

# THE PROBABILITY MODEL FOR RISK OF VULNERABILITY TO STDs/OR HIV INFECTION AMONG PRE-MARITAL FEMALE MIGRANTS IN URBAN INDIA

**Himanshu PANDEY**

Department of Mathematics and Statistics,  
D.D.U. Gorakhpur University, Gorakhpur (U.P.), India

**E-mail:** himanshu\_pandey62@yahoo.com

**Kamlesh Kumar SHUKLA**

Institute of Management Studies, Lal Quan,  
Bulandshahar Road, Ghaziabad-201009, National Capital Region, India

**E-mail:**

**Abstract:** *In the study, authors have proposed a mathematical model for unmarried female migrant workers having number of closed boy friends. They are more vulnerable to STDs and HIV transmission. The model is fitted well on the given data and estimate of female migrants having one close boy friend was found maximum. The study based on 362 pre-marital female migrant workers less than 30 years of age in Delhi urban India, while they have wanted lavish life styles and having number rich boy friends.*

**Key words:** *STDs; Vulnerability to HIV; closed boy friend*

## 1. Introduction

India, it is well known that females have been participating equally as males now days. , women have started taking up professional roles and they are now entering new fields such as administration, science, technology, medicine, journalism and etc. We all know that India is a male dominated country, but we should remove this word from our dictionary. Historically, females are totally dependent on the males. Now, we see that females have been migrating on their own irrespective of their martial status. The question arises, why do we need such study? Answer is simple that STDs and HIV/AIDS are increasing. It is not a particular answer of this question. It is major problem of world and not of India. HIV/AIDS is not clearly related to female migrants, it is related to male migrants also, but some how related to migrants. (Reddy, 2004) A study of 120 samples of HIV/AIDS infected people was taken from Sur Sunderlal Hospital, Banaras Hindu University, India; the study reported that about 70% of them were migrants. Now (Jain, et al 2007) National AIDS Control Organization (NACO) estimated around 0.6 million HIV infections in 2002. They also estimated that between 3.8 and 4.5 million Indians were living with HIV/AIDS during 2002, of who around 39 percent were women. The epidemic continues to shift towards women and young people.

According to an estimate of UNAIDS, although HIV prevalence rate is low (around 1 percent), the overall number of people with HIV infection is high. The majority of the reported AIDS cases have occurred in the sexually active and economically productive age group. Earlier men were the main transmitters of the disease but now studies are showing that females are also transmitting the disease to males. A study conducted among 379 HIV-infected people in 1991, reported in the journal of the American Medical Association, observes an evidence of female-to-male transmission.

Women are working in almost all types of jobs, such as technical, professional and non-professional in both private and public sectors. So, the traditional role of women as housewives has gradually changed into working women and housewives (Reddy, 1986; Anand, 2003).

The real world phenomenon indicates three distinct types of female migration (Fawcett et al, 1984) (a) Autonomous female migration: Many middle and upper middle class women migrate to cities for improving their educational credentials and also to get suitable employment apparently in a quest for social advancement and also to enhance their status in the marriage market. Among the semi-literate, young girls migrating to towns/cities to work in export processing units, garment industry, electronic assembling and food processing units is continuously on the increase in the recent years; (b) Relay migration: To augment family income, families which have some land holdings in the rural area, send the daughters to work mostly as domestic servants where they are safe in the custody of a mistress. First the elder daughter is sent out and she is replaced by the second, third and so on, as one by one get married.; (C) Family migration: Here the wife instead of staying back in the village prefers to join her husband in the hope of getting some employment in the destination area. Family migration among agricultural wage labourers who have no land or other assets to fall back at times of crisis is becoming increasingly common. Qian,X;et al.(2005) have also been studied in a large population of young people (age 10-24 years) in the region of Asia and the Pacific. Adjusting to sexual development and protecting their reproductive health are among the greatest challenges for adolescents during this period of transition from childhood to adulthood.

When women get empowered, they benefit themselves and the larger community (Hugo 2000). 'The expansion of women's A capability not only enhances women's own freedom and well-being but also has many other effects on the lives of all. An enhancement of women's active agency can in many circumstances contribute substantially to the lives of all people –men, women and children as well as adults' (Sen, 2001). Hongjie Liu,et al, (2005)have reported in the study, which is as under : the study was to identify risk factors associated with sexually transmitted diseases (STDs) among rural-to-urban migrants in Beijing in 2002. Migrants with STDs consisted of 432 migrants who sought STD care in two public STD clinics. Migrants without STDs included 892 migrants recruited from 10 occupational clusters. Compared to migrants without STDs, migrants with STDs were more likely to report having engaged in commercial sex (selling or buying sex) (odds ratio [OR] \_ 2.70, 95% confidence interval [CI]: 1.71–4.25), multiple sex partners in the previous month (OR \_ 6.50, 95% CI: 3.73–11.32) and higher perceived HIV-related stigma (OR \_ 1.89, 95% CI: 1.30–2.75). Being a migrant with an STD was also associated with female gender (OR \_ 4.10, 95% CI: 2.89–5.82), higher education (OR \_ 2.92, 95% CI: 1.40–6.06), and higher monthly salary (OR \_ 1.68. 95% CI: 1.23–2.29). Migrants with STDs visited their hometowns more frequently and had more stable jobs than migrants without STDs. Approximately 10%

of the migrants with STDs and 7.7% of the migrants without STDs always used condoms. This indicates that among migrants, acquisition of an STD is associated with higher participation in risk behaviors as would be expected, but also with higher perceived stigma, education, stable jobs, salary, and with female gender.

In the Indian context women in the migrant households do play an important role in family survival but unfortunately they remain invisible in the official data because of the way the concepts are defined and data is collected. But the limited research studies that are available in this concern for the earlier periods indicate that these women are exposed more to the risk of sexual harassment and exploitation (Acharya, 1987 and Saradmoni, 1995). Women migrant workers in sugarcane cutting, work almost twenty hours a day (Teerink, 1995) Female labour mostly from Kerala in the fish processing industries in Gujarat are subject to various forms of hardship and exploitation at the hands of their superiors (Saradmoni, 1995).

Among females, the proportion of migrant and non-migrant workers in white-collar jobs was almost similar in 1971 but the same became smaller in 1991 than that of the non-migrant workers. There are more migrant women than the non-migrant women in the category of blue-collar jobs (Premi, 2001). A study conducted by Dholakia and Dholakia (1971) for 20 major Indian states showed that per capita income, average size of households and overall literacy rates were the main factors explaining the variations in female participation rates across the states. Hirsch, Jennifer S. et al. (2002) have collected data on involved life histories and participant observation with migrant women in Atlanta and their sisters or sisters-in-law in Mexico and the reported that both younger and older women acknowledged that migrant men's sexual behavior may expose them to HIV and other sexually transmitted diseases. Younger Mexican women in both communities expressed a marital ideal characterized by mutual intimacy, communication, joint decision making, and sexual pleasure, but not by willingness to use condoms as an HIV prevention strategy.

Involvement, in risky behaviour can have negative repercussions on their health. In the case of unmarried women after marriage this burden of disease may be transmitted to their husbands and children as well (Jain, et al ,2006). Finally, the growing evidence of an association between migration and risky behaviour (UNAIDS and IOM, 1998), as well as the entry of sexually active migrant working women into the urban areas each year (Visaria, 1998), point to a need for a new sense of urgency.

Different types of mathematical models have been used by different statistician to represents the observed phenomenon in a concise form and systematic approach for different group of migrant's households.

A good number of studies took place after models have been proposed to study the pattern of rural out migration of male greater than 15 years of age and total number of migrants (including wives and children) out migration (Iwunor, 1995, Singh, Yadav, 1991 and Shukla and Yadav, 2006).

In the present paper authors have proposed probability model based on the above studies and applied to risk for sexually transmitted infections or HIV transmission or unwanted pregnancies due to change in sexual behaviour of single female migrants. They have wanted to make different closed boy friends and most of them have been taking interest to go out with friends for movies or drama or to restaurants or hotels, while some of them go to night clubs, discos, bars, pubs or attend late night parties.

## 2. Data

The study is based on surveyed of 362 unmarried working women, randomly selected from 12 working women’s hostels in Delhi. The list of the hostels was obtained from Social Welfare Department, YWCA and wardens of the hostels. Details about the data are given in Jain, et al, 2007.

## 3. Model

The present model is based on displaced geometric distribution. Proposed model for the number of closed boy friends to describe the distribution of single unmarried female migrants.

- (i). Let  $\alpha$  be the proportion of female migrants having at least one closed boy friend.
- (ii) Out of  $\alpha$  proportion of female migrants, let  $\beta$  be the proportion of female migrants having only one closed boy friends.
- (iii) Number of closed boy friends attached with female migrants follows a displaced Geometric distribution.
- (iv) Let  $p$  be the probability of closed boy friends attached with young unmarried female migrants, they are more vulnerable to STDs/HIVs infections.

Under the above assumptions, the probability distribution for number of closed boy friends,  $x$  (say) in given by

$$P(x=k) = \begin{cases} 1 - \alpha & \text{if } k = 0 \\ \alpha\beta & \text{if } k = 1 \\ (1 - \beta)\alpha pq^{k-2} & \text{if } k = 2 \end{cases} \quad (1)$$

The above model involves three parameters,  $\alpha$ ,  $\beta$  and  $p$  to be estimated from observed distribution of female migrants.

These are estimated by equating theoretical frequencies to the observed frequencies of first and second cells and theoretical mean to the observed mean

i.e.  $1 - \alpha = \frac{N_0}{N}$   
 $\alpha \beta = \frac{N_1}{N}$  and  
 $\alpha \beta + (1 - \beta) \alpha ((1-p)/p) = \text{mean } (x)$

## 4. Result and discussion

The table -A shows that the distribution of observed and expected number of young female migrants and their number of closed boy friends. The value of  $\chi^2 = 7.67$  was found insignificant at 1% level. This indicates that proposed model fitted well to the distribution of female migrants. An estimate of the proportion of female migrants having only one closed

boy friend was found very low (0.4364) in comparison to having at least one closed boy friend (0.8039). While, most of the young female migrants believe that their friends watch pornographic material such as blue films, sexy material on the internet, pornographic magazines, posters, photos, etc. and some of them agreed that they had exposure to pornographic material and more often on their computer or DVD player with their friends. Fewer knew that condom use can prevent STDs and HIV/ AIDS. Majority of respondents (86%) did not feel that a healthy looking person could have AIDs (Jain, et al 2007). This study indicates that number female (0.8039) migrants are having close boy friends. They are more vulnerable to STDs and HIV/AIDS. The first sexual event has clear health implications, since it marks initiation into the sexual act which if unprotected, and carries a risk of adverse outcomes such as unplanned pregnancy, HIV and sexually transmitted infections (Wellings et al. 1994).

**Table 1.** Observed and Expected numbers of unmarried single female migrants according to their close boy friends

No. of closed boy friends	Observed	Expected
0	71	71
1	127	127
2	60	93.4
3	55	40.5
4	19	17.7
5+	10	12.4
Total	362	362

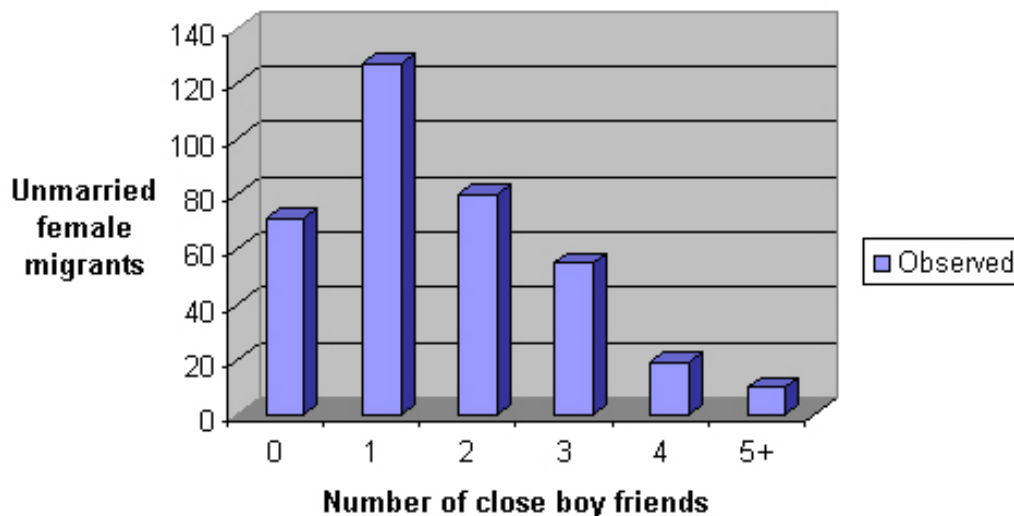
$$\chi^2 = 7.67$$

$$\alpha = 0.8039$$

$$\beta = 0.4364$$

$$p = 0.5691$$

$$d.f. = 2$$



**Figure 1.** Number of close boy friends and associated with unmarried female migrants

## 5. Conclusions

A model is proposed and tested a set of data on the number young unmarried female migrant workers less than 30 years of age having number of closed boy friends. They are closely attached with their boy friends. Proposed model is fitted satisfactorily. An estimate of female migrants having at least one boy friend has been found maximum, it is two times than female migrants having one closed boy friends, Hence increasing the living and working condition and they need adequate support should be provided to single young migrants women that might be make them vulnerable to STDs and HIV/AIDS infection.

## References

1. Anand, N. **Working Women: Issues and Problems**, *Yojana*, 47, 3, 2003, pp. 11-14
2. Binoy, A. **Beyond Bricks and Stone**, PRIA, New Delhi, 1987
3. Breman, J. **Of Peasants Migrants and Paupers: Rural Labour Circulation and Capitalist Production in Western India**, Oxford University Press, New Delhi, 1985
4. Brown, T. **The Asian Epidemic model: a process model for exploring policy and programme alternatives in Asia**, *Sex Transm. Infect.*, Vol. 80, 2004, pp. 19-26
5. Dholakia, B. H. and Dholakia, R. H. **Interstate Variations in Female Labour Force Participation Rates in India**, *Journal of Labour Economic*, 1978
6. Fawcett, J. T., Khoo, S. and Smith, P. C. **Women in the Cities of Asia: Migration and Urban Adaptation**, Westview Press Boulder Colorado, 1984
7. Hirsch, J. S. et al. **The Social Constructions of Sexuality: Marital Infidelity and Sexually Transmitted Disease-HIV Risk in a Mexican Migrant Community**, *American Journal of Public Health*, Vol. 92, No. 8, 2002, pp. 1227-1237
8. Hongjie, L. et al. **Risk Factors for Sexually Transmitted Disease among rural to urban migrants in China: Implications for HIV/ Sexually Transmitted Disease Prevention**, *Aids Patient Care and STDs*, Vol. 19, No.1, 2005
9. Hugo, G. **Migration and Women's Empowerment**, in H. B. Presser and G. Sen (eds.), *Women's Empowerment and Demographic Processes*, Oxford University Press, 2000
10. Iwunor, C. C. O. **Estimating of parameter of the inflated geometric distribution for rural out migration**, *Genus*, Vol. L1(3-4), 1995, pp. 253-260
11. Jain, R., Gupta, K. and Singh, A. K. **Sexual Risk Behaviour and vulnerability to HIV infection among young Migrant Women Workers in Urban India**, accessed on July 17, 2007, online source: <http://paa2007.princeton.edu/download.aspx?submissionID=72114>
12. Mahendra, P. K. **Who Migrates to Delhi**, *Demography India*, 30 (1), 2001, pp. 49-59
13. Qian, X., Tan, H., Cheng, H. and Liang, H. **Sexual and reproductive health of adolescents and youths in China: a review of literature and projects from 1995-2002**, World Health Organization Western Pacific Region, 2005
14. Reddy, C. R. **Changing Status of Educated Working Women-A Case Study**, B. R. Publishing Corporation, Delhi, 1986
15. Reddy, D. C. S. **Prevention of HIV/AIDS in Uttar Pradesh**, organized by the state Innovations in Family Planning Services Agency (SIFPSA), U.P. State AIDS control Society and the Policy Project, The Futures Group International, Agra, January 29-31, 2004
16. Rensje, T. **Migration and its impact on Khandeshi Women in the Sugarcane Harvest**, in Schenk Sandbergen, S. (ed.) "Women and Seasonal Labour Migration", IDPAD Sage New Delhi, 1995

17. Saradmoni, K. **Crisis in the Fishing Industry and Women's Migration: The Case of Kerala**, in Schenk Sandbergen (ed.), *Women and Seasonal Labour Migration*, IDPAD Sage, New Delhi, 1995
18. Sen, A. **Many faces of Gender Inequality**, *Frontline*, Vol. 18, No. 22, Oct/Nov, 2001
19. Shukla, K. K. and Yadava, K. N. S. **The distribution of number of migrants at the household level**, *Journal of population and social studies*, Vol.14, (2), Jan 2006
20. UNAIDS and IOM **Migration and AIDS**, *International Migration* 36, 4, 1998, pp. 445-466
21. Visaria, P. **Urbanization in India: Retrospect and Prospect**, Unpublished typescript, 1998
22. Wellings, K., Field, J., Johnson, A. and Wardsworth, J. **Sexual behaviour and Lifestyle in Britain: The national survey of sexual attitudes and lifestyles**, Penguin Books Ltd, London, England, 1994