

Original Articles

HIV testing among adults in a high prevalence district in India

RAKHI DANDONA, S. G. PREM KUMAR, G. ANIL KUMAR, VEMU LAKSHMI,
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ABSTRACT

Background. HIV testing is a key component of HIV control efforts. We examined the distribution of HIV testing in a population-based sample from Guntur district in Andhra Pradesh, which is estimated to have one of the highest prevalence rates of HIV in India.

Methods. A total of 12 994 persons (15–49 years of age) were interviewed in Guntur district. We assessed associations with the uptake of HIV test, place and reasons for undergoing HIV testing and awareness of voluntary counselling and testing centres (VCTC) among sexually active adults.

Results. The age-, sex-, urban- and rural-adjusted prevalence of HIV testing was 21.1% (95% CI: 19.1–23.2). The uptake of HIV test was higher in women (27.2%) than in men (18.8%). Increasing education level, urban area residence and being in an occupation requiring mobility were significantly associated with uptake of the HIV test. A previous test for HIV was reported by 37.8% of men and 30.3% of women. The adjusted prevalence of VCTC awareness was 5.4% (95% CI: 4.3–6.4), being higher in men (9.2%) than in women (3.5%). Among those who had undergone HIV testing, 83.9% of men and 76.2% of women did so at a private sector health facility. Women were significantly more likely to under-go testing at VCTC/public sector facility (23.5%) than men (15%). More men (47.6%) than women (3.3%) reported undergoing testing voluntarily ($p < 0.001$). Women reported pregnancy (57.4%) as the most common reason for undergoing the test.

Conclusion. These population-based data highlight the patterns of HIV testing and their associations. The high proportion of HIV testing in the private sector suggests the need to strengthen counselling in this sector to enhance HIV prevention activities.

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INTRODUCTION

Broadening access to HIV testing and counselling is important for effective HIV prevention and treatment approaches.¹ HIV counselling and testing services are inadequate in the majority of low- and middle-income countries worldwide.² Timely diagnosis of HIV infection is critical for effective medical management as individuals who are diagnosed late respond poorly to therapy and are at increased risk of death. It also offers an opportunity for reducing HIV transmission during the asymptomatic period.³ However, the stigma attached to HIV discourages people from knowing their HIV serostatus.¹

India is a signatory to the Declaration for Commitment on HIV/AIDS. One of the 25 core indicators for its implementation is the proportion of men and women in the age group of 15–49 years and of those most at risk who have had an HIV test in the previous 1 year and know the result of the test.⁴ In 2006–07 in India, 3.3% of men and 3% of women in the age group of 15–49 years, and 34.2% of female sex workers (FSWs), 3%–67% of men who have sex with men (MSM) and 3%–70% of injecting drug users (IDUs) across various locations were estimated to have received an HIV test in the past 12 months and knew the result of the test.⁵

Voluntary HIV counselling and testing (VCT) is a key component of the National AIDS Control Programme (NACP) to limit HIV transmission.⁶ Analysis of HIV prevention interventions in the Indian state of Andhra Pradesh suggest that it is critical to enhance the resource allocation to the voluntary HIV counselling and testing centres (VCTC) and to increase demand for their services for efficient utilization of resources for control of HIV in India.^{7,8} Understanding the dynamics of HIV testing at the population level would assist further planning of HIV control in India. We report population-based data on HIV testing from Guntur district of the state of Andhra Pradesh, which is estimated to have one of the highest prevalence rates of HIV in India.⁹

METHODS

A large-scale, population-based survey was carried out in Guntur district of Andhra Pradesh, India.^{10,11} This study was approved by the Institutional Ethics Committees of the Nizam's Institute of Medical Sciences and the Administrative Staff College of India, Hyderabad, India. It conformed to the Declaration of Helsinki. The detailed methods of this study have been published previously.^{10,11} Methods relevant to this paper follow.

This study was conducted in 32 rural and 34 urban clusters, which were selected using a stratified random method to represent

the adult population of Guntur district.¹⁰ Systematic sampling was done to select households so as to get 200–230 eligible persons 15–49 years of age in each cluster. Using this sampling strategy, a total of 13 838 eligible people 15–49 years of age were identified. Data were collected from September 2004 to September 2005. Trained interviewers obtained informed consent for participation in the study followed by a confidential interview that included documentation of demographic data, detailed history of sexual behaviour, HIV awareness and HIV testing, awareness about VCTC, and collection of a blood sample. Only those participants who reported awareness of HIV/AIDS were asked further questions about HIV testing. We did not ask if the respondent was aware of his/her HIV serostatus or if s/he had undergone HIV testing to avoid the possibility of stigma related to HIV status. Blood samples collected from the participants were tested in a laboratory to determine the HIV serostatus.^{10–12}

SPSS version 15.0 was used for data analysis. The main outcome variable was the prevalence of HIV testing among sexually active men and women (defined as those who reported to have sex ever) who were aware of HIV/AIDS. The overall prevalence of HIV testing and that for the two sexes and urban/rural area of residence is reported. The prevalence was adjusted for age, sex, and rural and urban distribution of the Guntur population based on the census data,¹³ and the 95% confidence interval (CI) of these estimates were adjusted for the design effect (DE) of cluster sampling.¹⁴ Associations of having undergone HIV test were explored by multiple logistic regression model using select demographic and behavioural risk variables including the number of lifetime sex partners, sex with FSW ever, and sex with men ever (for men only) with all variables introduced simultaneously in the model. The standard of living index (SLI) was based on living conditions and ownership of assets adapted from the index used previously by the National Family Health Survey (NFHS) in India,^{15,16} with a higher score denoting a higher living standard. The multiple logistic regression models were run separately for men and women.

We also report the prevalence of HIV testing irrespective of being sexually active, irrespective of being aware of HIV/AIDS, that among sexually active participants irrespective of HIV/AIDS awareness, and the proportion of HIV testing among the participants who were found to be HIV positive in our study. We assessed the awareness of VCTC, and the reason for and place where HIV test was undertaken. For the place of HIV testing, we combined VCTC and public sector facility as VCTC was available only at public sector facilities and the participants used these terms interchangeably. We also compared data on HIV testing in the state of Andhra Pradesh from the NFHS-3 data of 2005–06 for the sexually active population in the age group of 15–49 years.¹⁵

RESULTS

Of the 13 838 people in the age group of 15–49 years recruited for the study, 12 994 (93.9%) were interviewed and 12 617 (91.2%) provided a blood sample. Among those interviewed, 12 622 (97.1%) were aware of HIV/AIDS.

Prevalence of HIV testing

Among the 10 296 sexually active participants (81.6%) aware of HIV/AIDS, 2394 (23.3%) reported having undergone HIV testing—an age-, sex-, urban-, and rural-adjusted prevalence rate of 21.1% (95% CI: 19.1–23.2, DE 6.7). The adjusted rate for women was higher (27.2%; 95% CI: 25.0–29.4, DE 3.5) as compared with that for men (18.8%; 95% CI: 16.0–21.7, DE 6.6), and the rate was

higher in urban (30.3%; 95% CI: 28.6–31.9, DE 1.7) as compared with that for rural areas (17.1%; 95% CI: 14.8–19.4, DE 5.3).

On applying multiple logistic regression, increasing education level, urban area residence and being in transport/field-related occupations were significantly associated with having undergone HIV testing for both men and women (Table I). Being ever married had the highest odds of having undergone HIV testing for females (OR 11.32, 95% CI: 2.66–48.07) followed by the age group of 15–29 years (OR 4.78, 95% CI: 3.93–5.82). The odds of having undergone HIV testing increased with increasing SLI for men but not for women. Sex with FSW ever was significantly associated with having undergone HIV test for men (OR 1.46, 95% CI: 1.26–1.76). The results of multiple logistic regression model for having undergone HIV testing voluntarily for men were similar to those having undergone HIV testing (data not shown).

The overall adjusted prevalence of HIV testing irrespective of being sexually active or aware of HIV/AIDS was 18.9% (95% CI: 17.3–20.5, DE 5.2), and was 15.8% (95% CI: 14.2–17.5, DE 3.2) for men and 21.9% (95% CI: 20.1–23.7, DE 3.2) for women. The overall adjusted prevalence of HIV testing among sexually active participants irrespective of HIV/AIDS awareness was 20.7% (95% CI: 18.7–22.8, DE 6.9), and was 18.6% (95% CI: 15.7–21.4, DE 6.8) for men and 26.6% (24.4–28.7, DE 3.5) for women.

Among HIV-positive individuals

Data on HIV testing were available for 236 of the 241 participants (97.9%) found HIV-positive in this sample, of whom 81 (34.3%) reported having undergone HIV testing earlier. Among the 127 men and 109 women who were HIV-positive 48 (37.8%) and 33 (30.3%), respectively, reported having undergone HIV testing earlier.

Awareness of VCTC

Considering 634 participants (6.2%) who were aware of VCTC, the age-, sex-, rural- and urban-adjusted prevalence of this awareness was 5.4% (95% CI: 4.3–6.4, DE 6.1). This prevalence was higher among men (9.2%; 95% CI: 7.5–10.9, DE 4.2) than among women (3.5%; 95% CI: 2.5–3.4, DE 3.8) and in urban areas (8.7%; 95% CI: 7.2–10.2, DE 3.6) as compared with rural areas (3.9%; 95% CI: 2.9–4.8, DE 3.4).

Place of and reason for HIV testing

Among the 2394 participants who had had HIV testing, the majority of men ($n=753$, 83.9%) and women ($n=928$, 76.2%) reported having undergone the test at a private clinic or hospital (Fig. 1). Women (23.5%) were significantly more likely to have undergone the test at VCTC/public sector facility than men (15%; $p<0.001$). Of the 176 men and 91 women who were aware of VCTC and had also reported having undergone HIV testing, 138 men (78.4%) and 63 women (69.2%) underwent the test at a private clinic or hospital with only 35 men (19.9%) and 28 women (30.8%) having undergone HIV test at VCTC/public sector facility, respectively.

As shown in Fig. 2, the most common reason reported by men for having undergone HIV testing was on a doctor's advice for illness/surgery (51.8%), followed by voluntary testing (47.6%). On the other hand, women reported doctor's advice during pregnancy (57.4%) followed by advice for illness or surgery (38.8%) with a negligible proportion (3.3%) reporting voluntary testing. Men were significantly more likely to undergo HIV testing voluntarily than women ($p<0.001$).

Among the 900 men who underwent HIV testing (Fig. 3), those in the age group of 20–39 years were more likely to undergo the

TABLE I. Association of having undergone HIV test among sexually active population in the age group of 15–49 years with select variables using multiple logistic regression

Variable	Categories	Male (n=4820)			Female (n=5476)		
		Total	Number undergone HIV test (% of total)	Odds of having undergone HIV test (95% CI)	Total	Number undergone HIV test (% of total)	Odds of having undergone HIV test (95% CI)
Age group (years)*	15–19	253	20 (7.9)	1.00	566	211 (37.3)	5.15 (4.00–6.65)
	20–29	1588	330 (20.8)	2.63 (1.56–4.43)	1968	757 (38.5)	4.70 (3.84–5.74)
	30–39	1641	407 (24.8)	2.83 (1.65–4.85)	1718	285 (16.6)	1.51 (1.21–1.87)
	40–49	1338	235 (17.6)	1.68 (0.97–2.92)	1224	149 (12.2)	1.00
Marital status†	Never married	393	69 (17.6)	1.00	39	2 (5.1)	1.00
	Ever married	4427	923 (20.8)	1.12 (0.81–1.56)	5437	1400 (25.7)	11.32 (2.66–48.07)
Education*	No schooling	1414	169 (12.0)	1.00	2561	528 (20.6)	1.00
	Classes 1–12	2822	604 (21.4)	1.55 (1.27–1.88)	2638	762 (28.9)	1.06 (0.91–1.22)
	>Class 12	584	219 (37.5)	2.44 (1.86–3.21)	277	112 (40.4)	2.09 (1.54–2.86)
Place of residence*	Rural	2568	317 (12.3)	1.00	2890	625 (21.6)	1.00
	Urban	2252	675 (30.0)	2.19 (1.86–2.58)	2586	777 (30.0)	1.35 (1.17–1.56)
Standard of living index‡	0–22	2561	378 (14.8)	1.00	2929	700 (3.9)	1.00
	23–29	1168	255 (21.8)	1.37 (1.14–1.66)	1273	362 (28.4)	1.23 (1.05–1.45)
	>29	1091	359 (32.9)	2.03 (1.67–2.49)	1274	340 (26.7)	1.00 (0.83–1.21)
Occupation*	Transport related/field job	1090	287 (26.3)	1.33 (1.12–1.58)	85	24 (28.2)	1.76 (1.05–2.95)
	Begging/sex work	11	3 (27.3)	1.25 (0.37–4.92)	18	4 (22.2)	1.22 (0.36–4.10)
	Unemployed/house work	—	—	—	2520	817 (32.4)	1.64 (1.41–1.90)
	Others	3719	702 (18.9)	1.00	2853	557 (19.5)	1.00
Number of lifetime sex partners§	One	1682	316 (18.8)	1.00	4937	1274 (25.8)	1.00
	More than one	3138	676 (21.5)	1.27 (1.06–1.53)	539	128 (23.7)	1.26 (1.01–1.59)
Male to male sex ever#	Yes	111	32 (28.8)	1.31 (0.84–2.04)	na	—	—
	No	4709	960 (20.4)	1.00	na	—	—
Sex with female sex worker ever*	Yes	1179	320 (27.1)	1.46 (1.26–1.76)	na	—	—
	No	3641	672 (18.5)	1.00	na	—	—

* Chi-square test for significance, $p < 0.001$ for men and women (other than sex with female sex worker). † Chi-square test for significance, $p = 0.122$ and $p = 0.003$ for men and women, respectively. ‡ Chi-square test for significance, $p < 0.001$ and $p < 0.005$ for men and women, respectively. § Chi-square test for significance, $p = 0.024$ and $p = 0.299$ for men and women, respectively. # Chi-square test for significance, $p = 0.030$.

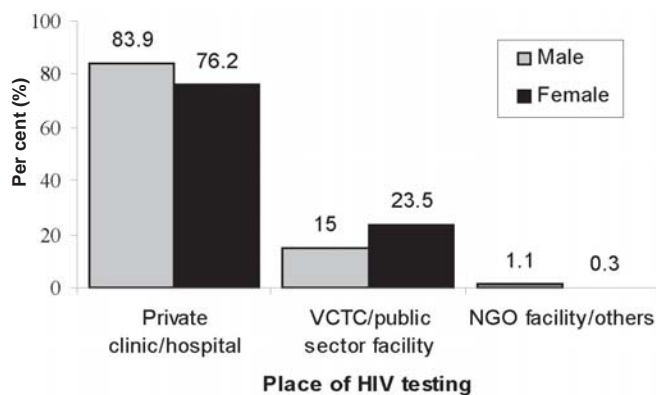


FIG 1. Place of HIV testing for the sexually active population in the age group of 15–49 years. VCTC voluntary counselling and testing centre NGO non-governmental organization

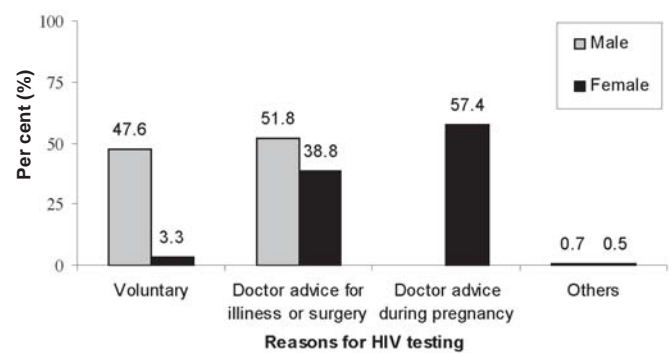


FIG 2. Reasons for undergoing HIV test among sexually active population in the age group of 15–49 years

test voluntarily than those in the age group of 40–49 years ($p = 0.007$). Men belonging to SLI > 29 were significantly more likely to undergo testing voluntarily ($p < 0.001$), whereas those belonging to SLI 0–22 were significantly more likely to undergo the test on a doctor’s advice ($p < 0.001$).

HIV testing in NFHS-3

Among the 9420 (63.5%) sexually active participants in the age

group of 15–49 years who were aware of HIV/AIDS in the NFHS-3 data for Andhra Pradesh, 1113 (11.8%, 95% CI: 11.2–12.5) reported having undergone an HIV test. The prevalence of HIV testing was 10.5% (95% CI: 9.4–11.5) for men and 12.6% (95% CI: 11.8–13.5) for women. Large proportions of men (65.5%) and women (66.8%) in NFHS-3 reported having undergone an HIV test at a private sector hospital/clinic.

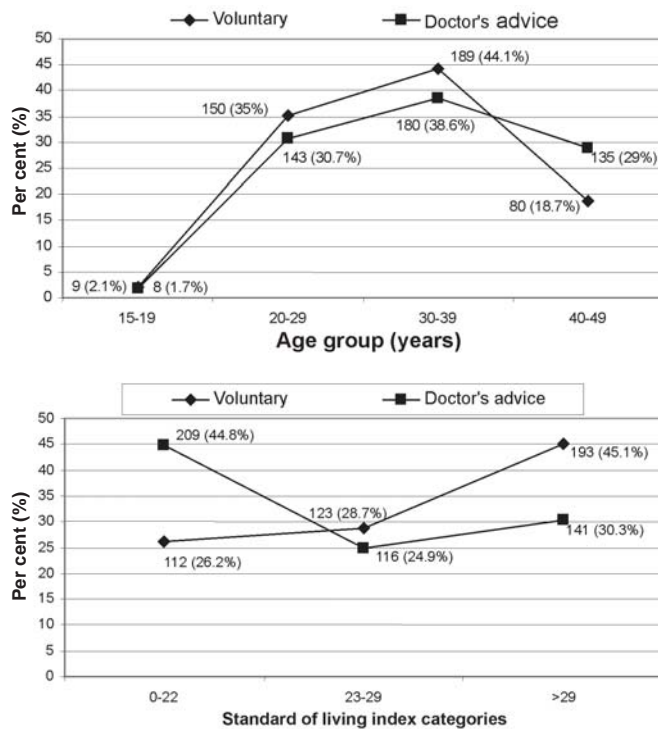


Fig 3. Reasons for undergoing HIV test for sexually active men in the age group of 15–49 years by age group and standard of living index

DISCUSSION

We found the prevalence of HIV testing among the sexually active age group of 15–49 years in Guntur district who were aware of HIV/AIDS to be 21% (women 27% and men 19%), and that irrespective of being sexually active or aware of HIV/AIDS to be 19%. Two-thirds of the participants found to be HIV-positive reported not having undergone HIV testing earlier.

The prevalence of HIV testing in this population was not high. Women and those living in urban areas had significantly higher testing rates as compared with men and those in rural areas. Three in five of the HIV tests in women were undertaken during pregnancy. This may be because of the recent increase in HIV screening in antenatal clinics to prevent mother-to-child transmission of HIV.¹⁷ Men were much more likely to undergo HIV testing voluntarily as compared with women, which could be related to the high risk behaviour for HIV among men including sex with FSW and male-to-male sex. High risk behaviour was the most common reason cited by men for reporting to VCTC in studies done at VCTCs in two Indian cities.^{18,19} The prevalence of HIV testing increased with increasing SLI for men. We have previously reported that the HIV prevalence was higher among people having a lower SLI in this population.¹⁰ These findings highlight the need to increase access to and utilization of HIV testing by people belonging to the lower socioeconomic strata. In our study, the prevalence of HIV testing in the state of Andhra Pradesh in NFHS-3 was lower than that in Guntur district. This difference could be due to Guntur district having one of the highest prevalence rates of HIV in Andhra Pradesh. This difference could also be related to the differences in data collection methods between the two studies. District-level estimates from NFHS-3 data are not reliable due to the small sample sizes in each district.

Only one-third of the participants who had tested positive for HIV in our study had reported having undergone HIV testing earlier. This finding that 2 of 3 HIV-positive people were unaware of their HIV serostatus is of major concern as this has considerable implications on HIV transmission in the population. We could not estimate the UNGASS (United Nations General Assembly Special Session) indicators⁴ from our study as we did not document whether the participants had received their HIV test results. In NFHS-3, only 3.3% of men and 3% of women in the age group of 15–49 years who had received an HIV test in the past 12 months reported to be aware of the test results.⁵

VCT can decrease high-risk sexual behaviour and reduce the rate of sexually transmitted infections,^{20–22} and can form an important link to the health system for individuals to access and utilize disease management options.²³ Major resources have been invested in setting up VCTCs by the National AIDS Control Organization (NACO) over the past few years in India.⁶ In addition, there has been a move to provide VCT and prevention of parent-to-child-transmission services in the same facility in public sector hospitals through integrated counselling and testing centres (ICTCs).²⁴ At the time of data collection for this study in 2004–05 the awareness of VCTC in this population was very poor. This is also reflected in the place of HIV testing reported by those who had undergone HIV testing. Private hospitals outnumbered VCTC/public sector facilities as the place of HIV testing. The latter were utilized mostly by women, which is likely to be related to pregnancy being a major reason for having undergone HIV testing. Even among those who were aware of VCTC, the majority underwent HIV testing at a private health facility. Private hospital/clinic was also reported as the place of HIV testing by the majority in NFHS-3. With the private sector facilities being the preferred place for undergoing HIV testing, efforts are needed for increasing and improving the counselling services at these facilities because it is widely known that counselling pre- and post-HIV test is poor in the private sector.²⁵ The number of ICTCs in Guntur district is now 56 including several at primary health centres, which is much higher than the number of VCTCs in this district in 2004–05.²⁶ It is therefore likely that the awareness about ICTCs could have increased in recent times. We plan to assess the difference in awareness in a follow up study of this population.

Nearly half of the men who had reported having undergone HIV testing, did so voluntarily. Men have been reported to be the main client population utilizing VCTC from two cities in India, and they were significantly more likely to report high risk behaviour, having symptoms, and reconfirming a previous positive HIV test as reasons for undergoing HIV testing.^{18,19} On the other hand, women were more likely to report having a current HIV-positive partner or death of the spouse due to HIV as the reason.^{18,19} Knowledge of the common reasons for which people undergo HIV testing and that of the population groups that undergo testing can provide opportunities to develop specific messages to reach specific population subgroups through mass media campaigns to increase the uptake of HIV testing and VCTC.²⁷ Furthermore, barriers to access to HIV testing will need to be understood in depth at the population level to make services available that are conducive to improve the uptake of HIV testing. In addition to increasing the understanding of provision of VCTC services in private health facilities, feasibility of alternative options such as home-based VCT,²⁸ couple counselling,^{21,29–32} and mainstreaming of HIV VCT services by routine counselling need to be explored.^{33–35}

In a 5-year follow up of this cohort we plan to assess how HIV

testing trends have changed over this period and the associated reasons. These data will complement the findings reported in this paper, providing further understanding about how to strengthen HIV testing and counselling in India.

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CONTRIBUTIONS

RD planned and led the analysis, interpretation and drafting of the manuscript and contributed to the design of the parent study; SGPK and GAK contributed to the analysis and interpretation; VL led the laboratory analysis and contributed to the design of the parent study; and LD conceptualized and designed the parent study and contributed to the data analysis and interpretation in this manuscript. All authors approved the manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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