

## SHIFTING TRENDS OF HIV EPIDEMIOLOGY AMONG MOST AT RISK GROUPS (MARGs) IN INDIA

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### ABSTRACT

**Background:** HIV/AIDS is one of the major barriers for community development. HIV epidemic in India is mainly concentrated among Most at Risk Groups (MARGs)/ High Risk Groups (HRGs) i.e. Injecting Drug Users (IDUs), Female Sex Workers (FSWs), Men who have sex with men (MSM) & Transgender and their sexual partners. National AIDS Control Programme (NACP) phase- II (year 1999-2006) & phase-III (year 2007-2012) envisaged and implemented Targeted Interventions (TIs) across country which has helped in somewhat containing the HIV epidemic among HRGs in various pockets. The implementation of Targeted Intervention programme has remained invariably different based on the response of respective State AIDS Control Societies (SACS).

**Objective:** To analyze the shifting trends of HIV epidemiology among MARGs, identify lessons learnt and examine future aspects of public health interventions among MARGs.

**Materials and Methods:** Present research has systematically reviewed HIV epidemiology among Most at Risk Groups (MARGs) using 16 peer reviewed research papers, HIV Sentinel Surveillance Survey (HSS) reports (years 2007 and 2008-09), National Family Health Survey (NFHS)-3 report, epidemiological studies, public health intervention reports via online database 'PubMed' and 'Web of Science' are analysed.

**Results:** Findings of various studies defining the HIV prevalence among MARGs highlights HIV prevalence ranging between 3.0 % to 70.0% in some pockets. These findings may not be generalized considering the limited sample size used in such studies. Annual rounds of HIV Sentinel Surveillance Survey (HSS) are considered more reliable and generalizeable. The trend of HIV prevalence among MARGs based on three years moving average show a consistent fall in HIV prevalence among FSWs in erstwhile high prevalence states. Whereas the trend of HIV prevalence among MSM & Transgender show initial decrease between period 2003 to 2006 and then rise from 2006 to 2007. HIV prevalence among IDUs show decrease from 2003 to 2008 in Manipur, Nagaland, and Chennai and notable increase reported in Meghalaya, Mizoram, West Bengal, Mumbai, Kerala and Punjab. There are regional variations in HIV prevalence among MSM & Transgender and Injecting Drug Users.

**Conclusion:** Review has outlined that despite reduction of new HIV infections (by 50% from 2000 to 2009) and reported decline in HIV prevalence among Female Sex Workers, a sustained focus on prevention is required among MARGs and their partner to contain HIV. However selection bias, non response bias, under reporting bias, surveillance bias in these studies might have also affected the results. There is felt need for more qualitative and behavioural researches to corroborate with HIV epidemiology and trends among MARGs.

**Key Words:** HIV/AIDS; Epidemiology; Trends; Most at Risk Groups (MARGs)

## INTRODUCTION

HIV/AIDS is not only a public health problem but also a social, political and economic challenge. The key concern with HIV infection is not only about infected person, but also about the chain of people infected by that individual and those he or she will probably infect in the future. HIV/AIDS is a big roadblock for community & social development which also includes the progress in health indicators. In words of former UN Secretary General Kofi Annan “The fight against HIV/AIDS requires leadership from all parts of government - and it needs to go right to the top. AIDS is far more than a health crisis. It is a threat to development itself.”<sup>[1]</sup> In terms of economic development AIDS rusts the productivity by reducing job opportunities and income which in turn, consumes savings and increases expenditure and it reduces life expectancy and increases the disease burden in any society. In July 2003 World Bank study indicated that, if AIDS were to continue unchecked in a developing country such as South Africa, the epidemic could socioeconomically “wreck a society in three generations.”<sup>[2]</sup>

Few years back most of us had not heard about HIV/AIDS and the situation at present is that within no time, AIDS has become the world's fourth leading cause of death and the number one killer in sub-Saharan Africa. The origin of HIV/ AIDS was first reported June 5, 1981, when the U.S. Centers for Disease Control and

Prevention recorded a cluster of *Pneumocystis carinii* pneumonia (now classified as *Pneumocystis jiroveci* pneumonia) in five homosexual men in Los Angeles. Originally dubbed GRID, or Gay-Related Immune Deficiency, health authorities soon realized that nearly half of the people identified with the syndrome were not homosexual men. In 1982, the CDC introduced the term AIDS to describe the newly recognized syndrome.<sup>[3]</sup>

Globally, the number of people reported to be living with HIV is estimated to have approximately doubled from 19.9 million in 1995 to 33.4 million (31.1 – 35.8 million) in 2008 (UNAIDS and WHO, 2009) details of which can be looked into from the Table 1. Globally, approximately 2.7 million (2.4 - 3.0 million) new HIV infections and approximately 2.0 million (1.7 – 2.4 million) AIDS-related deaths have occurred in one year (2008) alone. About 330,000 (260,000–400,000) AIDS-related deaths have been estimated in Asia alone in year 2008. Asia is considered next to sub-Saharan Africa in terms of the number of people living with HIV/ AIDS. India accounts for roughly half of Asia's HIV prevalence.<sup>[4]</sup>

HIV emerged later in India than it did in many other countries. The first case of HIV infection was reported in Chennai in 1986 which has since spread to all states and union territories. At present, India has the third largest number of HIV & AIDS cases after South Africa and Nigeria.

**Table-1: Global Summary of HIV/AIDS Epidemic, December 2008\*\***

Description	Total	Adults	Women	Children under 15 years
Number of PLHIV in 2008	31.1 million (31.1-35.8 million)*	31.3 million (29.2-33.7 million)*	15.7 million (14.2-17.2 million)*	2.1 million (1.2-2.9 million)*
People newly infected with HIV in 2008	2.7 million (2.4-3.0 million)*	2.3 million (2.0-2.5million)*	Data not available	430000 (240000-610000)*
AIDS related death in 2008	2.0 million (1.7-2.4 million)*	1.7 million (1.4-2.1 million)*	Data not available	280000 (150000-410000)*
Asia- Number of PLHIV in 2008 & new infection in 2008	4.7 million (3.8-5.5 million)* as on Dec. 2008	350000 million (270000-410000 million)* new infection	Data not available	21000(13000-29000)* new infection

\*The ranges around the estimates in this table define the boundaries within which the actual numbers lie, based on the best available information.

\*\*Source: UNAIDS and WHO 2008

**Objectives of Study:**

- i. To review and describe shifting epidemiology of HIV infection in India with specific reference to High Risk Groups (HRGs)/ Most at Risk Groups (MARGs) in terms of prevalence (person, time & place), incidence, trends and duration through use of currently available literature.
- ii. To analyze methodology of select studies through critical appraisal of their design, results and execution.

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## METHODS

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**CASE DEFINITION**

For the purpose of this paper the case definitions have been used based on the current literature available from the World Health Organisation (WHO), UNAIDS and National AIDS Control Organisation (NACO)/ Ministry of Health & Family Welfare-Govt. of India. As per WHO (2006) case definitions of HIV for surveillance and the clinical and the immunological classification for HIV-related disease in adults and children- "Cases diagnosed with advanced HIV infection (including AIDS) not previously reported should be reported according to a standard case definition. Advanced HIV infection is diagnosed based on clinical or immunological (CD4) criteria among people with confirmed HIV infection. AIDS case reporting for surveillance is no longer required if HIV infection or advanced HIV infection is reported".<sup>[5]</sup>

**1) Human Immunodeficiency Virus (HIV):**Adults and children 18 months or older:

HIV infection is diagnosed based on positive HIV antibody testing (rapid or laboratory-based enzyme immunoassay). This is usually confirmed by a second HIV antibody test (rapid or laboratory-based enzyme immunoassay) relying on different antigens or of different operating characteristics.

**and /or;**

A positive virological test for HIV or its components (HIV-RNA or HIV-DNA or

ultrasensitive HIV p24 antigen) confirmed by a second virological test obtained from a separate determination.

**2) Acquired Immune Deficiency Syndrome or Acquired Immunodeficiency Syndrome**

**(AIDS):**A diagnosis of AIDS is made whenever a person is HIV-positive and:

- he or she has a CD4+ cell count below 200 cells per microliter OR
- his or her CD4+ cells account for fewer than 14 percent of all lymphocytes OR
- that person has been diagnosed with one or more of the AIDS-defining illnesses

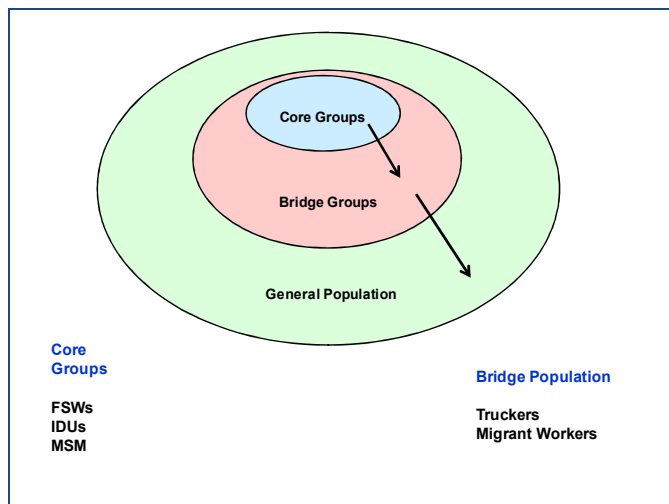
**3) Most at Risk Groups (MARGs)/ High Risk Groups (HRGs):**

According to Gordis. L (2009) "An important question in prevention is whether our approach should target groups that are known to be at high risk or whether it should extend primary prevention efforts to the general population as the whole. Epidemiologic studies have outlined that the high-risk strategy is an interim expedient that is necessary for the protection of susceptible individuals".<sup>[6]</sup>

Regarding HIV transmission it is estimated that more than 90% of HIV transmission in India is related to unprotected sexual intercourse or sharing of injecting equipment between an infected and an uninfected individual.<sup>[7]</sup> Not everyone in the population has the same risk of acquiring or transmitting HIV. Much of the HIV transmission in India occurs within groups or networks of individuals who have higher levels of risk due to a higher number of sexual partners or the sharing of injection drug equipment. As evident from Figure 1, these populations are at a greater risk of acquiring and transmitting HIV infection due to more frequent exposure to HIV, higher levels of risky behaviour and insufficient capacity or power to decide to protect themselves. The core groups are core transmitters of HIV infection as maximum number of HIV infection exists in this sub population. The bridge population contract

HIV infection and they form a transmission bridge from core groups to general population.

**Figure-1: Focused Groups under Targeted Intervention**



**4) Core High Risk Groups (HRGs):** There are three core HRGs – female sex workers (FSWs), high risk men who have sex with men and transgender (MSM and TGs), and injecting drug users (IDUs).

**5) Bridge Populations:** Particular focus on clients of sex workers two major populations within the bridge population: truckers and high risk migrants (STD clinic attendees).

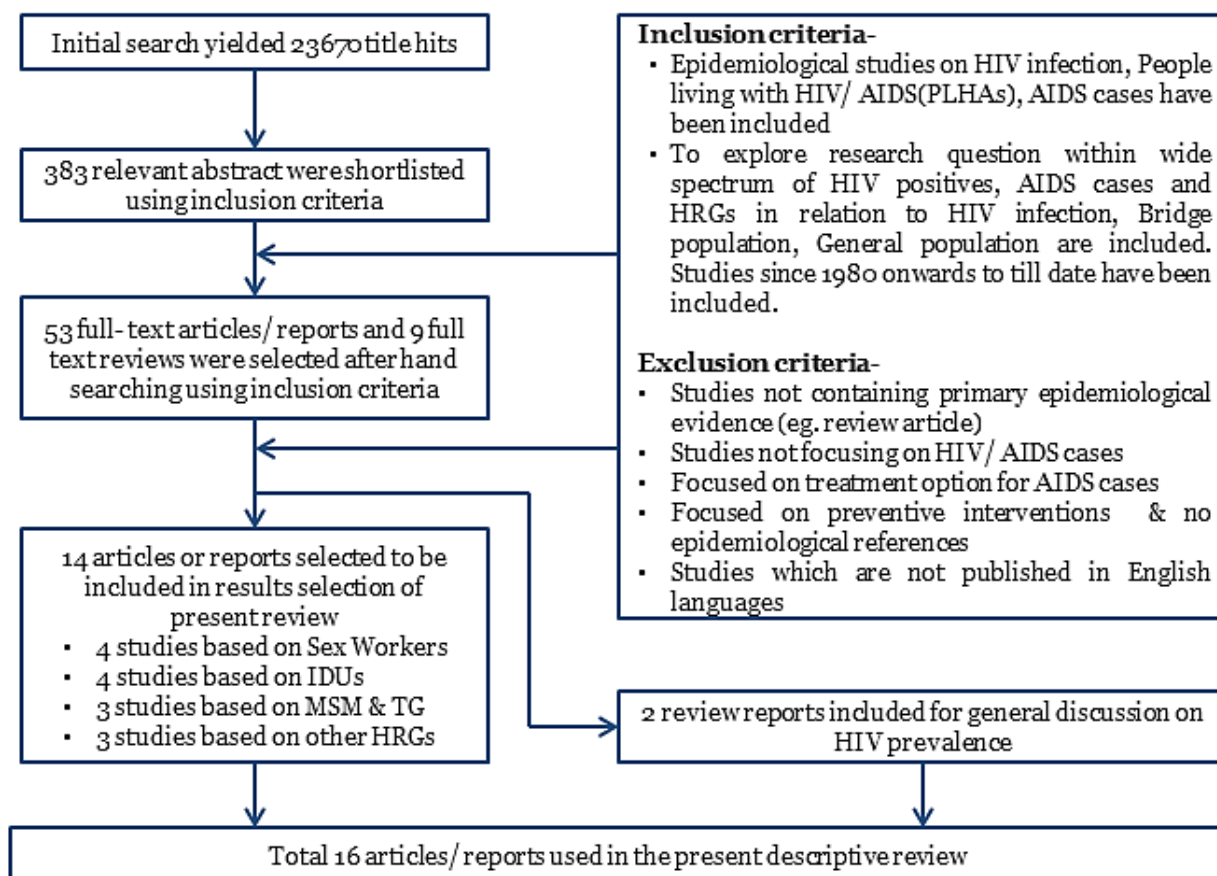
## SEARCH STRATEGY

The literature search was conducted to identify studies investigating the epidemiology of HIV infection among High Risk Groups (HRGs) in India by using online database PubMed. Articles were limited to those written in English and conducted especially with High Risk Groups/human subjects.

MeSH heading and keywords used include: (HIV OR AIDS) AND (HIV/AIDS) AND (Incidence OR Prevalence OR Trends) AND (High Risk Groups OR HRGs) AND (INDIA)

Using the same MeSH terms, eight more searches were conducted for namely, 'World', 'Asia', 'epidemiology', 'cohort study', 'cross-sectional study', 'survey', 'HIV Sentinel Surveillance', 'Behavioural Sentinel Surveillance', 'National

**Figure-2: Flow Chart of Search Strategy**



Family Health Survey', 'Integrated Biological & Behavioural Assessment', 'English language', 'year 1980 to present'. Hand searching was carried out for every full text to find articles which presented the latest 'nationally representative data'. Finally, 16 original papers and 2 reviews were extracted from 62 articles and reports. In addition, relevant reports, articles, books, journals which were available via Cambridge library resources and national websites, websites of WHO & UNAIDS were referred for additional information about the global scenario of HIV/AIDS.

## REVIEW METHODOLOGY

Based on the secondary research, the studies have been grouped in accordance to the quality

of information available with reference to General Population and High Risk Groups (HRGs). Limited data has been obtained in form of independent studies detailing out the HIV epidemiology for all the 28 states and seven union territories of India. The studies found for this essay have been conducted based on limited sample size. The main source of information for descriptive epidemiology of the region is through HIV Sentinel Surveillance (HSS) and population based survey viz. National Family Health Survey- NFHS-3, jointly conducted by the apex government of India body (NACO) for HIV surveillance and other international agencies and NGOs. These data set are supported by World Health Organisation (WHO) and UNAIDS. The data from individual literature were then compiled in suitable table 2.

**Table-2: Summary of epidemiological evidence sources on HIV prevalence in India**

Sr. No.	Author, year of publication (ref.)	Period	Geographic Area	Population sub group	Age group	Study Design	Prevalence (%)
1	Bhave G. AIDS, 1995 <sup>[12]</sup>	1986-1995	Mumbai	Sex Workers	≥ 15	Cross Sectional Survey	2.5-69.0
2	Rodrigues J et. Br Med J 1995 <sup>[13]</sup>	1993-1999	Pune	Sex Workers	≥ 15	Cross Sectional Survey	34.0-54.0
3	Desai V, et al J Commun Dis 2000 <sup>[14]</sup>	2000	Surat	Sex Workers	≥ 15	Cross Sectional Survey	43.2
4	Sarkar S et al Bull Narc 1993 <sup>[15]</sup>	1989-1998	Manipur	IDUs	≥ 15	Cross Sectional Survey	3.0-70.0
5	Panda S, et al Natl Med J India 2001 <sup>[16]</sup>	1997	Imphal-Manipur	IDUs (Females)	≥ 15	Cross Sectional Survey	57.0
6	Gupta P, et al Int J STD AIDS 2003 <sup>[17]</sup>	1999-2000	Calcutta	HRG clients	≥ 15	Cross Sectional Survey	40.0
7	Gawande A, et al J Commun Dis 2000 <sup>[18]</sup>	2000	Nagpur	Truckers-HRG clients	≥ 15	Cross Sectional Survey	15.2
8	Gawande A, et al J Commun Dis 2000 <sup>[18]</sup>	2000	Tamil Nadu	Truckers-HRG clients	≥ 15	Cross Sectional Survey	2.6-9.4
9	Manjunath J V, et al Int. J. STC AIDS 2002 <sup>[19]</sup>	1999-2001	Pondicherry	Truckers-HRG clients	≥ 15	Cross Sectional Survey	15.9
10	Jindal N et al JpnJ. Infect. Dis., 2008 <sup>[20]</sup>	2005-2007	Punjab	IDUs, Truckers, STD Clinic	≥ 15	Cross Sectional Survey	IDUs-7.0 Truckers-16.0 STD Attendees-1.4
11	Shinde S Ind. J of Der. Vener&Lep, 2009 <sup>[21]</sup>	2008	Mumbai	MSM	mean age 23.3	Cross Sectional Survey	MSM-17.0 Transgender-41.0
12	Soloman S et al J. Acquir Immune DeficSyndr 2008 <sup>[22]</sup>	2004-2005	Chennai	IDUs	median age 35	Longitudinal Cohort study	29.0%
13	Silverman JG, JAMA 2009 <sup>[23]</sup>	2006	Mumbai	Sex Workers	median age 17	Medical Records	38.0%
14	Setia MS, IJDVL, 2006 <sup>[24]</sup>	2005	Mumbai	MSM & TG	≥ 15	Cross Sectional Study	MSM-17.0 Transgender-68.0
15	Bairy I, Indian Journal of Medical Sciences, 2001 <sup>[25]</sup>	1991-1999	Manipal	HRG clients	21-40	Medical Records	8.22
16	HIV Sentinel Surveillance, 2008 <sup>[9]</sup>	2007	Country Report	Sex Workers, IDUs, MSM & TG	15-49	Sentinel Surveillance	Sex Workers- 5.1 IDUs- 7.2 MSM & TG-7.4

## MEASURES OF FREQUENCY FOR HIV INFECTION

Apart from some limited epidemiological studies, a formalized annual HIV sentinel surveillance system (since 1998) has been put in place by NACO in India to measure the HIV prevalence & incidence. The primary data source for generating the state & district specific prevalence in these studies & survey among general population and HRGs has been through samples taken from Ante Natal Clinics (ANC) and sites at STI clinics & sites at Targeted Interventions (TIs). The sentinel surveillance is conducted annually from August to October and 400 sample size from ANC and 250 samples from STI clinic have considered as valid for the estimation of prevalence under a uniform protocol. The numbers of sites have been steadily expanded over a period of time for improved representation of data to generate state specific estimation. The subjects have been selected by consecutive sampling and tested for HIV for unlinked anonymous testing. The HIV prevalence among general population and HRGs have been calculated separately for each state adjusting for inter and intra state variations using mixed effects logistic regression models. The details of selected studies detailing its methodology, design and results may be seen in table 2.

## PRINCIPLE DATA SOURCES

The principle data sources divided in two categories-

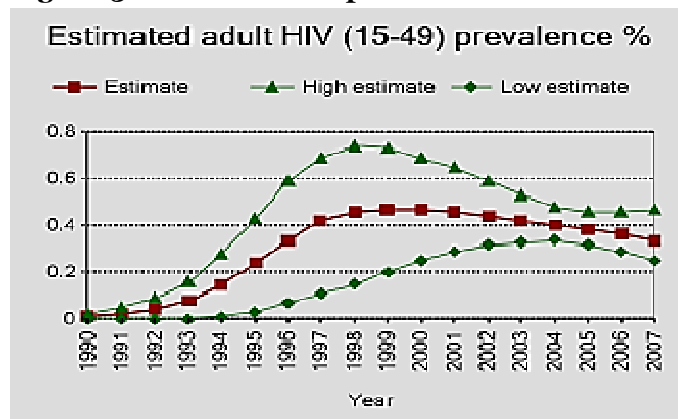
- i. Evidence from peer reviewed sources: The original articles and review papers published in the national & international journals using the national, regional, state & area specific datasets have been selected for the essay.
- ii. Evidence from health statistics: The information has been collected from the government of India website of National AIDS Control Organisation (NACO) international agencies viz. World Health Organisation (WHO) and UNAIDS.

## RESULTS

In India, the first HIV case was detected in 1986 at Chennai (earlier Madras) the capital of Tamil Nadu state. Based on this the government machinery was geared up and the national AIDS control program was initiated mainly focussing the strengthening of HIV surveillance in high risk areas, blood screening, health education.<sup>[7]</sup>

As on year 2005 the NACO reported an adult HIV prevalence in India was 0.88% with an estimated 5.2 million PLHIV.<sup>[7]</sup> In the year 2006 the HSS reported the revised adult HIV prevalence to 0.36% (range 0.29-0.46%) and estimated number of PLHIV to 2.47 million (range 2.0-3.1 million). The national adult prevalence for the previous years were also revised and found stable prevalence around 0.4% between 2002 and 2006. "The improvement in the 2006 estimates of the HIV burden in India is attributable to the expanded sentinel surveillance and representative data from the population-based survey in 2006, combined with improved analysis".<sup>[8]</sup>

**Figure-3: Year wise HIV prevalence in India<sup>[9]</sup>**



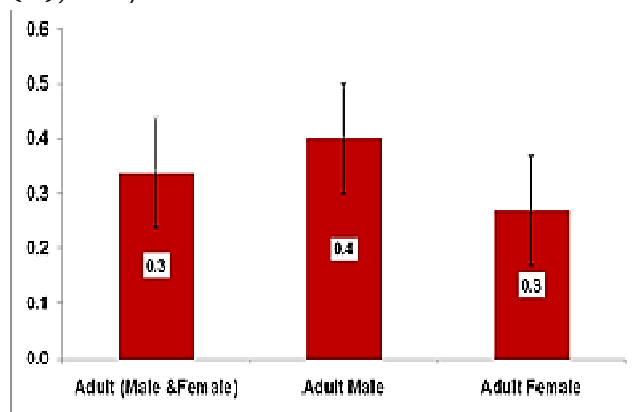
(Source: NACO/WHO, 2008)

According to the press release (December 1, 2011) by NACO, Government of India, based on HIV Sentinel Surveillance and HIV Estimation in India, 2009 the adult HIV prevalence has been reported 0.3 % (range 0.3% -0.4%) and there are estimated 2.3 million (range 2.0 to 2.6 million) PLHIV.<sup>[28]</sup>

The prevalence of HIV infection is more among males (0.38%) than females (0.26%). Out of total HIV infection Men constitute 61.1 % and

Women constitute 38.9 % (HSS 2007). The age wise profile of HIV infection among Adults <50 years-88.7%, Older adults >50 years-7.8% and Children<15years- 3.5 %. The total numbers of estimated mortalities due to AIDS are reported to 11682. HIV infection shows mixed trends with increase in some areas along with decrease in the other areas.<sup>[9]</sup>

**Figure-4: Estimated adult HIV prevalence (%), 2007<sup>[9]</sup>**



(Source: NACO/WHO, 2008)

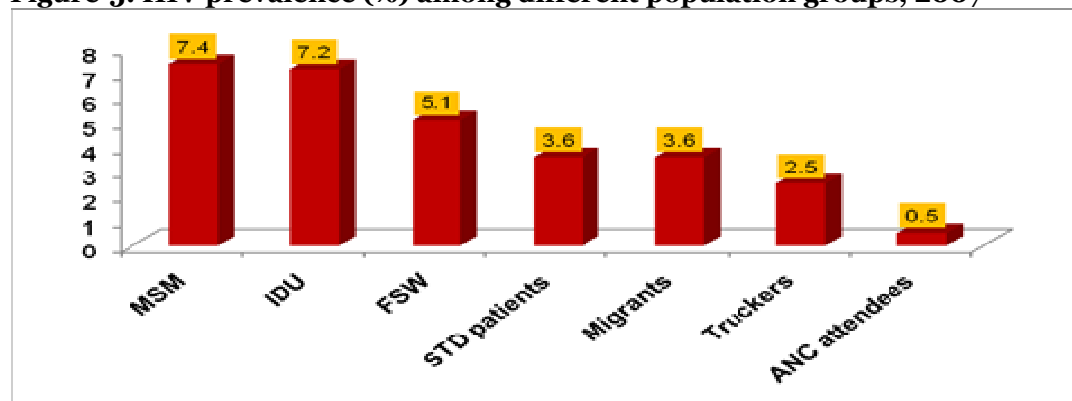
The evidence suggests that India's highly heterogeneous epidemic is still concentrated geographically and among some sub populations and is largely confined to six states. But overall the prevalence of HIV infection has been noticed in all communities, universally across the country. According to experts disease prevalence is highest in the Mumbai – Karnataka corridor, Nagpur region in Maharashtra State, Namakwa District of Tamil Nadu, Coastal Andhra Pradesh & few Geographical areas of Manipur and Nagaland in North Eastern Region.<sup>[10]</sup> Andhra Pradesh, Karnataka, Maharashtra & Tamilnadu contribute 63 % of the HIV infected person in the country. The remaining states & districts

which were previously classified as low prevalence, have been reclassified as 'highly vulnerable' or 'vulnerable' to guard against complacency and reflect the increasing threat of the epidemic and the presence of structural factors of risk and vulnerability. HIV & AIDS is now into its third decade & disease burden is characterized by its heterogeneity. Some epidemiologists opine that the countries epidemic pattern is following the scenario of Thailand.<sup>[7]</sup>

#### MEASURE OF DISEASE FREQUENCY: PREVALENCE

The findings of various studies defining the HIV prevalence among HRGs may be seen at the Table- 2. The prevalence of HIV range between 3.0 % to 70.0% in some pockets as outlined in these studies.<sup>[12-27]</sup> These findings may not be generalized considering the limited sample size. More reliable and generalizable findings are reported through annual round of HIV Sentinel Surveillance and periodic National Family Health Survey -3 (NFHS-3) HSS, 2007 was conducted on 488 sentinel sites for HRGs out of total 1134 sites. A total of 3, 58,799 sample were tested including HRGs. The evidence suggested that HIV epidemic in India is concentrated with high prevalence among HRGs in comparisons to low prevalence among ANC clinic attendees (age adjusted-0.48%) representing general population. The epidemic continues to occur among population with high risk behaviour in female sex workers (FSW), men having sex with men (MSM) & injected drug users (IDU).

**Figure-5: HIV prevalence (%) among different population groups, 2007<sup>[9]</sup>**



(Source: NACO/WHO, 2008)

These high risk groups continue to have high HIV prevalence in 2007. HIV wave in India is a dual epidemic driven by two transmission routes – Sexual and Injecting drug use, concentrated in nature with high HIV prevalence among high risk groups and heterogeneous in spread with pockets of infection found in various districts of the country. The prevalence of HIV is higher among high risk groups - Female Sex Workers (FSW)-5.1%, Men who have sex with men (MSM)-7.4%, Injecting Drug Users (IDU)-7.2%, Migrants-3.6%, Truckers- 2.5 %.

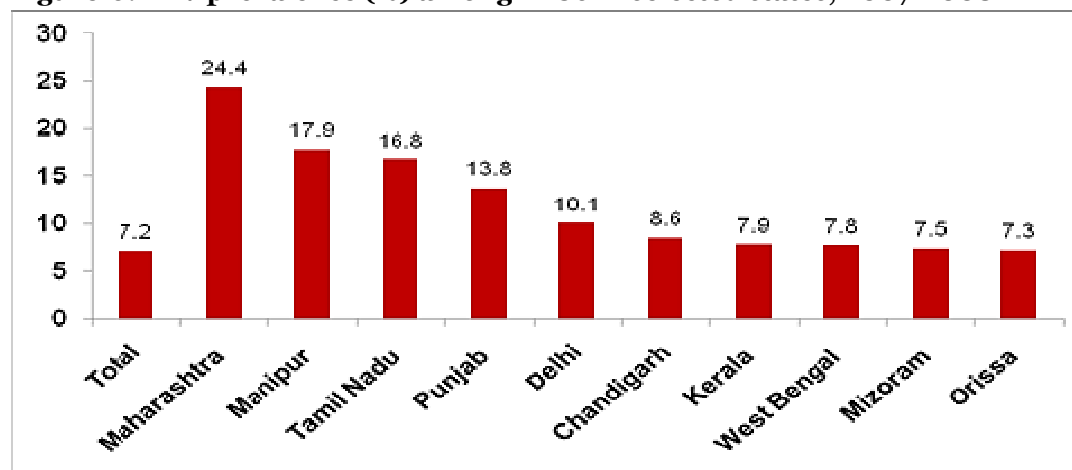
## PERSON

**i. Injecting Drug Users (IDUs):** As it can be ascertained from the appended below figure the trends among IDUs are on decline in states of Manipur, Nagaland, and Chennai where as a steady rise can be seen in the states like Meghalaya, Mizoram, West Bengal, Mumbai, Kerala and Punjab.

The average HIV prevalence among IDUs is 7.2%. In states like Maharashtra (24.4%), Manipur (17.9%), Tamil Nadu (16.8%), Punjab (13.8%), Delhi (10%), Chandigarh (8.6%), Kerala (7.9%), West Bengal (7.8%), Mizoram (7.5%) & Orissa (7.3%) have shown high HIV prevalence of >5%.<sup>[9]</sup>

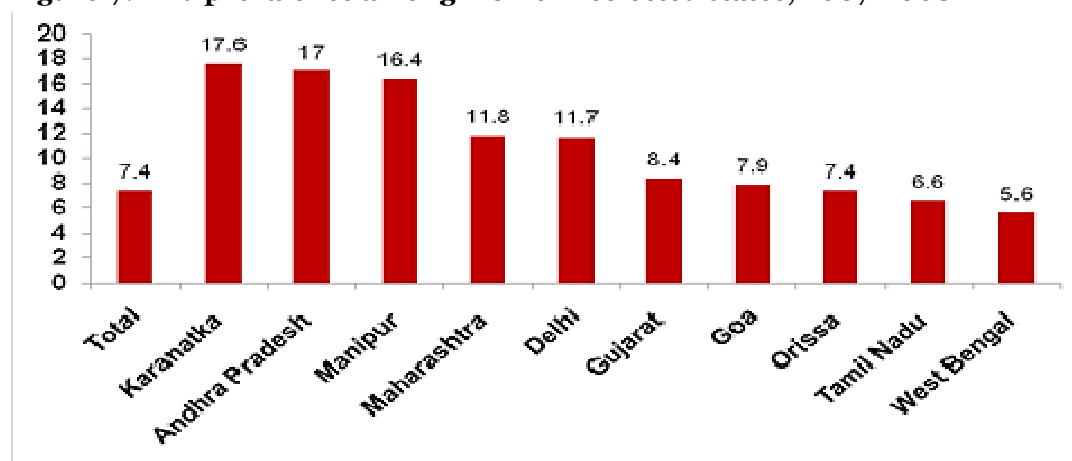
**ii. Men who have sex with men (MSM) & Transgender:** The estimates of HIV prevalence among MSM & Transgender population have been improved with the adding more number of sentinel sites. The average HIV prevalence among MSM & Transgender population is highest in state Karnataka (17.6) followed by Andhra Pradesh (17.0%) and Manipur (16.4%). The HIV prevalence among states Maharashtra (11.7%), Delhi (11.7%), Gujarat (8.4%), Goa (7.9), Orissa (7.4), Tamil Nadu (6.6%) and West Bengal (5.6%)

**Figure-6: HIV prevalence (%) among IDUs in selected states, 2007-2008<sup>[9]</sup>**

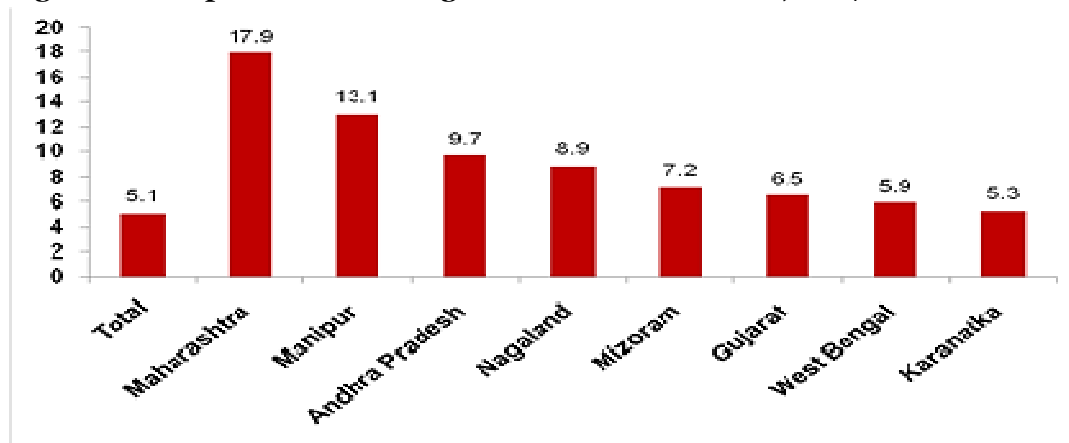


(Source: NACO/WHO, 2008)

**Figure-7: HIV prevalence among MSMs in selected states, 2007-2008<sup>[9]</sup>**



(Source: NACO/WHO, 2008)

**Figure-8: HIV prevalence among FSWs in selected states, 2007-2008<sup>[9]</sup>**

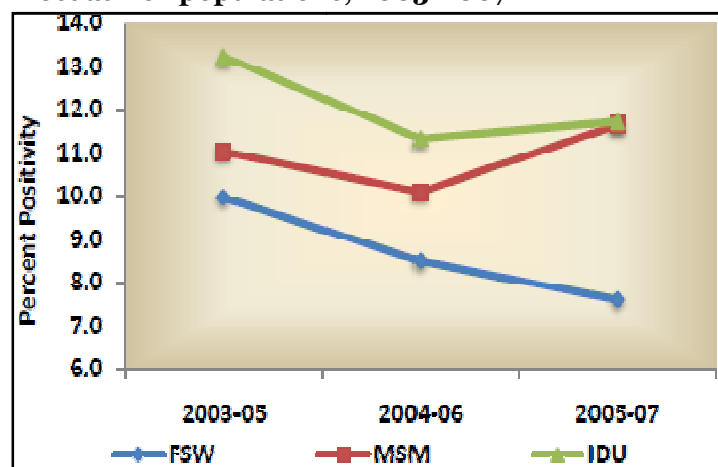
(Source: NACO/WHO, 2008)

- iii. **Female Sex Workers (FSWs):** The average HIV prevalence among FSWs is 5.1%. The HIV prevalence among highest among FSWs in state of Maharashtra (17.9 %) followed by Manipur (13.1), Andhra Pradesh (9.7%), Nagaland (8.9%), Mizoram (7.2%), Gujarat (6.5%), West Bengal ( 5.9%) and Karnataka (5.3%).

“The evidence further suggests forty seven districts have shown >5% HIV prevalence among FSWs, which also include FSW sites in low prevalence states namely West Bengal, Bihar and Gujarat. FSW site in Mumbai and Thane have shown >30% HIV prevalence among FSW. Among FSW, there is a decline in South Indian states indicating a possible impact of interventions, while rising trends are evident in the North East suggesting a dual nature of the epidemic”.<sup>[9]</sup>

### TIME TRENDS

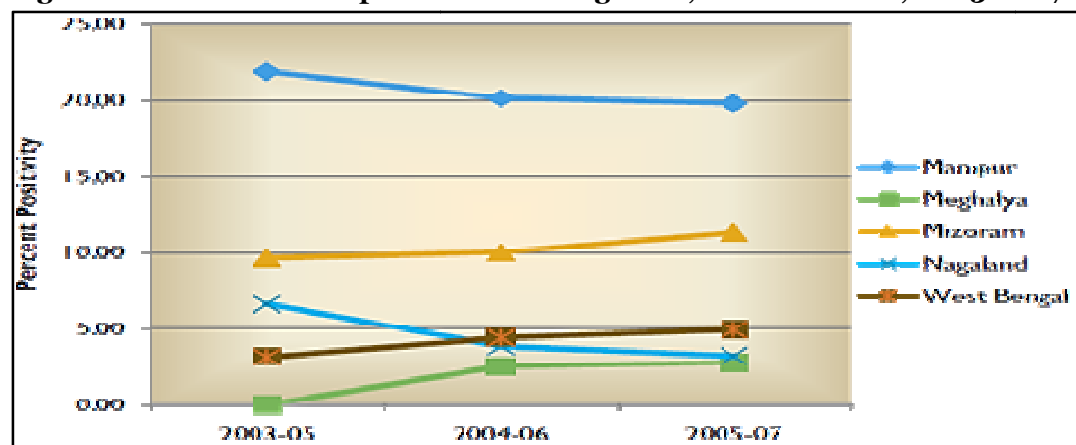
The year wise HIV prevalence among Core HRGs viz. IDUs, MSM and FSWs can be appraised from the table appended below. The trends of HIV prevalence among HRGs based on the three year moving average at consistent shown consistent fall of HIV prevalence among Female Sex Workers (FSWs), whereas the trend of HIV prevalence among MSM & Transgender is showing an increment over period of time. The HIV prevalence among IDUs is showing a gradual rise.

**Figure-9: Trends of HIV prevalence among most at risk populations, 2003-2007\*<sup>[9]</sup>**

\* 3 years moving average based on consistent sites: IDU-13, MSM- 7, FSW-22

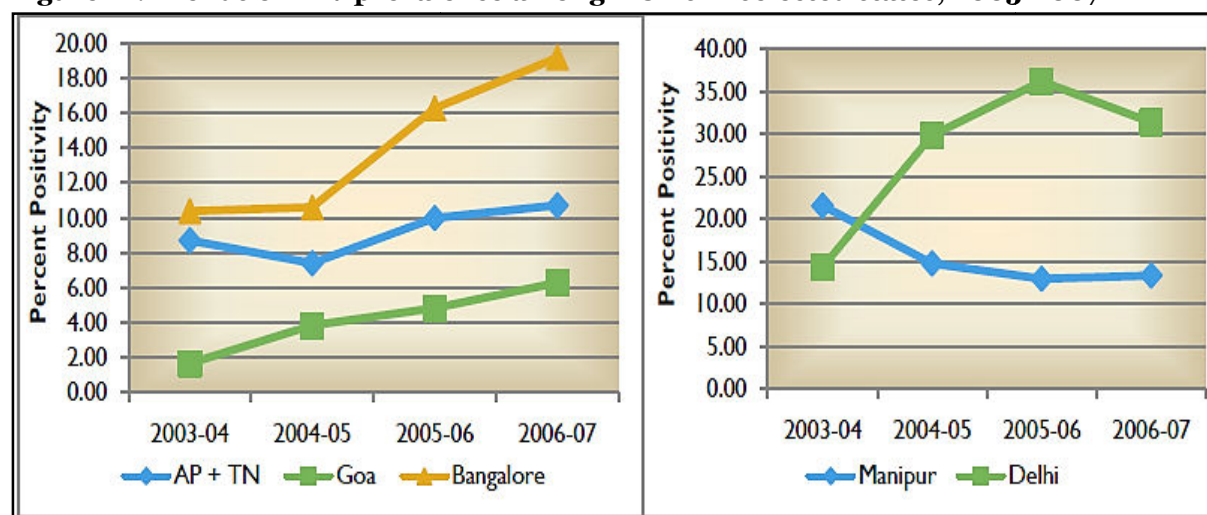
(Source: NACO/WHO, 2008)

Regarding IDUs the HIV prevalence over a period of time between 2003 to 2007 is rising in states like Meghalaya, Mizoram and West Bengal where as the HIV prevalence is showing decline in the Manipur and Nagaland states. Further HSS, 2007 has reported “high HIV prevalence persists among IDUs in the states of Chandigarh (8.64%), Punjab (13.79%), Delhi (10.10%), Orissa (7.3%), Kerala (7.8%), West Bengal (7.8%), Maharashtra (24.4%) and Tamil Nadu (16.80%). Six states have shown HIV prevalence between 1% to 5% among IDUs viz. A.P. (3.71%), Assam (2.12%), Karnataka (2%), Meghalaya (4.17%), Nagaland (1.90%) and U.P. (1.29%). Out of almost 620 districts in India 22 districts have shown HIV prevalence greater than 5% among IDUs”.<sup>[9]</sup>

**Figure-10: Trends of HIV prevalence among IDUs, selected states, 2003-2007\*[9]**

\* 3 years moving average based on consistent sites: Manipur: 3 sites, Meghalaya: 1 site, Mizoram: 1 site, Mumbai: 1 site, Nagaland: 5 sites, West Bengal: 1 site

(Source: NACO/WHO, 2008)

**Figure-11: Trends of HIV prevalence among MSMs in selected states, 2003-2007\*[9]**

\* 3 years moving average based on consistent sites: AP+TN : 3 sites, Goa: 1 site, Bangalore: 1 site, Delhi: 1 site, Manipur: 1 site

(Source: NACO/WHO, 2008)

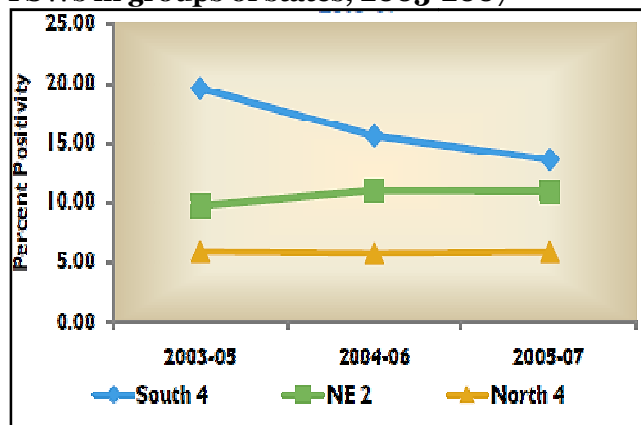
The trends of HIV prevalence among MSM shows sharp increase over period of 2003-2007 in the states of Goa, Andhra Pradesh and Bangalore city. Whereas a downward trend can be seen in the states of Manipur and Delhi. With the introduction of new sites among MSM has shown new epidemic clusters. Among MSM, high HIV prevalence is recorded in the states of Karnataka (17.6%), Andhra Pradesh (17.04%), Manipur (16.4%), Maharashtra (11.80%), Delhi (11.73%), Goa (7.93%) and Gujarat (8.40%). About 21 states have shown HIV prevalence > 5% among MSM.

The trends of HIV prevalence among FSWs in three regions South, North East and North for

the period between 2003-2007 suggests that HIV prevalence is declining steadily in the southern region comprising of Andhra Pradesh, Karnataka, Tamil Nadu & Maharashtra. The trend shows that HIV prevalence in northern region comprising of states Gujarat, Rajasthan, Orissa & West Bengal has remained almost stable over a period of time, whereas in the north eastern states comprising of Nagaland & Manipur, a marginal increase in the HIV prevalence has been noticed. High prevalence has been reported in the Maharashtra (17.91%), Manipur (13.07%), Andhra Pradesh (9.74%), Nagaland (8.91%) and Mizoram (7.2%). Additionally the HIV prevalence > 5% among

FSWs in states Gujarat, Karnataka and West Bengal.

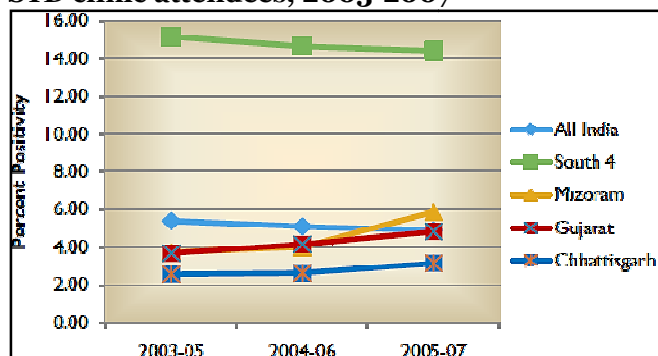
**Figure-12: Trends of HIV prevalence among FSWs in groups of states, 2003-2007\*[9]**



\* 3 years moving average based on consistent sites: South 4 (AP, TN, Kar, Mah): 7 sites, NE 2 (Mani,Naga): 2 sites, North 4 (Guj, Raj, Ori, WB): 7 sites

(Source: NACO/WHO, 2008)

**Figure-13: Trends of HIV prevalence among STD clinic attendees, 2003-2007\*[9]**



\* 3 years moving average based on consistent sites: All India: 157 sites, South 4 (AP, TN, Kar, Mah): 36 sites, NE 2 (Mani,Naga): 3 sites, Mizoram: 1 site, Guj: 8 sites, Chandigarh: 3 sites

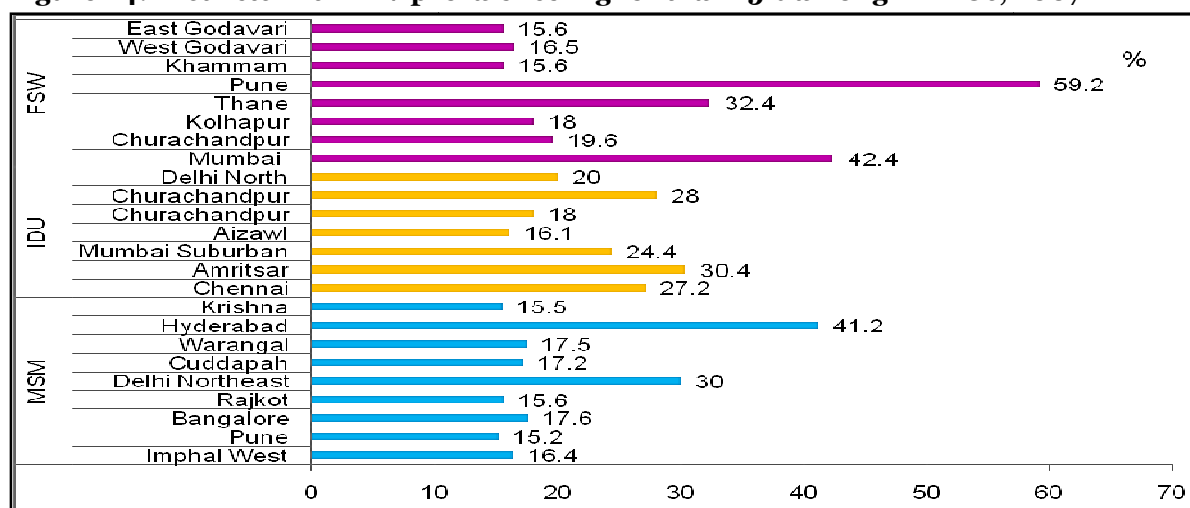
(Source: NACO/WHO, 2008)

There is proximity between Sexually Transmitted Infections (STIs) and HIV infection. It is evident there is almost 5-10 times more chances of contracting HIV infection in presence of any STI. Following figure shows increasing trends of HIV prevalence among STD clinic attendees in states of Mizoram and Chhattisgarh, whereas the HIV prevalence among STD clinic attendees all India average and the southern region (A.P, TN, Karnataka, Maharashtra) are showing steady declining trends.

### GEOGRAPHICAL AREAS

HIV epidemic in India is concentrated among high risk groups. Heterosexual mode of transmission is still the predominant mode of HIV transmission in India. As per HSS, 2007 143 high risk group sites have shown HIV prevalence greater than 5% out of which 39 have shown greater than 15% HIV prevalence in 2007.[9] Though HIV trends among high risk groups have mixed patterns, there are pockets of high HIV prevalence among high risk groups in many part of the country. 23 out of 49 districts with IDUs sites have HIV prevalence > 5% and 7 out of 49 districts with IDUs sites have HIV prevalence > 15%. 21 out of 40 districts and 9 out of 40 districts with MSM sites have HIV prevalence > 5% and >15% respectively. Likewise the HIV prevalence among districts with FSW sites 47 out of 129 districts and 8 sites have > 5% and 15% respectively. FSW sites in Pune, Mumbai and Thane have shown > 30% HIV prevalence among FSWs.

**Figure-14: Districts with HIV prevalence higher than 15% among MARGs, 2007[9]**



(Source: NACO/WHO, 2008)

## OTHER VARIABLES

Ethnic background: Majority of the 16 listed studies have discussed the ethnic background of respective HRGs but none of the study has tried to compare the ethnic background with HIV prevalence. These studies have provided demographic information about the different HRG population like their ethnicity, place of living, their marital status, etc. In at least one study related to sex workers have found trafficking as a strong factor for their entry into sex work.

## EDUCATIONAL BACKGROUND

Three studies have tried to discuss the educational background of HRGs, One study on IDU has tried to discuss the need subject's education so as to understand the written consent for taking part in the longitudinal study. The information on educational background may be of use to compare the possible relation between educational background of HRG with HIV prevalence.

## SOCIO ECONOMIC STATUS

The socio economic status of respective HRGs have been taken in some studies and found that HRGs are deprived of good living conditions and majority of them are from below poverty line.

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## DISCUSSION&CONCLUSION

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The HIV prevalence in India has been nearly halved from the reported adult HIV prevalence of 0.88% and estimated 5.2 million people living with HIV (PLHIV) in year 2005 to an adult HIV prevalence of 0.36% (range 0.29-0.46%) and estimated number of PLHIV to 2.47 million (range 2.0-3.1 million) in year 2006. The revisions of these estimates are based on the improved methodology and analysis that has combined antenatal clinic (ANC) and NFHS-3 data. In the earlier rounds of HIV Sentinel Surveillance (HSS) only ANC data and some limited data from HRG sites were used. These revisions have been supported by the international technical agencies the World

Health Organisation (WHO) and UNAIDS. The new HIV prevalence estimate represents a combination of data from the National Family Health Survey- 3(NFHS-3) the first national population based household survey to include HIV testing, data from HSS among specific population. The evidence has depicted that epidemic is less generalized and it is concentrated among high risk groups at identified pockets in the country. The evidence also suggests that epidemic is showing downward trends in southern part of country among HRGs viz. Sex workers, among IDUs in Manipur & Nagaland states but is also rising in the pockets where the HIV prevention program remained of low priority. 11 The evidence suggests that this concentrated epidemic has high HIV prevalence among HRGs viz. Sex Workers (5.1%), IDUs (7.2%), MSM & Transgender (7.4%).

The studies obtained for the present study suggests a high percentage of HIV prevalence among HRGs from a range between 3.0 % to as high as 70.0 %, but these are because of the lower number of sample size taken for the respective study. Since majority of these samples are taken from the intervention sites there is chance of selection bias while selecting the sample size and implementing the study. However the availability of such studies are also important to plan preventive interventions at respective site but their results cannot be generalized because non representation of large set of community. This necessitates more representation of the HRGs data, quantitative and qualitative information collected under Behavioural Sentinel Surveillance (BSS) to provide and corroborate with more accurate trends about HIV prevalence in India. Also despite reduction of new HIV infections (by 50% from 2000 to 2009) [28] and reported decline in HIV prevalence among Female Sex Workers, a sustained focus on prevention is required among MARGs and their partner to contain HIV.

In this regard the evidence from HIV Sentinel Surveillance (HSS) and NFHS-3 are more useful and has better representation of the general population and HRGs. These methods have been

scientifically planned and implemented and the data analysis, its interpretation has been made by using scientific statistical tools. However the HIV sentinel surveillance and population based survey viz. NFHS-3 also contain biases, including the under representation of high risk groups, non response from cases, ascertainment bias etc. Thus there is need to either reduce, overcome these biases or at very least recognise it and discuss the same while interpreting the findings of the study.

### LIMITATION OF THE STUDY

For the present essay limited studies have been obtained through search strategy. The epidemiological studies conducted for ascertaining the HIV prevalence especially among HRGs have been found to be very limited. The inferences of the results have been made based on the small sample size and cannot be generalized. Only studies conducted in some pockets have been included and thus comparisons are difficult to make between regions and HRGs. These studies also contain number of biases and have seldom tried to interpret it while sharing the findings of respective study. The epidemiologic information on HIV infection in India is primarily contributed by the annual rounds of HIV Sentinel Surveillance (HSS) especially the data pertaining to HRGs. For the present essay the data from the national HIV Sentinel Surveillance and NFHS 3 has been used mostly due to more authentic and quality information. However these methods have also biases induced in their methodology but have more opportunity of generalizing the results considering the vastness of these studies.

### RECOMMENDATION FOR FUTURE RESEARCH

- 1) Limited number of researches especially among HRGs generates need for conducting more quality researches with adequate sample size considering the possibility of generalizing the findings on the large set of population.
- 2) Most of the studies contain number of biases which is a systematic error in the design or

conduct of a study. Efforts should be there for made to reduce or overcome the bias or the least should be discussed while interpreting the findings.

- 3) Since many of the studies could not be obtained due to limitation of language, there is need to publish research papers for the benefit of researchers and academia considering larger comprehension.
- 4) More pockets of HRGs need to be included in the surveys and studies so that trends of HV prevalence in new pockets can also be ascertained.

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