Chapter II
PREVALENCE OF COMMUNICABLE DISEASES IN
THE SOUTH EAST ASIAN REGION INCLUDING INDIA

2.1. Introduction

Since the infectious and communicable diseases are causing not only personal suffering but generating enormous health externalities, public health policies are mostly targeted towards management and control of such episodes. In a global context to locate India in the morbidity map, it is useful to look at her situation from the perspective of her neighbors. How she is getting affected by the risk exposures of her contiguous countries and how she is imposing additional risk on her neighbors is important to study. To carry out this analysis we would focus on the South East Asian Region (SEAR) which comprises eleven countries including India. The countries in this group are Bangladesh, Bhutan, DRP Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand and Timor-Leste. Communicable diseases continue to be one of the most important public health problems in this region. About half of the deaths in some countries are attributable to infectious causes. The region suffers disproportionately from the burden of infectious diseases, dominated by Influenza, Dengue, Malaria, Chikungunya, Kala-azar, Tuberculosis (TB), Pneumonia, Severe Acute Respiratory Syndrome (SARS), Avian Flu, Encephalitis, Diarrhea, Cholera, HIV/ AIDS, etc., while age-old diseases such as leprosy and lymphatic filariasis (LF) continue to tax the poor and the socially marginalized populations (Sai 1998, Mackenzie et al., 2010). This contributes not only to ill health and poverty at micro-level but also have serious socio-economic implications at the macro-level.

According to the estimates prepared by the World Health Organization (WHO) in the year 2007, the SEAR which has 25% of world’s population and 30% of world’s poor, bears 80% of the global leprosy burden, 34% of TB, and has the highest rate of drug-resistant malaria cases. An estimated 2.9 million deaths in the region are caused by infectious and parasitic diseases and an estimated 89 million disability-adjusted life years (DALY) are lost as a result. Each year, 0.25 million children die of measles and 0.75
million adults die of TB. More than 5 million people in the countries of the region have been living with HIV/AIDS and 250 million are at risk for contracting malaria. Furthermore, epidemics of infectious diseases occur frequently and in new areas; many of them are predictable but some of them take the health system by surprise. Avian influenza (bird flu), severe acute respiratory syndrome (SARS) and Nipah virus disease are recent examples of such surprises which are capable of causing enormous socio-economic hardship extending beyond national borders. Dengue and new strains of cholera are spreading to areas where they were not common in the past.

Apart from causing a large number of deaths, communicable diseases can result in considerable disability and personal disfigurement. Severely deformed limbs may result from lymphatic filariasis and facial erosion and scarring from leprosy. The threat of these infections becoming resistant to drugs is another mounting concern. While the arsenal of antimicrobial drugs is not increasing, the spread of antimicrobial drug-resistant infections is rapidly narrowing the windows of opportunity for the control of such infections.

Figure 2.1: SEAR at High Risk of Dengue Transmission
The contribution of global warming and environmental degradation in enhancement of such health risks would be apparent from the geographical concentration of some of these diseases in the tropics. Figure 2.1 shows the zone bounded by the tropics of Cancer and Capricorn within which almost all cases of dengue attack lies. The entire SEAR appears to be especially vulnerable to such attacks. The speed of this spread is remarkable and without some inter-country coordination it is difficult to check. So, in the subsequent sections of this chapter we report an account of the prevalence pattern of these diseases in this region and its changing profile over time (section 2.2); try to understand the causes of such severe concentration of these diseases in this particular region (section 2.3) and discuss the direction of policy initiatives adopted so far to combat this problem (section 2.4). Section 2.5 specifically highlights the India’s position on epidemiological ladder and finally, section 2.6 concludes the chapter.

2.2 Prevalence Pattern of Communicable Diseases in SEAR

Interplay of socioeconomic, environmental and behavioral factors, as well as population movements, foster the spread of communicable diseases both within and across borders and threaten international health security. As already been mentioned in the introductory chapter that the situation is worsened by globalization and rapid economic activity, often unplanned and unregulated, and by the region’s considerable poverty, prevailing inequalities and inability to allocate increased resources for public health (Narain & Bhatia 2010). For example nearly 99% of all cases of HIV/AIDS in SEAR are concentrated in India, Indonesia, Myanmar and Thailand. Commercial sex and injecting drug use are the two main factors driving the epidemic in the region, but it has spread to cover lower risk population in several countries.

Malaria continues to threaten the life of an estimated 1.2 billion people or 85% of the total population of the region. It affects all age groups, especially the poor, pregnant mothers, infants and young children. The region carries 35% of the global burden of tuberculosis, with 3 million new cases and 0.75 million death every year. The key constraints are the lack of continuity of tuberculosis treatment (particularly in countries with decentralized health care), inadequate human resources to sustain Directly Observed
Treatment, Short-course (DOTS) and low community awareness leading to poor utilization of available services (Fric 2004). In the following paragraphs a disease specific account of the prevailing situation is reported¹.

**Pneumonia & Acute Diarrhoea:** Pneumonia and acute diarrhoea are among the three leading causes of death among children below the age of five. The South-East Asia Region suffers disproportionately from the burden of these two communicable diseases: more than 40 percent of annual 156 million cases of pneumonia and 37 percent of 1.87 million annual deaths from diarrhea worldwide occur in the SEA Region (Vol. 5, No. 3).

In the year 2007, an outbreak of acute diarrheal disease was investigated in the state of Orissa of India. The disease affected a population of 104,872 in 306 villages of 10 administrative blocks (Kanungo et al., 2010). Of the 7,565 cases detected, 1,848 needed hospitalization. 1,059 among these hospitalized patients died (Vol. 4, No. 4). Recently, 71,136 individuals developed acute watery diarrhea in Mid-West Nepal, of whom 371 died (Vol. 7, No. 1). For both Orissa and Mid-West Nepal areas were remote where health services are limited and people suffer socio-economic deprivation, low level of awareness, poor access to services, poor sanitation and hygienic practices and non-availability of safe water.

**Dengue:** Dengue fever is now endemic in more than 100 countries of the world. Some more than two fifth of the world’s population are at risk. In 2006-07, WHO estimates that around 50 million cases of dengue infection occur worldwide every year, 5,00,000 cases of dengue require hospitalization, of whom a very large proportion are children and at least 2.5% of cases are fatal. Along with increase in the number of cases, explosive outbreaks are also occurring. In 2006-2007 alone, dengue fever has been reported for the first time in at least nine countries including three in South-East Asia. The spread of dengue is attributed to the expanding geographical distribution of the four dengue viruses and their mosquito vectors (Vol. 4, No. 4).

¹The reporting is mostly based on the Communicable Disease Newsletter (Various Volumes), Regional Office for Southeast Asia, World Health Organization, New Delhi; Web: http://www.searo.who.int, accessed during May – June, 2011;
Recently, increased number of cases is being observed in Maldives. Dengue here shows a seasonal trend with a majority of cases reported between May to August which corresponds to the rainy season in the country. In 2011, the cases have shown an increasing trend during the relatively dry season (January – April) compared to previous years even without the start of the rainy season (similar to the trend observed in 2006). One probable cause may be the increased construction activities with the subsequent accumulation of water at the construction sites which are good breeding places for mosquitoes. A similar situation was seen is an outbreak of dengue in Delhi, India in 2010 and West Bengal in 2012. With the onset of the rainy season, a further spike in the number of cases is expected unless strong efforts are made to prevent outbreaks (Vol. 8, No. 2).

**Leprosy:** The South-East Asia Region, which traditionally accounts for the highest case load of leprosy, has made a significant contribution towards reducing the global leprosy burden. Of the more than 15 million cases globally cured with multi-drug therapy (MDT), about 12.8 million were from the South-East Asia Region, more than 11.8 million of them from India (WHO SEA Report, Vol. 5, No. 2). Elimination of leprosy as a public health problem is defined as a prevalence rate (PR) less than 1 case per 10,000 populations at the national level. The eight countries of the SEAR have achieved the national level elimination of Leprosy. The remaining three countries, who are lagging behind, are India, Nepal and Timor-Leste (WHO SEA Report, Vol. 2, No. 1). Among these three countries, the reduction in prevalence and new case detections has been most significant in India. This is mainly due to minimization of ‘operational factors’ like wrong diagnosis, re-registration of cases, wrong grouping, delayed treatment completion, over-treatment and delayed release from treatment. The evidence that “operational factors” were influencing prevalence and new case detections in India was established through a WHO-supported Leprosy Elimination Monitoring (LEM) and Case validation Study conducted in 2003 and 2004. Results showed 25–30% “over-detection”. The National Leprosy Eradication Program (NLEP) in India initiated prompt corrective action to minimize these factors and this explains the dramatic reduction in prevalence and new case detections during 2003-05. In Nepal, the achievement of the goal was quite difficult because of the political situation. But at the end of 2008 Nepal was able to achieve the
target. Timor-Leste was able to launch an effective leprosy program in 2003 after a 4-year dislocation of services. Hence, it is likely to have a large backlog of cases to be detected (Vol. 2, No. 1). On 23 March 2011, Timor-Leste, the last frontier against leprosy in the Region, declared the disease eliminated as a national public health problem.

The South-East Asia Region achieved the goal of elimination at the end of December 2005 with the regional PR of 0.87 per 10,000 populations. There was a remarkable reduction in the number of new cases detected annually, in the Region. In spite of these achievements, at the end of 2009, based on the latest available data from all member countries, 68% of the global total new cases were detected in SEA Region. Globally, there are 16 countries that reported 1000 and more new cases during 2009. Six of these 16 countries are in this Region (Bangladesh: 5,239 new cases; India: 1,33,717; Indonesia: 17,260; Myanmar: 3,147; Nepal: 4,374; and in Sri Lanka: 1,975 cases). Two of these countries (India and Indonesia) are considered as priority countries with large populations and with a significant number of new leprosy cases being reported annually (WHO SEA Report, Vol. 8, No. 2).

**Chikungunya:** The origin of this infection is mostly in sub-Saharan Africa and South East Asia.

*Figure 2.2: The Spread of Chikungunya in the World*

![Map showing the spread of Chikungunya](image)

Source: WHO, 2008
Within the first eight months of the year 2007, a total of 30,710 cases of Chikungunya have been reported from 12 states in India, of which 903 were laboratory confirmed cases. Kerala with 22,583 cases remains the most affected state. Clinical presentation showed about 40-50% patients having skin manifestation such as rash and arthralgia which is the characteristic feature of Chikungunya tends to last up to 4-6 months causing considerable disability and discomfort. Interestingly most cases occurred in areas relatively spared during outbreak in 2006, when 1.39 million cases were reported from 16 states in India.

Anthrax: South-East Asian Region is called ‘Anthrax Belt’. Sporadic outbreaks have been reported from many states of India. Similarly, it is endemic in many provinces of Indonesia. Outbreaks of anthrax in animal population are reported from Bangladesh, Bhutan, Myanmar, Nepal and Sri Lanka. Human anthrax is also considered endemic in India and Indonesia due to consumption of infected meat or contamination of open wound with infected material. The human anthrax outbreaks mainly in three states of India – Orissa: where villagers were contracted Anthrax believed to have consumed meat of dead cattle, Andhra Pradesh: where people are contracted anthrax after reportedly skinning infected sheep, West Bengal: people are affected by Anthrax through infected Cows (Vol. 5, No. 1). Due to unusual Anthrax outbreak in human and animal population, Bangladesh Government issued a red alert on September 2010. From 18 August - 4 October 2010, 607 cases were reported from 12 districts, with no deaths. In April-June 2010, 44 human cases had been reported. The anthrax outbreak was a disaster for farmers in North-Eastern Bangladesh, a dairy pocket area. Beef consumption and prices plummeted after media coverage, which reported 66 people being infected in one day in one affected district. The consequent sharp fall in cattle slaughter and limited supply of hides seriously affected the 60 tanneries employing more than 70,000 workers (WHO SEA Report, Vol. 8, No. 1).

Nipah: Between 11 and 28 April 2007, cases of fever with acute respiratory distress and/or neurological symptoms were reported from Nadia district of West Bengal, India. The cases presented mainly with fever, headache and body ache with a few cases having episodes of vomiting, disorientation, respiratory distress. Five cases ended fatally within
3-10 days of onset. A similar Nipah virus outbreak was first reported in India in Siliguri district, West Bengal with high mortality (74%) in January and February 2001. Such outbreak was first documented in Bangladesh in 2001. In January 2003, a similar outbreak was reported in Naogaon district at a distance of 150 km from village reporting the first outbreak. All the outbreaks so far were recorded during winter or early spring, which is the prime time for date palm sap cultivation. Bangladesh has reported a total of 182 cases with a case fatality rate of 77%. Twenty-eight cases of Nipah virus encephalitis with 100% case fatality rate were reported from six districts namely Lalmonirhat, Dinajpur, Nilphamari, Faridpur, Rajbari and Comilla from late December 2010 to February 2011. Nineteen cases were clustered at Hatibandha sub-district of Lalmonirhat, and five were isolated cases, one each from five different districts in the country. A case was reported for the first time from Comilla which is outside the Nipah-belt. Earlier in January 2011, four cases were reported from Faridpur and Rajbari. All of them died.

**Kala-azar:** Globally, leishmaniasis or Kala-azar is endemic in 88 countries. In SEAR, three countries, namely Bangladesh, India and Nepal, are affected where approximately 147 million people are at risk and at least 100,000 new cases are being encountered every year. The disease occurs predominantly in the poor and marginalized communities (WHO SEA Report, Vol. 2 No. 1). Recent information suggests that Some 200 million people are at risk of kala-azar in the Region. The disease is now being reported from 109 districts (45 Bangladesh, 52 India and 12 Nepal). In Bangladesh some 10,000 cases are detected and treated annually; more than half of them from Mymensingh district. India reports kala-azar from 52 districts in four states – Bihar 31, Uttar Pradesh 11, West Bengal 6, and Jharkhand 4. North Bihar is the worst affected (70% - 80% cases). Both Miltefosine and rK39 are available in 11 districts. In Nepal, 12 districts are affected by kala-azar, and only in one district Miltefosine and rK39 are currently available for treatment and case diagnosis. Three countries in collaboration with the WHO are working together to eliminate Kala-azar from the SEAR by 2015. Although some progress has been made by India, rapid scaling up of activities is needed in all three countries to achieve the elimination target of 2015 (WHO SEA Report, Vol. 7 No. 1).
**HIV/AIDS:** The number of people living with HIV/AIDS (PLHIV) in SEAR has remained constant at an estimated 3.5 million since 2008-09. The numbers vary widely between countries, with five countries – India, Thailand, Myanmar, Indonesia and Nepal – accounting for the majority of cases. In the Region, more than a third of PLHIV are women – in contrast, globally, women account for little more than half. The number of new infections fell by 31% from 2001 to 2009 indicating the halting and reversing of the HIV/AIDS epidemic in the Region. Unsafe sex and injecting drug use are the main drivers of the epidemic in South-East Asia. HIV infection rates are much higher (up to 50 times in some cases) among high-risk populations, i.e., sex workers and their clients, men who have sex with men, and injecting drug users. The number of children living with the disease has grown from an estimated 89,000 in 2000 to 1,30,000 in 2009. Thailand’s perinatal HIV transmission rate had decreased to less than 3% due to high coverage of prevention of mother-to-child transmission (PMTCT) interventions and effective triple antiretroviral prophylaxis. Myanmar has also significantly increased PMTCT coverage. Despite these achievements, overall in the Region only 34% of pregnant women have access to PMTCT. Further progress will be driven by increasing coverage of PMTCT services in India which accounts for 75% of the HIV-infected pregnant women needing prophylaxis or treatment. Important accomplishments in combating HIV/AIDS in the Region include high levels of condom use among sex workers and clients leading to reduction in HIV prevalence among sex workers in Thailand and south India (WHO SEA Report, Vol. 8 No. 1). Each year, the National AIDS Control Organization (NACO) of India conducts annual facility-based HIV sentinel surveillance among selected population groups. Applying this data and the data of National Family Health Survey (NFHS-III), it is estimated that there are 2.5 million (range: 2 million-3.1 million) people living with HIV (PLHIV) in the country in 2006 with an adult HIV prevalence of 0.36%. This represents more than 50% reduction in absolute numbers from the previous year’s estimates: in 2005 there were an estimated 5.2 million adults living with HIV in India (WHO SEA Report, Vol.4 No. 3).

**TB:** The South-East Asia Region bears 28% of the global burden of multi-drug resistant tuberculosis (MDR-TB) cases, with an estimated 150,000 cases of MDR-TB occurring
annually in countries of the Region. While the overall rates of multi-drug resistance are low at an average of 2.8% among new cases, much higher rates averaging around 18% are reported among previously treated cases. Very little information is available on second-line drug resistance in the Region; however, extensively drug resistance XDR-TB has been documented in six countries: Bangladesh, India, Indonesia, Myanmar, Nepal and Thailand (Vol. 6 No. 1). The disease, which is most common among people in their productive years, has a huge economic impact. For instance, in 2006, TB caused India to lose an estimated US $23.7 billion. In a region where one-fourth of the world’s poorest live, TB can lead to catastrophic out-of-pocket expenditure and cause patients to lose an average of 3 to 4 months’ wage due to illness-related loss of work (Nair et al., 2010). India had 2 million new tuberculosis cases in 2009, which is the highest in the World for that year (John et al., 2011). However, the prevalence of tuberculosis is not uniform in all states. The cases of drug resistant tuberculosis have been reported from Maharashtra, UP, Tamil Nadu and Kerala. However, the main problem of TB has been low reporting of the diseases, resulting from serious social stigma.

According to the Communicable Disease Newsletter (WHO, 2011), countries in the South-East Asia Region have continued to make steady progress with tuberculosis (TB) control. The number of notified TB cases has been steadily increasing with more than two million TB patients initiated on treatment in the Region during 2009. Based on data from National TB programmes in Member States in 2009, nine countries in the Region have now achieved or surpassed the 85% treatment success target; the overall treatment success rate achieved in the Region as a whole was therefore 88%, close to the current target of 90% (2010). Major achievements during the year were the establishment and scaling up of interventions for TB/HIV, multidrug-resistant TB and further expansion of private and public partnerships for the provision of TB care in Member States. As a result of on-going efforts, TB prevalence and mortality rates have declined by almost a third as compared to the baseline in 1990, while a slower decline in incidence continues to be maintained.

Malaria: In the past decade, the WHO (South-East Asia Region) has seen significant progress in malaria control. Key interventions were scaled up, and malaria morbidity and
mortality have shown a declining trend. SEAR as a whole had 23,82,661 reported Malaria case in 2003 (WHO Bulletin). Malaria still remains a serious health challenge in this region, with 1.216 billion people at risk. The impact, especially and disproportionately on the poor, is enormous. Different interventions, supported by innovative behavior related to communication and community participation, have contributed in reducing the malaria burden in the SEA region. The number of malaria cases has declined sharply in 2002-2005, and less rapidly after that, in Bhutan, DPR Korea, India, Sri Lanka, Nepal, and Thailand. Compared to 2000, malaria morbidity declined by over 50% in these countries except India (25% decline). However, in Bangladesh, Indonesia, Myanmar and Timor-Leste, intensive case finding and use of RDT at community level as well as in “hard-to-reach areas” has resulted in decreased probable malaria cases and an increase in confirmed malaria cases, and therefore they did not show a declining trend. This has affected the regional data in 2000-2009, overall malaria morbidity and mortality has declined by 5.4% and 44.3% respectively in the South-East Asia Region. With low transmission, Bhutan, DPR Korea, Nepal, and Sri Lanka as well as Goa of India and some Indonesian islands namely, Bintam, Batam, and Java Bali is now moving towards malaria pre-elimination phase. Maldives has been malaria-free since 1984. The malaria burden is still high in other parts of India, Indonesia and Myanmar, with 90% of malaria cases and deaths in the past 10 years. Timor-Leste has the highest malaria incidence in the Region (WHO SEA Report, Vol. 8, No. 2).

**Avian Influenza (Bird-Flu):** Since 2003 the number of countries worldwide with Avian Influenza outbreaks has increased markedly, along with a steadily rising number of human deaths. According to WHO, the outbreak originated in South-East Asia and spread to the Middle East, Europe, Africa and other parts of Asia. In 2006 alone, more than 30 countries have reported outbreaks in poultry. By January, 2007 more than 160 people had died globally. Furthermore, the fatality rate among those infected is increasing; at the end of 2006 it was standing at 60% against 53% in during the start of 2006. Countries in the SEA Region can be categorized as those which have had both poultry and human cases (Thailand and Indonesia); those with cases reported only in poultry (India, Myanmar and DPR Korea) and those without any case of avian influenza (Sri Lanka, Bangladesh, Maldives, Bhutan, Timor-Leste and Nepal). Since the beginning of 2004, Thailand and
Indonesia have reported 25 and 74 cases respectively, of which 17 and 57 have been fatal. Indonesia, where the disease may be endemic within the domestic poultry population, has in 2006 witnessed an average of one human death every week (WHO SEA Report, Vol. 4 No. 1). As of 31 March 2008, 372 confirmed human cases were reported to WHO globally since 2003, of which 235 were fatal. In the South-East Asia Region, since 2004, a total of 154 human cases with 122 deaths have been reported by three countries. Moreover, there were 36 human cases of influenza A (H5N1) reported globally in 2008; 21 were from the South-East Asia Region and 95% (20) of them were from Indonesia. Global mortality in 2008 was 78%; mortality in Indonesia was 85% (WHO SEA Report, Vol. 5 No. 3). On 10 August 2010, the Director-General of WHO declared that the pandemic was over; by then 18,449 deaths had been reported worldwide. In the SEA Region 76,302 cases and 2,054 deaths had been reported. In the post-pandemic period it was likely that the pandemic (H1N1) 2009 virus would continue to circulate as a seasonal virus for some years. Several Member States of the WHO South-East Asia Region continue to report cases of the pandemic virus; Sri Lanka is currently experiencing a second wave and India and Thailand continue to report cases each week although the trend is on a downswing (WHO SEA Report, Vol. 8 No. 1).

Neglected tropical diseases (NTDs) continue to have crippling effects on at least one billion people living in poverty. NTDs are a group of infectious diseases which primarily affect the poorest sectors of the society, especially the rural poor and the most disadvantaged urban populations. Almost all poor suffer from NTDs, which are referred to as "neglected" because they are characterized by little attention from policy-makers, lack of priority within health strategies, inadequate research, limited resource allocation and few interventions. While recently NTDs have been the focus of some attention globally, four of them continue to present a major public health problem in the 11 countries of SEAR. The diseases in question are leprosy, lymphatic filariasis, visceral leishmaniasis (Kala-azar) and yaws (Narain et al., 2010). Even though 26.5% of the 6.8 billion of the World population live in SEAR, an estimated 0.5 billion (about 50%) of the one billion people living in poverty are in this region. Poor living condition has lot to do with the spread of tropical diseases. Both kala-azar and lymphatic filariasis are vector-borne diseases casually linked with poor housing conditions. Until recently, yaws was
endemic in three countries of the region: India, Indonesia and Timore-Leste. However, India succeeded in eliminating this disease in 2006. Basically, yaws affects poor people with crowded living conditions, poor water supply and lack of sanitation. The following section looks deeper into the major causes of such concentration of communicable diseases in SEAR.

2.3 Factors Influencing the Spread of Communicable Diseases in SEAR

Coker et al., (2011) from the Communicable Disease Policy Research (CDPR) group has identified different factors leading to this wide prevalence of communicable diseases in the South-East Asia. According to them Southeast Asia is a hotspot for emerging infectious diseases- in particular, zoonotic and vector-borne diseases- as a result of many factors including population growth, mobility, urbanization, environmental changes such as agriculture and livestock intensification, deforestation and climate change. The combined influence of all these factors would culminate into three effects, viz., (a) as a region containing diverse zoonotic and vector-borne pathogens, and thus a primary source of emerging infectious diseases; (b) as a region in which the high animal density, proximity and mobility of human beings and animal reservoirs provide fertile conditions for transmission between species, within human populations, and across geographic areas; and (c) as a region with ecological factors that allow rapid pathogen mutation and host adaptation- for example, Dengue, re-assortments of influenza virus and emergence of drug resistance. The factors that have specially increased the spread of these infectious diseases are:

(a) Population Growth: Human population growth and increasing density are important independent predictors of emerging infectious diseases. The population in Southeast Asia, which is currently estimated at around 580 million, has increased by more than 30% since 1990. Increasing population density not only affects the spread of infectious diseases directly (through increased human-to-human contact, but also underpins many other ecological driving forces such as changing land use, agriculture and livestock intensification.
(b) **Rapid Urbanization:** Around 48% of people in the region live in urban areas, a figure which is expected to grow to more than 70% by 2050. Urbanization is associated with changes in social structures, increased personal mobility and extended and changing social networks. It is also a driving force behind some vector-borne diseases— for example Dengue, which has seen resurgence in Southeast Asia during the past 50 years. This resurgence has been linked to the establishment of peri-urban areas in which the collection and storage of water, because of lack of reliable water and sanitation systems and the accumulation of social detritus such as used tyres, provide breeding sites for *Aedes Aegypti* mosquitoes.

(c) **High Birth Rates:** This has also contributed to infectious disease transmission because of the effects of immunologically naïve individuals who perpetuate epidemics.

(d) **Population Movement:** Increasing regional population mobility, including both documented and undocumented travel, as well as increase in international population movements across national boundaries is an important feature of Southeast Asia. The Mekong Basin sub-region, which includes Thailand, Cambodia, Laos, Vietnam, Myanmar and China, has seen a sharp increase in cross-border migration in recent years. Much of this migration is driven by poverty, with migrant workers moving from the low-income countries to middle income countries. Thailand alone is estimated to have 1.5 to 2 million immigrants from neighboring countries, and about 0.15 million refugees. Large scale migration of economic and political refugees and especially the undocumented ones living in the border camps presents substantial challenges to the cross-border disease control in the region.

(e) **Animal Trade & Livestock Production:** Increased cross-border trade of livestock and wildlife is also a major route of the spreading of infectious and communicable diseases in SEAR region. Trading centers, for example, can act as mixing bowls for humans and dozens of other species before they are shipped to other markets, sold locally or even freed and sent back into the wild. Data for wildlife trade is scarce, although some have estimated that in East and Southeast Asia, tens of millions of wild animals cross borders each year regionally and to more distant countries around the world for use as food, pets, or in traditional medicines. Along with trade, the
natural movements of migratory birds and bats within, to, and from the region are also a key influence for several emerging infectious diseases such as H5N1 influenza (avian flu), Japanese Encephalitis and Nipah Virus.

(f) Agriculture & Changing Land Use: Human-induced changes in land use are key driving forces of emerging infectious diseases. In SEAR the area under agricultural production and especially, that under rice-paddy-cultivation has gone up over time. Development of rice paddies may promote transmission of vector-borne diseases such as Japanese Encephalitis through their role as vector breeding sites and by attracting water birds, which are natural reservoirs of the disease. Transmission between birds and mosquitoes are further amplified by transmission in pigs. Countries such as Cambodia, Indonesia, Laos and Myanmar are at risk of increase in Japanese encephalitis because of the combination of intensified rice and pig farming and the absence of vaccination program and surveillance. In addition to an increased potential for transmission of Japanese encephalitis, the attraction of various birds to rice paddies has also been associated with increased risk of H5N1 (aviation flu) outbreak in Thailand and Vietnam. Moreover, continuous conversion of forestlands into agricultural and/or urban land has lead to increased interaction between wildlife, livestock and humans encouraging the pathogens to cross the species barriers. The prevalence of Nipah virus induced fatal fever due to the contact between humans and pigs that have ingested bat excreta is a very unique instance of such risk-amplification.

(g) Climate Change: SEAR is the home of one-fourth of World’s humanity and one-third of World’s poor. The region already suffers disproportionately from communicable diseases and the situation is expected to deteriorate further in the foreseeable future due to climate change. The receding of glaciers in the Himalayas and the changes in weather conditions leading to higher incidence of vector-borne diseases, water-borne diseases and zoonotic diseases. Since anthropod vectors tend to be most active at high temperatures, and because water scarcity during droughts often leads to poor sanitation, climate change can be expected to drive and spread of vector-borne diseases and diarrheal illnesses in Southeast Asia. Much of the burnt will
unfortunately fall on the poor and the most vulnerable populations in nations which contributed so little to climate change in the first place. In fact, the impact is already visible in many countries in the form of expanding disease vectors to newer geographic areas where they were never seen before and unprecedented increase in some vector borne diseases like Dengue. The 1994 Plague outbreak in Surat, India which cost India 2 billion dollars is also considered as a consequence of climate change.

(h) **Drug Resistance:** In addition to the aforesaid demographic and environmental factors, which can drive the emergence of novel diseases and increase the incidence, prevalence or geographic scope of existing ones, the importance of incomplete surveillance of the public health system including factors like drug-resistant strains, the wide availability of counterfeit and substandard drugs, etc. are of particular relevance in explaining the spread of communicable diseases in SEAR. During the past five decades, Southeast Asia has been the epicenter of the evolution and spread of resistance to all important classes of anti-malarial drugs. Artemisinin and its derivatives are currently the best drugs available to treat falciparum malaria, a disease that can be fatal. WHO has recommended malaria endemic countries to use artemisinin derivatives in combination with efficacious partner drugs (like ACT) for early parasite clearance. However, ACT resistance was reported at Thailand-Combodia in 2006-07, in Myanmar-Thailand Border and in Nepal-China border.

Thus, the SEAR countries are sharing some common structural as well as cultural features creating bottlenecks in effective management of health-risks arising from communicable infectious but preventable diseases. Here there is some scope for taking up some integrated inter-country policy initiatives.

### 2.4 Policy Initiatives

Strong health systems are crucial for the success and sustainability of disease control program. Many countries in SEAR carry an enormous burden of preventable diseases and a host of emerging problems which the health systems are unable to cope with. In fact,
countries face the vicious cycle of weak health systems not being able to support disease programs to improve their outcomes and disease programs burdening them further.

Clearly communicable diseases in the region pose enormous challenges but also special opportunities for action. All countries are striving to implement and document innovative approaches to diseases control and share their experiences with each other. Core capacities are being built for detecting new pathogens early and responding to them as rapidly as required under the International Health Regulations. To generate an evidence base for decision making, countries such as Indonesia are developing an epidemiology work force. The region has a vibrant civil society and private health sector, advanced pharmaceutical and biotechnological research and development and manufacturing capacity (Gupta & Guin 2010, Narain & Bhatia op. cit.). Capita inputs are also provided by the international funding agencies. Urgent priorities for member countries of the region include strengthening public health infrastructure, harnessing partnerships, and allocating sufficient national resources for health within the framework of primary care.

2.5: The Epidemiological Status of India

India is the second most populous country in the present world accommodating more than 17 per cent of the total population of the world. However, India’s shares in global health problems are much higher than her population share. India accounts for 23 per cent of all child deaths, 26 per cent of childhood vaccine preventable death, 20 per cent of maternal death, 68 per cent of leprosy cases, 30 per cent of the tuberculosis cases and 10 per cent of the HIV infected persons of the world (http://wcd.nic.in/ searched on 27 August 2013; 3.35 p.m.).

Over the last five decades there is a steady decline in birth rate, death rate and under five mortality rates in India. However, the overall presence of maternal mortality, neo-natal mortality and peri-natal mortality do not provide any chance to be complacent. The country has added 85 per cent of her population during 1951 – 2001. Huge population pressure with unequal growth and development increases its inter-state inequality in different health indices. Few states like Kerala, Tamil Nadu was successful to arrest population growth, decline in fertility and mortality and to achieve a internationally
comparable health status whereas, Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh and few more states were staggering with high fertility and mortality rate and poor health status (Srinivasan 2004). A study on the causes of death in rural India spanned over the period 1966 – 94 has noted a significant change (Chattopadhyay & Ramanakumar 2005) where it was found that infectious and communicable diseases are still very much present in the demographically backward states as cause of death due to poverty and unhygienic environment. Infectious and communicable diseases are still responsible for more than 50 per cent disability adjusted life years (DALYs) losses. Corresponding figures for the non-communicable diseases and injuries were 27 per cent and 17 per cent respectively. In his study on morbidity profile of India, Nayar (1998) has found the evidence of malaria outbreak in North Eastern states and Rajasthan and Japanese encephalitis in Kerala, Tamil Nadu and West Bengal, and a general dominance of infectious and communicable diseases. Another important change is observed in the demographic profile of the victims of communicable diseases. Instead of isolating the infants and children as sole vulnerable class, these diseases are attacking the aged and the grownups with equal severity (Gupte et al., 2001). He has pointed out strategic role of female literacy, healthcare accessibility and availability, public distribution system, housing and amenities, equity and political factors as the causes behind the health achievement for any state. In the absence of any effective initiative to remove these differences the inter-state as well as intra-state inequalities would continue to persist.

While the backward areas are experiencing high prevalence of communicable diseases, the advanced urban sectors are victim of life-style induced chronic diseases and, thus, the economy is suffering from the stage overlap leading to the double disease burden (Quigley 2006). Taylor (2010) suggested a list of risk factors which are mostly responsible for different types of chronic and non-communicable diseases. Overweight or obesity, sedentary life style, smoking, hyper tension and lower economic status have been included as risk factors for most of the cardiovascular diseases. Risk factors for COPD includes tobacco use, both in-door and out-door air pollution, occupation environment and lower economic status. Cancer mostly causes by tobacco use (prime cause), obesity, physical inactivity, urban air pollution, in-door air pollution from solid fuel, excessive alcohol use and low fruit and vegetable intake. Here in India, non-communicable diseases
are increasing, communicable diseases like HIV, malaria, TB, etc. are not still under control and quite often the previously controlled infectious diseases are reemerging (Yadav & Arokiasamy 2014).

This changing epidemiological profile of India has been portrayed by Ghosh and Kulkarni (2004). Authors have used National Family Health Survey (NFHS-1998-99) data to examine the socioeconomic factors responsible for death among various age groups; the ultimate goal was to check the epidemiological transition process in the country. Results found that the epidemiological transition is in progress but the stages vary across different socioeconomic classes. Financially better-off, educated and urban people are experiencing more chronic and degenerative diseases, whereas infectious and communicable diseases are more prevalent among the socioeconomically weaker sections. Ghosh & Arokiasamy (2009) have analyzed the morbidity pattern and its determinants in India using two rounds of National Sample Survey (NSS) data (1995-96 and 2004). The study has noted the difference in the quality of morbidity reporting across Indian states. Socio-economically and demographically advance states like Kerala, Punjab and West Bengal are reporting more morbidity than Jharkhand, Bihar, Madhya Pradesh and Rajasthan where lower socio-economic and demographic condition is generally accepted. It was also noted that in addition to high morbidity prevalence among almost all age-group the share of elderly is increasing steadily leading to lower mortality and higher frailty (and, hence, morbidity). Significant coexistence of chronic diseases like IHD (Ischemic Heart Disease), Diabetes, Cancer, COPD (Chronic Obstructive Pulmonary Disorder) is observed along with the communicable ones like Malaria, Diarrhea, Tuberculosis (Patel et al., 2011, Chatterjee 2011, Mahal et al., 2013). A significant increase in non-communicable diseases and injuries in India is projected during next 25 years.

2.6 Overall Assessment

Therefore a variety of infectious are still dominating in India and are taking many lives each year. However most of the diseases are preventable either by changing life style, environment and housing condition or by vaccination and immunization. It is widely
accepted that most effective approach to improve public health from such infectious and communicable diseases is to prevent rather than treat these diseases. But the complex organizational structure in India is a barrier to implement collaborative and integrated activities required to prevent such diseases. Public initiative and accountability is also an important component. As disease control is a silent phenomenon and its success is marked by its absence, so preventive measures suffers from lack of political will to implement these measures. However, the results of curative services are instantly available and easy to materialize political goals. So, policies have been taken for curative health services to get more tangible and immediate results (Gupta et al., 2003). In his paper John et al., (op. cit.) has suggested that instead of adopting different policies to control different types of infectious and communicable diseases it would be more effective for India to promote primary health care for a few select communicable diseases like tuberculosis, malaria and leprosy where such focused attempt would control these diseases and generate some positive externality in terms of promoting environmental awareness, consciousness about health and hygiene and improving life style to avert other disease related vulnerability.

In this backdrop in the following chapter (Chapter III) an attempt will be made to study the morbidity profile of our selected representative Indian state, West Bengal, by utilizing household level data collected by the National Sample Survey Organization over two different rounds in 1995-96 and 2004 to study the influence of different socio-economic and demographic factors on the observed pattern.