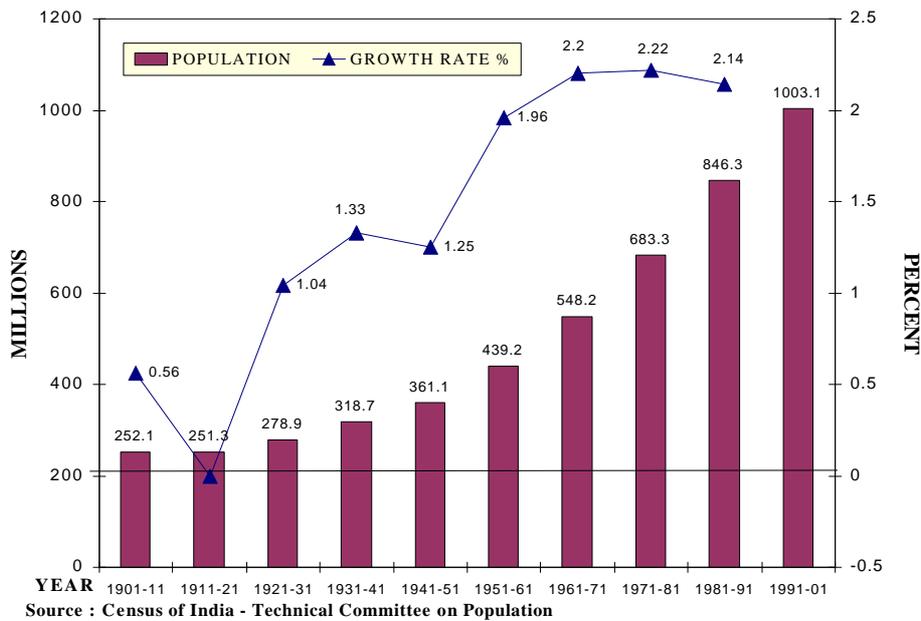


Figure 6. Population of India.

Another encouraging instance of bridging the gap is one where many rural and urban slum women are coming forward to get trained as multipurpose health workers and subsequently returning to their communities to carry out the work. Needless to say breaking barriers between professionals and public is no easy task. It is often a slow and arduous process of rapport and relationship building.

Despite these achievements, if the HFA goals are to be successfully attained, then among other things greater community participation is of paramount importance. Several factors promote community participation. Important among these is the adoption of a “participatory”, “bottom-up” approach to programme planning and implementation. Until 1994–1997, much of the country’s health and disease control programme remained a “planner’s programme” as opposed to being a “people’s agenda”. Unless people’s participation and cooperation are enlisted from the planning stage onwards, public support will remain sub-optimal with adverse impacts on the outcome of such programmes.

5. Determinants

Several factors operate as determinants of the aforesaid BOD and health status observed in the country across the last century. These include (i) demographic changes, (ii) socio-cultural profiles, (iii) gender disparities and (iv) poverty and economic inequalities.

5.1 Demographic changes

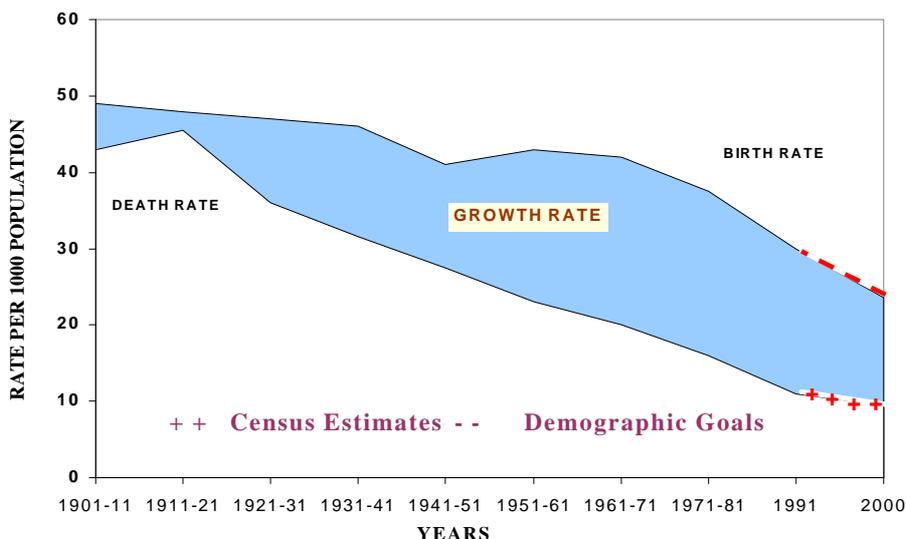
India’s population has been the subject of worldwide debate for over half a century. The demographic trends

profiled in table 11 provide ample evidence for such anxiety. From a meagre 238.4 million in 1901, the population has nearly quadrupled and presently rests at over a staggering one billion, accounting for over 1/6th of the world’s population.

The fall in the population between the years 1911 and 1921 (figure 6) are attributable largely to sharp increases in mortality with the CDR rising from 42.6/1000 in 1911 to 47.2/1000 in 1921. This rise was mainly due to high mortality caused by the third major epidemic of plague (1898–1908), a minor epidemic of smallpox (1897–1908), and deaths due to famine (Banthia and Dyson 1999).

After 1921, India’s population has been growing steadily and rapidly till 1981 with annual average growth rates increasing from –0.03% in 1921 to 2.22% in 1981. Improvements in health services as well as developments in the social sector such as improved literacy rates – particularly female literacy rates – compared to the situation in 1921 have contributed to the consequent population explosion observed in the late 70’s and early 80’s.

The trends in birth and death rates discernible from figure 7 seem characteristic of all societies moving through the various stages of the demographic cycle. Since 1981, there has been a slow but steady decline indicating that the country is progressing towards demographic transition. These changes notwithstanding, inter- and intra-state differences continue to remain wide – with crude birth rates (CBR) ranging from 35.2/1000 in rural Rajasthan to 17.3/1000 in Kerala (figure 8); and CDR recording a high of 12.5/1000 in rural Madhya Pradesh and a low of 5.4/1000 in urban Maharashtra.



Source : Census of India - RGI

Figure 7. Birth and death rates in India (1901–11 to 2000).

In keeping with the population growth, the density of the population has been steadily increasing from a sparse 77/sq. km in 1901 to 273/sq. km. in 1991. Here again, rural-urban differentials abound with urban areas becoming increasingly more densely populated than rural areas.

Rapid urbanization is evident with the per cent of urban population rising from 17.3% in 1950-1951 to 28.3% in 1996-1997. In absolute numbers the urban population has nearly quadrupled over the last 50 years – increasing from 44 million in 1941 to 217 million in 1991. Similarly, the total number of towns have increased from 2843 in 1951 to 4689 in 1993 (Mukhopadhyay and Choudhury 1997). Cities with over one million population have nearly doubled from 12 to 23, since 1980.

Rapid urbanization has promoted industrialization, modernization and technological know-how which in turn has contributed to the process of demographic and developmental transition. On the other hand, it has brought in its wake an uncontrolled, unplanned proliferation of slums and squatter settlements in the urban sector. This has placed heavy demands on the existing meagre urban resources in terms of housing, sanitation, water supply, lighting and other civic and health infrastructure facilities. Another aspect to the slum problem is the selective immigration (at least during the initial phases) of males from the rural areas into the cities in search of work and

greener pastures. This consequently not only paves the way for widening of the sex ratios in favour of men in the slums but also brings with it accompanying increasing risks of developing HIV/AIDS/STDs. The inability of urban planners to meet the ever increasing needs and demands of the urban-poor on account of scanty resources has led to an increase in their disease burden, particularly in communicable diseases, due to a gross deterioration of their living standards which ultimately leads to further reductions in positive health status indicators. This in turn leads to a worsening of their quality of life, which renders them doubly disadvantaged and worse off than both their rural as well as urban counterparts.

Life expectancies have nearly trebled, rising from a low of 22.9 years in 1901 to a high of 57.3 years in 1991, indicating that the prevailing health and development conditions have supported of human survival. However, wide interstate variations exist with estimated life expectancies ranging from a high of 71.1 years in Kerala to a low of 49.6 years in Uttar Pradesh.

The age structure of India's population provides evidence for "growing" (children 0-14 years = 36%) and a "greying" (persons aged 65 + = 5%) population with resultant high (69%) dependency ratios (Mukhopadhyay 1999). Persistent high fertility (TFR = 3.0 in 1999) and declining death rates have largely been responsible for the

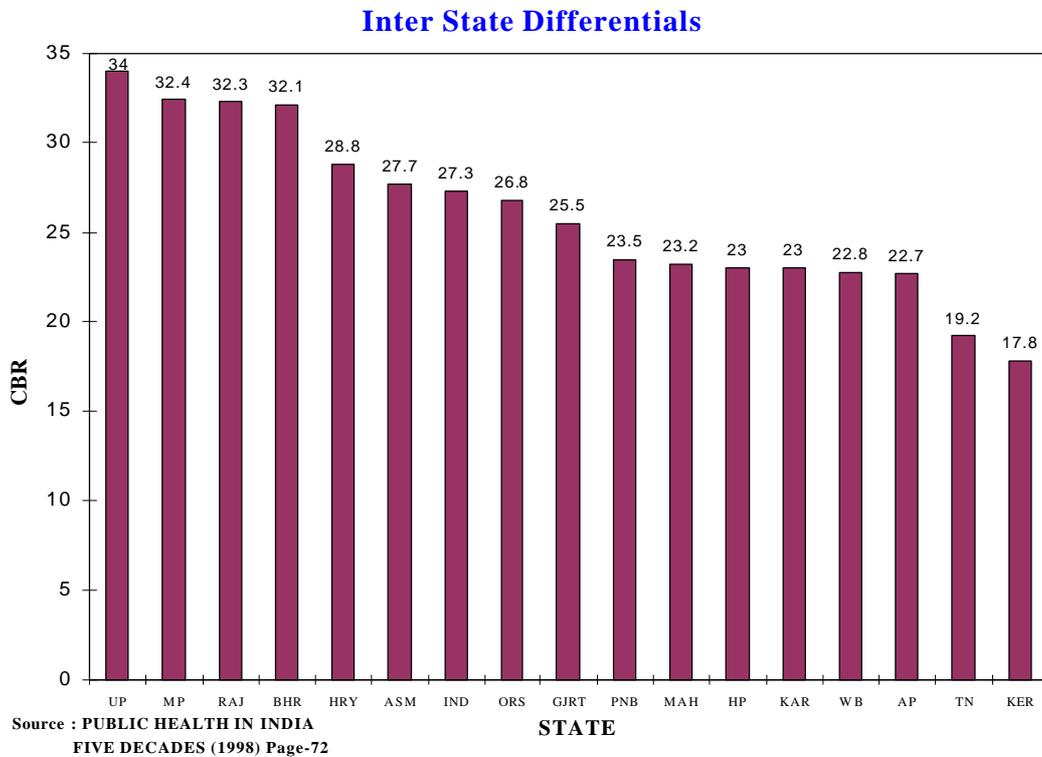


Figure 8. Crude birth rate – SRS 1996.

prevailing age structure. This kind of an age structure provides clear evidence for the dual vulnerability of the population to a heavy onslaught of both infectious and non-infectious diseases. Further, such a population with its high dependency ratios not only increases the burden on the national economy but also imposes heavily on its health and development resources.

However, there is a sliver lining in the form of a young population of age 15–59 years, signifying the availability of a work force estimated at about 57%. That the total labour force in India has more than doubled over the last 40 years – from 140 million in 1951 to 315 million in 1991 is indicative of this fact (Srinivasan 1996). Such a phenomenon, viz. the “bonus of the bulge” is characteristic of a society in demographic transition.

Several factors have contributed to the ongoing process of demographic transition in India. Important among these are (i) mean age at marriage for girls which has risen from 13.1 years in 1901 to 19.0 years in 1991, (ii) general fertility rates that have declined from 201/1000 to 140.9/1000 and (iii) increases in the couple protection levels from 11.5% in 1971 to 44% in 1991. Lastly, India’s HFA goals and population policy since 1981 have provided an added fillip to the demographic transition process in the country.

5.2 Socio-cultural factors

There is little doubt that the socio-cultural situation in India has undergone several changes since the early 1900s and is expected to continue to remain in this dynamic state well into the next millennium.

A major evidence of change observed and typical of a country in social transition is the change in family structure. From being a predominantly joint or extended family, the Indian family is rapidly becoming nuclear. This is particularly obvious in the urban and semi-urban sectors. In the rural areas families largely continue to be joint or extended. To a large extent nuclearization of families in the urban sector is due to lack of housing on the one hand and the high cost of housing on the other. The health impacts of nuclear families has its advantages as well as disadvantages. For instance, studies suggest that while the nuclear family promotes maternal health, child survival is better in extended families (Mahadevan *et al* 1986).

Changes in the family structure are often a reflection of people’s responses to and coping mechanisms with regard to the prevailing socio-economic pressures. For instance, apart from the high cost of housing as well as the inherent lack of it, the cost of living in the urban sector is often much higher as compared to the rural areas. This precludes couples from bringing their parents and other dependents from the rural areas to live in the cities.

Increases in the literacy levels of the population from 5.35% in 1901 to 52.21% in 1999 is yet another example of cultural change. Of particular significance is the increase in female literacy rates which have risen from a mere 0.69% in 1901 to 39.29% in 1999. Inter- and intra-state variations in literacy rates are observed with higher levels of literacy recorded in urban areas as opposed to rural areas with Kerala registering the highest literacy rate (86%, 1991) and Bihar the lowest (22%). These variations notwithstanding, the overall increases in literacy rates certainly endorse society’s recognition of the need for alphabetization and consequent intellectual enlightenment. Further, the varying degrees of success achieved by the Government of India’s total and adult literacy programmes testify to the above fact.

Another dimension of social change is evidenced in people’s perception of disease and their general health seeking behaviour. In the pre-independent era, the occurrence of disease was perceived as visitation of the demon or a result of incurring the wrath of gods. Various forms of faith healing were taking precedence over other systems of cure. Moreover, much of the health seeking behaviour was associated with curative services – resorting to treatment for relief from illnesses. Very little initiative was observed with regard to disease prevention efforts.

However, towards the close of the century welcome changes have been discerned, with people volunteering to immunize their children. Overall, people’s awareness of disease causation has certainly improved. Nevertheless, variations in knowledge and awareness levels persist – with those in the urban sectors being better informed than their rural counterparts. Males also exhibit better health seeking behaviour than females who often tend to neglect their health. While the existing health seeking behaviour is far from optimal, the shifts observed certainly appear to be in the right direction. Of course, myths and misconceptions on matters related to health do certainly exist but these are also on the decline.

5.3 Economic development, poverty and inequalities

Optimal health status is both the cause and consequence of the development status of a country. Development *per se* stands for an improved quality of life through gains in health, education, living standards and higher income (Basch 1999).

Tracing the history of economic development in India (table 12), it is interesting to find that the per capita Net National Product (NNP) at 1980–1981 prices has nearly doubled over the last forty years from Rs 1,126.9 in 1951 to Rs 2,222.5 in 1991. Similarly, the growth rate of GDP has increased by over one and a half times – from 3.61% in 1951–1952 to 5.81% in 1985–1990. Further, the

compound growth in per capita income per annum has also grown 1.5 times over the last 40 years from 1.9% in 1951 to 2.5% in 1991. Contrary to general belief, the rate of savings has also doubled over the last 40 years from 10.28% in 1951 to 20.37% in 1991.

While the growth rate of the agricultural sector has increased from 2.88% in 1951 to 3.59% in 1991, the percentage share of agriculture in GDP has declined considerably from 54.91% in 1951 to 32.82% in 1991. On the contrary, the share in GDP of the manufacturing sector practically doubled from 11.88% in 1951 to 20% in 1991, indicating an economic transition within the country, shifting from being a predominantly agricultural economy in the 1950's to become a more industrialized-production oriented one in the 1990's. This also illustrates the contribution of economic transition to demographic transition.

The economic and demographic transition notwithstanding the stumbling block to progress is the extreme poverty faced by the millions in the country. Though the percentage of people in poverty has declined from 53% in 1951 to 35% in 1991, in absolute numbers there are still 350 to 400 million people living below the poverty line.

The total labour force of the country has nearly doubled over the last 40 years. However, employment opportunities have not kept pace with the increase in labour force. This is evidenced in the work force participation rates declining from 43.0% in 1961 to 37.6% in 1991.

In order to capture the various facets of poverty, UNDP has devised a composite Human Poverty Index (HPI). The HPI takes into account (i) longevity (percentage of people expected to die before 40 years), (ii) knowledge (percentage adult literacy), (iii) decent standard of living, (iv) percentage of people with access to health care and safe water and (v) percentage of children under five years malnourished. Based on the above factors the HPI for India is computed at 35.9% with a ranking of 59 in 1997. Following from this the Human Development Index (HDI) value computed for India in 1997 rests at 0.545 – well below that of Sri Lanka (0.721) and Maldives (0.716) in the South East Asia (Basch 1999).

5.4 Gender inequalities and women's health

Women's health and development form the cornerstones of a nation's progress. This realization has acquired worldwide acclaim in recent years. India's population policy 2000 also endorses the fact that women's development and empowerment are crucial to achieving the country's population and reproductive health goals.

Despite acknowledging the pivotal role of women in national development, their status continues to remain low on account of persistent gender inequalities. An eloquent evidence is that though women constitute 50% of the world's population and shoulder 66% of the world's work

Table 12. Economic development profile of India.

Indicators	1951–1952	1956–1957	1961–1962	1966–1967	1971–1972	1976–1977	1981–1982	1985–1986
	to 1955–1956	to 1960–1961	to 1965–1966	to 1970–1971	to 1975–1976	to 1980–1981	to 1985–1986	to 1989–1990
Per capita NNP at 1980–1981 prices	1126.9	1350.3	–	–	1519.6	–	1630.0	2222.5
Compound growth in per capita income per annum (%)	–	1.90	–	–	2.40	–	5.10	2.50
Per cent of people below poverty line (expert group)	53.10	–	–	–	53.10	–	43.30	35.97
Growth rate of GDP	3.61	4.27	2.84	4.66	3.08	3.24	5.06	5.81
Rate of savings	10.28	11.73	13.21	14.35	17.27	21.65	19.36	20.37
Investment rate	10.66	14.52	15.45	15.99	17.87	21.47	20.98	22.70
Growth rate of agriculture sector	2.88	3.35	–0.28	5.36	2.33	1.33	3.16	3.59
Growth rate of manufacturing sector	5.84	6.28	6.62	3.96	3.33	4.86	6.99	6.72
Percentage share of agriculture in GDP	54.91	51.86	46.61	43.76	42.04	38.75	36.48	32.82
Percentage share of manufacturing in GDP	11.88	13.47	15.77	16.17	16.95	18.02	18.85	20.00
Total labour force (millions)	140.00	188.70	–	–	230.40	–	305.40	314.90
Labour force proportion (% of total labour force)	–	–	–	–	67.30	–	71.70	71.00
Males	–	–	–	–	32.70	–	28.30	29.00
Females	–	–	–	–	85.50	–	77.80	79.20
Rural	–	–	–	–	16.50	–	22.20	20.80
Urban	–	–	–	–	–	–	–	–

Sources: Planning Commission of India, 8th Five Year Plan (1992–97), Vol. 1, pp 3–5.

EPW Research Foundation: Social Indicators of Development for India-1, *Economic and Political Weekly*, May 14, 1994.

burden, they receive only one-tenth of the world's income and own only one-hundredth of the world's property.

Several factors contribute to and are in turn conditioned by gender inequalities. A brief description of some of these as well as their impacts on women's health and development will be discussed.

5.4a Literacy/illiteracy: The adult literacy rate in India suggests that only 39.4% of females are literate as against 66.7% of males (Mukhopadhyay 1999). Wide variations in combined first, second and third level gross enrollment ratios are observable ranging from 47% and 62% (1997) for females and males, respectively.

Rural, urban differentials in gender inequality abound with nearly 56% of females and 31% of males being illiterate (NFHS II). According to NFHS II, at best one in three females in every state are illiterate except Mizoram, Kerala, Delhi, Goa, Himachal Pradesh and Nagaland. Among other reasons, the need to travel long distance, particularly in the rural areas leads to high drop out rates among girls from high school. In the urban slums – older girls are often expected to take care of the home and younger siblings while the parents go out to work. In other instances, they are also expected to take up employment in the informal sector to augment the family income.

5.4b Employment: In India, the gap between male and female labour force participation rates is considerable. For every 100 males employed only about 34 women are employed as compared to 59 in Sri Lanka and 88 in Thailand. Wide geographic variations in female employment exist with more women in the south being employed compared to the north. Urban-rural differentials also indicate that only 15% of urban women are employed as against 32% of rural women (Desai 1994). Important reasons cited for gender differences in employment include under-enumeration and women's activities not being considered economically productive. In terms of real GDP per capita (PPP \$), women's purchasing power parity equals US\$902 while that for man is US\$ 2,389 (Mukhopadhyay 1999). This is not surprising since in most instances women are paid less than men for doing the same type of jobs.

5.4c Autonomy: A study on women's autonomy carried out by NFHS II (1998–1999) indicated that 85% of women participated in decisions about what to cook. However, 68–76% needed permission to go to the market or visit relatives. Nearly 60% had access to some money which they could spend according to their wishes. Only 41% could decide independently on how they spend the money they earn.

5.4d Legal issues: Though women are granted equal rights as decreed by the Indian Constitution with several laws (e.g. Equal Remuneration Act) supporting such a premise, legal discrimination against women persists. This is most evident in inheritance, divorce and maintenance laws. In addition even the laws favourable to women have not been adequately enforced. Ignorance of these existing laws as well as reluctance to use the laws for their protection, further widens gender inequalities (Krishwar 1991). Thus the legal system is as responsible as societal norms in fostering gender inequalities.

5.4e Societal norms: Perhaps the greatest perpetrator of gender inequalities is the socio-cultural milieu into which women are born and bred. In India, gender and generation tend to dominate the power structure within most families, thus restricting autonomy and physical mobility on women. The origin of gender inequalities dates back to the Laws of Manu and Hindu culture. However, in most cases the seclusions and restrictions advocated were intended to protect women who were considered weak and vulnerable. In the current context, however, such restrictions have lost their purpose at least to some extent and appear a contradiction to present day thinking and the changing roles of women in society.

5.4f Health impacts of gender inequalities: Gender inequalities lead to several impacts. The visible and unfortunately adverse impacts are painfully seen in the health sector. The declining sex ratios in India from 972 females per 1000 males in 1901, 946 in 1951 to 929 males in 1991 caused by the practice of female infanticide, high maternal mortality rate and deaths due to domestic violence testify to this fact.

Another facet of gender inequality is the early age at marriage of females and frequent and high fertility rates associated with early marriage. Wide variations in mean age at marriage exist across the country with the figures for the BIMARU states being below 17 years and over 20 years for Kerala, Punjab and Tamil Nadu. Similarly, TFR for the BIMARU states is higher at 5.3 compared to 2.5 to 3 for Kerala and Tamil Nadu.

Gender differentials in vulnerability to disease burden exist with higher DALY losses among women than men due to communicable diseases. Further, most women suffer their illnesses in silence. On account of this, complications occur leaving behind permanent disabilities. A common example is reproductive tract infections (RTIs) among women which often go untreated leading to upper pelvic inflammatory diseases and ultimately infertility. RTIs and infertility also carry with them undertones of social dissent and ostracism. Therefore in order to foster better health status and optimal quality of life for women, it is imperative that existing and persisting

gaps in gender equality be bridged by appropriate measures that are culturally acceptable and economically sustainable.

6. Future perspectives and challenges

Major challenges (epidemiological, demographic, economic, social, etc.) await nations in transition like India, in the 21st century. Therefore, a prior appraisal of the nature and magnitude of the challenges and barriers to be encountered is essential for effective policy formulation and public health programme management. What follows is a brief description of the likely challenges in the demographic, development and health sectors.

6.1 Demographic sector

As per demographic projections, the population of India is unlikely either to reach replacement levels or stabilize until 2045. Changing age structure, increasing life expectancies and declining mortality rates indicate increases in populations across all age groups – more so among those in the reproductive years and above 60 years. The reproductive and child health ideology mooted by ICPD in 1994 and implemented by the Government of India in October 1997 is yet to percolate down to the level of the peripheral health functionaries across the country. The better performing states tend to be better informed while poor performing states continue in blissful ignorance. Therefore, addressing and resolving the population problem in a comprehensive, appropriate and acceptable manner to facilitate early and efficient stabilization is perhaps the most daunting challenge that health planners and programme managers are likely to be confronted with during the next century.

6.2 Development sector

6.2a Economic issues: Between 35–40% of the population is living below the absolute poverty line. Nearly 53% of people have a purchasing power parity of less than US\$ 1 per day. Increasingly high levels of unemployment is observed, particularly in the rural areas thus “pushing” rural people into urban areas in search of jobs. Globalization policy and structural adjustment programmes lead to cuts in public/welfare spending which in turn affects employment opportunities, health services and other associated welfare programmes. These lead to further increase in unemployment, feminization of poverty and increasing economic inequities between the haves and have nots. Poverty alleviation, therefore, becomes a major mandate for the 21st century.

6.2b Social aspects: Nearly 50% of the population is illiterate, with females being more so than males. Declining sex ratios (927 females/1000 males) reflect the unfavourable conditions for survival of women (e.g. female foeticide, infanticide and high MMR). Like poverty, women’s low status in society is self-perpetuating with adverse consequences for their development/empowerment. Poverty also brings with it diseases due to poor eating habits, stressful living and working conditions, smoking, drinking and drug abuse with consequent ill effects on health and quality of life of people. The pace of social development initiatives appears to be slow and unequal between and within states, among sexes and rural, urban places of residence. Therefore, measures to assure gender equity, bridge social development gaps and enhance the pace of social development assume priority.

6.3 Health sector

6.3a Disease burden: As a sequel to the demographic and developmental dispositions, the BOD encountered will remain heavy and dual in nature. In spite of more than 50% reductions in DALY losses achieved during the 20th century, communicable diseases will continue to pose major public health threats in the country. Though DALY losses due to leprosy, polio, etc. will be greatly reduced, the disease burden due to HIV/AIDS, tuberculosis, malaria, etc. will continue to remain increasingly heavy. Accounting for just over 1/3rd the total DALY losses, non-communicable diseases are likely to assume epidemic proportions if left unchecked. Accidents and injuries that already account for over 17% of DALY losses are rapidly on the rise and demand urgent redressal particularly since they strike people in the prime of their productive lives. Population, poverty and progress – all predispose interferences and imbalances in the bio-physical environment as well as geo-ecological systems leading to terrestrial and topographical crises and calamities. This may lead to emergence of new diseases and natural disasters. Therefore constant monitoring of health status, environmental conditions as well as climatic changes appear paramount to mobilizing early, effective and efficient preventive public health measures.

6.3b Maternal and child health: Appreciable declines in IMR, PNMR and MMR have been accrued. However, perinatal and neonatal mortality remains persistently high. Nearly 33% of newborns are low birth weight of whom 25% are premature. Under-five mortality continues to remain high. Vaccines are freely and abundantly supplied to all primary health centres and health sub-centres in the country. Yet 47.5% of mothers in the rural areas reported that their children did not receive any vaccines against the

six vaccine preventable diseases. For the country as a whole the immunization coverage reported was only 44%. Almost 90% of the maternal deaths are preventable. Yet the risk of dying among women due to maternal causes in India is 1 in 37 as against 1 in 1800 in developed countries. The Government of India's CSSM programme demands 100% registration of antenatal cases. However, in rural areas about 42.4% received no antenatal care. Promotion of institutional deliveries constitute an important decree of the CSSM programme. Despite this, 84% of deliveries in rural areas are conducted at home. Statistics reveal that 88.5% of women in India are anaemic, accounting for over 22% of maternal mortality. Strengthening of MCH services as per the ICPD POA charter under the aegis of the country's RCH agenda has been instituted to assure safe motherhood and child survival.

6.3c Nutrition status: Food grain production has more than trebled since 1951, thus assuring food security to the masses. Nevertheless per capita availability of food grains has increased only by 25% (from 397 g to 496 g/day). The Public Distribution System's (PDS) contribution has fallen from 15% to 10% over the last 40 years. Operational inefficiencies of the PDS are responsible for its poor utilization. Malnutrition among women continues to be inter-generational and traceable to three generations. Ignorance of scientific methods of cooking, inappropriate/inadequate decisions on food choices and cultural patterns of eating further compound the problems of malnutrition among women. There is an urgent need to direct nutrition supplementation and education programmes towards adolescent girls and women to break the cycle of malnutrition among women.

6.3d Environmental sanitation and water supply: Only 29% of the population have access to sanitation. Sanitation is inadequate in both urban and rural sectors. Approximately 70% of the people are denied access to safe water supply. Here again both urban slums as well as rural areas have problems in procuring water, which is not only safe but also adequate. Inadequate safe water supply and proper sanitation provides predisposition towards the spread of several gastro-intestinal and helminthic diseases. Water supply and sanitation get only 2% of the health budget.

6.3e Health resources and programmes management: Public sector contribution towards health expenditure is a meagre 1.9% of total GDP. Gross shortage of all levels of trained manpower in the health sector is widespread causing deterioration in both quantity and quality of services rendered. Lack of essential drugs, supplies and equipment reduces efficacy of services rendered. Medical

and paramedical training programmes are neither sensitive nor responsive to people's health needs and problems. Poor distribution, access, availability and utilization of health facilities, particularly in the rural areas accompanied with poor budgetary allocation practices both between various sectors and within the health sectors pose major challenges to quality and equity assurance in health.

7. Conclusion

From the preceding deliberations, it is clear that though India has many successes to her credit with regard to reductions in communicable diseases, IMR, MMR, etc. much more remains to be achieved in the areas of non-communicable diseases, trauma and disaster/outbreak management. It is therefore necessary that the government reorients its policies such as adopting a holistic, integrated, intra- and inter-sectoral, life span approach to health care assessment and service delivery. This will ensure that people are assured of efficient services throughout their life cycle, with the special needs of specific age groups being addressed and resolved adequately and appropriately.

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References

- Asha Bai P V, Murthy B N, Chellamariappan M, Gupte M D and Krishnaswamy C V 2001 Prevalence of known diabetes in Chennai city; *J. Assoc. Phys. India* **49**, October
- Bajaj J S 1998 New Millennium, Old Maladies – Public Health and National Economy. An interactive interdependence; in *Public health in India – Five decades. A commemorative volume* (Calcutta: AIIPH and PH) vol. 1, pp 1–10
- Banthia J and Dyson T 1999 Smallpox in Nineteenth Century India; *Popu. Dev. Rev.* **25** 649–680
- Basch P F 1999 *Textbook of International health* 2nd edition (Oxford: Oxford University Press)
- Chadha S L, Radhakrishnan S, Ramachandran K, Kaul V and Gopinath N 1990 Epidemiological study of CHD in urban population of Delhi; *Indian J. Med. Res.* **92** 424–430
- Chakraborty A K 1998 New Challenges of Communicable Diseases in India; in *Public health in India – Five decades. A commemorative volume* (Calcutta: AIIPH and PH) vol. 1, pp 95–115
- Deodar N S 1998 Primary health care: Achievements, problems and prospects; in *Public health in India – Five decades. A commemorative volume* (Calcutta: AIIPH and PH) vol. 1, pp 36–53
- Desai S 1994 *Gender inequalities and demographic behaviour* (New York: Population Council)
- Economic and Political Weekly 1994 *Social indicators of development for India* (EPW Research Foundation) May 14

- Ghai O P and Gupta P 1999 *Essential preventive medicine – A clinical and applied orientation* (New Delhi: Vikas Publication)
- Gupta O P *et al* 1984 *Diabetes mellitus in developing countries* (New Delhi: Interprint)
- Khatri G R and Frieden T R 2000 The status and prospects of tuberculosis control in India; *Int. J. Tubercul. Lung Diseases* **4** 193–200
- Kishmar M 1991 May god give sons to all: Gender and child mortality in India; *Am. Sociol. Rev.* **58** 247–265
- Krishnaswamy K, Vijayaraghavan K, Sastry J G, Rao D H, Brahmam G N V, Radhaiah G, Kashinath K and Rao M V 2000 *25 years of National Nutrition Monitoring Bureau (1992–1997)* (Hyderabad: National Institute of Nutrition) pp 7–14
- Mahadevan K, Reddy P J and Naidu D A 1986 *Fertility and mortality – Theory, methodology and empirical issues* (New Delhi: Sage Publications)
- Mishra M S 1998 Health, policy and management of health care delivery services in India – Issues and challenges; in *Public health in India – Five decades. A commemorative volume* (Calcutta: AIIPH and PH) vol. 1, pp 11–35
- Mukhopadhyay A and Choudhury A R 1997 *Report on the independent Commission on Health in India* (VHAI)
- Mukhopadhyay S 1999 Socio-economic indicators for selected countries; *Manpower J.* **34** 71–78; *University News* **37**, August 9, 1999
- Murray C J L and Lopez A D 1996 The global burden of disease – Summary (WHO, WB and Harvard School of Public Health)
- Nath K J 1998 Environmental health management in India: Issues and concerns; in *Public health in India – Five decades. A commemorative volume* (Calcutta: AIIPH and PH) vol. 1, pp 1–10
- Paramasivan C N 1998 An overview on drug resistant tuberculosis in India; *Indian J. Tubercul.* **45** 73
- Rajagopalan M S 2000 Health and nutrition profile of India; in *Health education in south east Asia*, vol. XV, No. 1, January
- Reddy V, Rao N P, Sastry J G and Kashinath K 1993 *Nutrition Trends in India* (Hyderabad: National Institute of Nutrition)
- Sathe P V and Sathe A P 1997 *Epidemiology and management for health care for all* 2nd edition (Popular Prakashan Pvt Ltd)
- Sharma V P 1998 Fifty years of malaria control in India; in *Public health in India – Five decades. A commemorative volume* (Calcutta: AIIPH and PH) vol. 1, pp 76–94
- Singh R 1999 *HIV/AIDS workers and labour rights: A study of vulnerability of the workers in Wazirpur Industrial areas, Delhi* (New Delhi Centre for Education and Communication)
- Srinivasan K 1996 *Population policy and reproductive health* (New Delhi: Population Foundation of India)
- Tyagi B K 1995 Malaria in the Thar Desert: A critical Review; *ICMR Bull.* **25** 9
- UNAIDS/UNICEF 2000 *HIV/AIDS – A briefing package, The HIV/AIDS epidemic in India: Situation at a glance*, May–June
- Warnakulasuriya K A A S, Ekanayake A N I, Sivayoham S, Stjernsward J, Pindborg J J, Sobin L H and Peera K S G P 1984 Utilization of primary health care workers for early detection of oral cancer and pre-cancer cases in Sri Lanka; *Bull. WHO* **62** 243–250
- World Health Organization 1999 *Fifty years of WHO in South East Asia 1948–1998*