

Socio-demographic and clinical profiles of HIV (human immunodeficiency virus)-positive patients at an ART (anti-retroviral therapy) centre in western Maharashtra: A cross-sectional study

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ABSTRACT

Introduction: Human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) remains a global health challenge, particularly in developing nations like India, with approximately 2.35 million people living with HIV. Socio-demographic factors, including education and socio-economic status, influence infection rates. This study examines the socio-demographic and clinical profiles of HIV-positive patients at an anti-retroviral therapy (ART) Centre in Maharashtra. **Methodology:** This single-center, cross-sectional descriptive study assessed the socio-demographic and clinical profiles of HIV-positive patients at an ART Centre in Western Maharashtra. The sample included 400 participants aged 18 and above, selected via systematic random sampling. Data were collected through a pre-tested questionnaire covering socio-demographic details and clinical parameters, including CD4 counts and opportunistic infections. Statistical analysis was conducted using Jamovi v4.3.2, with ethical clearance obtained from the institutional ethics committee. Informed consent and data confidentiality were maintained. **Results:** A total of 400 HIV-positive individuals participated in the study, with most aged 21–40 years and a slight female predominance. Half were married, and many had low educational levels, with 308 participants in the upper-lower socio-economic class. Clinical findings showed that 45.5% had a CD4 count of ≤ 200 cells/ μ L, indicating advanced immunosuppression. The majority were in WHO Stage II (41.8%) or Stage III (33.3%), with 48.3% experiencing opportunistic infections, predominantly candidiasis (34.3%). Adverse reactions to ART were reported by 22.3% of participants, highlighting treatment challenges. **Conclusion:** This study highlights the socio-demographic and clinical profiles of HIV-positive patients in Maharashtra, emphasising the need for tailored public health interventions, partner testing, integrated HIV-TB services, and strengthened public-private partnerships, along with robust IEC activities to enhance awareness and promote safer practices.

Keywords: AIDS, anti-retroviral therapy centre, human immunodeficiency virus

Introduction

HIV/AIDS (human immunodeficiency virus, acquired immunodeficiency syndrome) continues to affect a large number of people globally despite the latest developments in its treatment.^[1] World Health Organization estimated that, by the end of 2023, there were nearly 39.9 million people living with

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HIV (PLHIV) worldwide, which is 0.6% adults in the 15–49 age group overall.^[1] As a major global health priority, the HIV/AIDS pandemic has significantly impacted developing nations.^[1] In India, approximately 23.48 lakh PLHIV exist.^[2] HIV weakens the immune system by depleting CD4 cells, increasing the risk of opportunistic infections (OIs) when counts fall below 200 cells/ μ L. Conditions like tuberculosis, candidiasis, and pneumocystis pneumonia commonly arise at this stage. Prompt initiation of anti-retroviral therapy (ART) and monitoring CD4 counts are critical for managing disease progression. The Indian government is making considerable efforts to curb the epidemic by providing free ART to all PLHIV and advocating comprehensive care with an emphasis on high-risk groups.^[3]

Even 45 years after the first case of HIV was detected, socio-demographic inequalities continue to fuel the spread of the epidemic.^[4,5] HIV infection is increasingly concentrated in the poorest and most marginalised sections of society in all countries. The association between HIV/AIDS and socio-demographic and socio-economic factors has thus become a key focus in policy discussions regarding the most effective strategies for containing the epidemic.^[4]

A large proportion of PLHIV come from lower socio-economic backgrounds, including labourers, drivers, and migrants, with many being illiterate or having limited education.^[5-8] Education appears to provide some protection as educated individuals have a better understanding of HIV, adhere to treatment more effectively, and have a lower risk of OIs.^[5-8]

HIV infection disproportionately affects the poorest and most marginalised sectors of society, making socio-demographic and socio-economic factors central to discussions on effective epidemic responses. Understanding the epidemiology of HIV, particularly its link with socio-demographic variables, is key to shaping prevention and control strategies. However, limited research existed on the socio-demographic and clinical profiles of HIV patients in Maharashtra.

Against this background, the current study assessed the socio-demographic and clinical profile of HIV-positive patients attending an ART centre in a tertiary care hospital in western Maharashtra. The objectives were to describe the socio-demographic characteristics of HIV-positive patients and the clinical parameters in HIV/AIDS patients.

Materials and Methods

Study design

A single-centre, cross-sectional descriptive study was conducted to address the objectives of describing the socio-demographic and clinical profiles of PLHIV visiting the ART centre.

Study setting

The study was conducted at a designated ART centre located in a tertiary care hospital in western Maharashtra.

Study population

The study population comprised all HIV-positive patients visiting the ART centre at the tertiary care hospital in western Maharashtra. The inclusion criteria for the study were all confirmed HIV-positive patients registered at the ART centre, aged 18 years and above. The exclusion criteria included HIV-positive patients with mental disabilities.

Sample size

The sample size for this observational study was calculated based on the prevalence^[6] of socio-demographic factors obtained from the literature. To estimate a minimum proportion of 50% at a precision of 5%, at 95% confidence interval, the minimum sample size was required to be 385.^[9] To ensure robustness, we rounded the sample to 400 participants. The software used for calculation was WinPepi.

Sampling method

Systematic random sampling was employed to select participants from those visiting the ART centre. The sampling frame was obtained from the ART centre's database.

Data collection tool

A questionnaire was used as the data collection tool, designed to meet the study objectives. It was developed and pre-tested on a sample of 30 PLHIV visiting the ART centre. This pre-tested, face-validated questionnaire was used for interview and data collection.

In the hospital setting, PLHIV were more accessible and willing to speak openly, creating a safe and trustworthy atmosphere that facilitated reliable data collection.

The interview-administered questionnaire gathered socio-demographic information such as age, gender, religion, marital status, monthly family income, occupation, and whether participants lived in rural or urban areas. It also included questions on transport to the ART centre, toilet location (at home or outside), and methods of waste disposal and water purification at home. Clinical data collected included CD4 count at registration, the presence of opportunistic infections (e.g., candidiasis), and any reported adverse effects. Participants were also asked about their tuberculosis history and WHO clinical classification.

Statistical analysis

Data collected from the interviews were recorded in Microsoft Excel and analyzed using Jamovi v4.3.2. Categorical variables were presented as frequencies and percentages, while continuous variables were summarised as means and standard deviations. Analytical tests were not performed as the study was descriptive in nature.

Ethical clearance

Informed consent was taken from all participants and data confidentiality was assured. This study was cleared by the

institutional ethics committee Armed Forces Medical College, Pune, vide reference number IEC/COMMED/93A/2015.

Results

Table 1 presents study population characteristics. A total of 400 HIV-positive individuals participated, with the majority, 231 (57.8%) aged 21–40 years and 151 (37.8%) aged 41–60 years. Females slightly outnumbered males (215, 53.7% vs 185, 46.3%). Half of the participants (200, 50%) were married, while 95 (23.9%) had never married, depicting HIV-AIDS as a social obstacle to marriage. Occupationally, 188 (47%) were semi-skilled or skilled workers, and 27 (6.8%) were unemployed. Educational levels were low, with 154 (38.5%) having completed middle school, and 54 (13.5%) were illiterate. Most participants (308, 77%) belonged to the “upper-lower” socio-economic class, and 351 (87.8%) were Hindu. Urban residents made up 238 (59.5%) of the sample. Regarding substance use, 101 (25.3%) reported being habitual tobacco users, 122 (30.5%) were current smokers, and 51 (12.8%) were current alcohol drinkers.

Table 2 shows that 216 (54%) of the study subjects were registered at the ART centre through government hospitals, followed by 66 (16.5%) through NGOs, and 45 (11.3%) through STI clinics. This calls for an enhanced referral system and strengthening public–private partnership.

Table 3 highlights that 174 (43.5%) of infections were acquired via heterosexual contact, 77 (19.3%) were linked to commercial sex workers, and 64 (16%) were of unknown origin.

Table 4 presents clinical characteristics of the participants. At registration, 182 participants (45.5%) had a CD4 count of ≤ 200 cells/ μL , indicating advanced immunosuppression. A total of 84 participants (21%) had CD4 counts between 201 and 500 cells/ μL , and 47 participants (11.8%) had CD4 counts greater than 500 cells/ μL . WHO clinical staging revealed that the majority of participants were in Stage II (167; 41.8%) and Stage III (133; 33.3%). A smaller proportion (52) (13%) were in Stage IV, while 48 (12%) were in Stage I, representing mild or asymptomatic infection. OIs were present in 193 (48.3%). The most prevalent OI was candidiasis, affecting 137 (34.3%). Other OIs included genital herpes (47; 11.8%), tuberculosis (41; 10.3%), diarrhoea (33; 8.3%), herpes zoster (16; 4%), and pneumocystis carinii pneumonia (PCP), which was seen in 16 participants (4%). One participant (0.3%) had mycobacterium avium complex (MAC) pneumonia. Adverse reactions to ART were reported by 89 participants (22.3%), highlighting the ongoing challenge to treatment compliance and side effects in immunocompromised states.

Discussion

This cross-sectional study conducted at an ART centre in a tertiary care hospital in western Maharashtra elucidated the

Table 1: Socio-demographic characteristics of the study population

Categories	n (400)	%
Age Group (years)		
≤20	11	2.80%
21–40	231	57.80%
41–60	151	37.80%
>60	7	1.60%
Sex		
Male	185	46.30%
Female	215	53.70%
Marital Status		
Never Married	95	23.90%
Married	200	50.00%
Separated	34	8.50%
Divorced	24	6.00%
Widowed	47	11.80%
Spouse HIV Status	305	100.00%
HIV Positive	247	80.90%
HIV Negative	58	19.10%
Occupation		
Unemployed	27	6.80%
Unskilled Worker	49	12.30%
Semi-skilled Worker	95	23.80%
Skilled Worker	94	23.50%
Clerical/Shop Owner	83	20.60%
Farmer	52	13.00%
Education		
Illiterate	54	13.50%
Primary School	133	33.30%
Middle School	154	38.50%
High School	58	14.40%
Intermediate	1	0.30%
Socio-economic Status		
Lower	5	1.30%
Upper Lower	308	77.00%
Lower Middle	85	21.30%
Upper Middle	2	0.40%
Religion		
Hindu	351	87.80%
Muslim	20	5.00%
Buddhist	10	2.50%
Christian	8	2.00%
Jain	4	1.00%
Sikh	7	1.70%
Residence		
Rural	162	40.50%
Urban	238	59.50%
Alcohol Use		
Social/Occasional	2	0.30%
Never	235	58.80%
Current	51	12.80%
Past	112	28.30%
Smoking		
Social/Occasional	222	55.50%
Never	51	12.80%
Current	122	30.50%
Past	5	1.30%

Contd...

Table 1: Contd...

Categories	n (400)	%
Tobacco Use		
Never	240	60.00%
Social	53	13.30%
Habitual	101	25.30%
Past	6	1.50%

Table 2: Distribution of study subjects based on entry point at ART centre

Entry Point	n	%
OPD Government	216	54.00%
NGO	66	16.50%
STI Clinics	45	11.30%
TB/RNTCP	23	5.80%
Private Practice	21	5.30%
OPD Private	16	4.00%
PPTCT	11	2.80%
Others	2	0.50%
Total	400	100%

Table 3: Distribution of study subjects based on mode of infection

Mode of Infection	n	%
Heterosexual Contact	174	43.50%
Commercial Sex Workers	77	19.30%
Unknown Source	64	16.00%
Intravenous Drug Use (IDU)	20	5.00%
Blood Transfusion	28	7.00%
Homosexual Contact	25	6.30%
Mother-to-Child Transmission	11	2.80%
Unknown	1	0.30%

socio-demographic and clinical profiles of 400 HIV-positive patients.

Socio-demographic profile of HIV-positive patients

Age

Our findings indicate that 35% of patients were of 31–40 years, with an overall mean age of 35 years. Singh A *et al.*^[5] reported a mean age of 35.44 ± 9.66 at Jayarogya Hospital, Gwalior. Most patients were aged between 30 and 45 years, a sexually active and productive age group within a patriarchal social structure. NACO statistics indicate that 89% of cases were in the age group of 15 to 44 years.^[2]

Gender

Gender distribution revealed a near-equal male-to-female ratio (53.8% female, 46.3% male), diverging from male-dominant trends in studies like Joge *et al.*^[6] which reported 68.04% males. This discrepancy may reflect heightened awareness and accessibility to testing for women in our study region, suggesting a shift in gender dynamics in HIV prevalence. While Wal *et al.*^[10] noted higher male attendance at ART centres, our results may

indicate improved awareness motivating more females to seek testing.

Rural versus Urban

Urban residents (59.5%) outnumbered their rural counterparts (40.5%), consistent with Jha *et al.* (2015), who also reported higher prevalence in urban areas. This trend may be attributed to increased migration for work and better access to healthcare facilities in urban settings. Conversely, rural populations face barriers to healthcare access, necessitating improved outreach programs. Jha AK *et al.*^[7] similarly noted a higher proportion of urban residents in their study from North India, while studies in South India indicated 67% of subjects were from rural areas.^[8] Additionally, extended migration for work can remove individuals from family support systems, placing them at increased risk for engaging in risky behaviour.

In our study, 247 (61%) of patients had HIV-positive spouses. Joge Us *et al.*^[6] found that the majority of patients were married (70.53%), with widows (53.12%) outnumbering married women (42.19%). Jayarama S *et al.*^[11] also reported that 70.3% of HIV-positive individuals were married, suggesting many women contracted HIV from their husbands. This trend suggests that men often acquire HIV earlier, resulting in higher rates of widows than widowers.

Education

In our study, 87% of patients were literate, with only 54 (13.5%) being illiterate. Among literate individuals, 38.5% had only completed middle school, and only 14.5% had attended high school, indicating that higher education levels may offer some protection against HIV. Those with lower education may lack adequate knowledge to protect themselves from sexually transmitted diseases. These findings align with Chennaveerappa PK *et al.*^[12] who reported that 32% of male and 45% of female seropositive subjects were illiterate. Nearly half of the patients were semi-skilled (23.8%) or skilled workers (23.5%).

Socio-economic status (SES)

Using the Modified Kuppuswamy scale, we found that 77% of patients belonged to the upper lower class. The connection between lower socio-economic status and HIV vulnerability emphasises the importance of socio-economic interventions to mitigate transmission rates and improve healthcare access.

Referral Sources

The majority of patients were referred to the ART Centre through Government OPDs (54%), followed by NGOs (16.5%) and STI clinics (11.3%). Sharma reported similar trends in a study at a VCTC in Ahmedabad, noting that most referrals came from doctors and NGOs.^[13]

Mode of transmission

The predominant mode of HIV transmission in our cohort was unprotected heterosexual intercourse (43.5%), aligning with

Table 4: Distribution of study subjects based on CD4 count, WHO stage, opportunistic infections, and adverse reactions

Category	n	%
CD4 Count at Registration		
≤200	182	45.50%
201-500	84	21.00%
>500	47	11.80%
WHO Stage		
Stage I	48	12.00%
Stage II	167	41.80%
Stage III	133	33.30%
Stage IV	52	13.00%
Opportunistic Infections		
Candidiasis	137	34.30%
Genital Herpes	47	11.80%
Tuberculosis	41	10.30%
Herpes Zoster	16	4.00%
Diarrhea	33	8.30%
PCP Pneumonia	16	4.00%
MAC Pneumonia	1	0.30%
Total with OIs	193	48.30%
Adverse Reactions due to ART	89	22.30%

findings from Baig *et al.*^[14] This underscores the urgent need for public health campaigns promoting safe sex practices, especially within high-risk populations.

Clinical profile and implications

In our study, 182 patients (45.5%) had a CD4 count below 200, indicating late diagnosis, which aligns with Singh AP *et al.*⁽⁹¹⁾, who also noted late reporting. Most participants were in WHO clinical stage I (348; 87%), similar to Gautam L *et al.*,^[15] who found a majority in stage III. OIs affected 48.3% of our patients, with candidiasis being the most common (137; 34.3%), consistent with Nayak *et al.*,^[16] who reported oral candidiasis as the most prevalent OI.

Most patients (345; 86.3%) maintained the ability to perform usual activities, reflecting functional status reported by Jha AK *et al.*^[7] Alcohol and tobacco use were reported by 26% and 12.8% of participants, respectively, with most citing reduced consumption post diagnosis. Adverse reactions to ART were observed in 22% of patients, with gastrointestinal issues being the most common, similar to the findings of Balasundaram *et al.*^[8] and Nayak *et al.*^[16]

Overall, these findings emphasise the urgent need for targeted educational interventions and socio-economic support for vulnerable populations to enhance health outcomes in HIV-positive patients.

Strengths and limitations

While systematic random sampling provides strength in this observational study, only consenting adults were included; this approach may limit the study by not accounting for estimates in children and younger and unreached populations.

Conclusion

This study contributes valuable insights into the socio-demographic and clinical profiles of HIV-positive patients in Maharashtra. It underscores the need for tailored public health interventions that address educational gaps, enhance socio-economic conditions, and improve access to early testing and treatment. Partner testing is crucial and needs to be advocated especially as many patients are married, indicating increased vulnerability. The study also found HIV-TB co-infection, necessitating integrated services for timely diagnosis and treatment. Strengthening public-private partnerships can be enhanced with a dual referral system. Moreover, robust information, education, and communication (IEC) activities are essential to raise awareness about HIV transmission and promote safer practices.

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Conflicts of interest

There are no conflicts of interest.

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