Utility of Prevention of Parent-to-Child Transmission (PPTCT) Programme data for HIV surveillance in general population

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Background & objective: HIV sentinel surveillance (HSS) among antenatal clinic (ANC) attendees is used to monitor HIV trends in general population. Recently, information on HIV infection has also become available from prevention of parent-to-child transmission (PPTCT) programmes. Systematic appraisal of routinely collected programme data is needed for choosing a scientific, cost-effective, and ethical surveillance strategy. In this study HIV prevalence estimates obtained from PPTCT programme and HSS were compared to find out the utility of PPTCT programme data for HIV surveillance.

Methods: The data of HSS and PPTCT programme were obtained from National AIDS Control Organization, New Delhi. A list of PPTCT programme sites where ANC HSS was also conducted during 2005 to 2007 was prepared. HIV prevalence and 95 per cent confidence interval (CI) were estimated from antenatal attendees in PPTCT and HSS. Correlation coefficient of HIV prevalence in PPTCT and HSS was also examined according to the level of HIV test acceptance in PPTCT programme. Pregnant women presenting directly for labour in PPTCT centers were not included in the analyses.

Results: In 2007, HIV test acceptance ranged from 8 to 100 per cent (average 76%) in 372 sites where both PPTCT and HSS were carried out. HIV prevalence was similar in the PPTCT (0.68%, 95% CI 0.66%, 0.70%) as compared to the HSS (0.61%, 95% CI 0.58%, 0.66%). Overall the correlation of HIV prevalence between PPTCT and HSS was quite high at state level (r = 0.9) but low at district or site level (r = 0.6).

Interpretation & conclusions: HIV prevalence estimates among pregnant women in PPTCT program were similar to that of ANC HSS. Routinely collected PPTCT program data therefore has potential for providing reliable HIV time trends in various states of India.

Key words Antenatal - HIV - parent-to-child transmission - prevalence - sentinel surveillance - UAT
appraisal of the PPTCT programme data is needed for choosing a scientifically sound and cost-effective surveillance strategy.

Ethical issues are likely to complicate the programme operations in near future. Women who do not volunteer for HIV testing in the PPTCT programme but are found to be positive in unlinked anonymous testing (UAT) in the HSS sites miss the opportunity and benefits of receiving anti-retroviral drugs. Moreover, there is duplication of HIV testing during sentinel surveillance at least for women who accept the testing offered by PPTCT programme. Hence, sharing of test results by the PPTCT programme to HSS, at least for those who have opted for testing, could be a better way of utilizing scarce resources. Other advantages of using PPTCT data for HIV surveillance include better geographic coverage as the number of PPTCT sites is usually more than the HSS, and the precision of the prevalence estimate from PPTCT sites could also be higher as the number of pregnant women tested in PPTCT is much more than the HSS.

HIV prevalence estimates from prevention of mother-to-child transmission (PMTCT) programmes have been compared to that of UAT in antenatal clinics (ANC)\(^1\)\(^-\)\(^6\). In some of these studies, HIV prevalence among women participating in the PMTCT programme was found to differ from those who did not participate\(^4\)\(^-\)\(^6\), while in other studies the opposite was observed\(^2\)\(^-\)\(^3\). Key concern still remains about the validity of HIV prevalence estimates derived from PPTCT sites particularly when HIV prevalence and test acceptance are low. Hence, this study was carried out to compare the HIV prevalence estimates obtained from PPTCT and HSS in India to examine the utility of PPTCT programme data for HIV surveillance.

**Material & Methods**

The HSS and PPTCT programme data were obtained from the National AIDS Control Organization (NACO), Government of India, New Delhi. HSS data were available at individual level but the PPTCT data existed at site level in aggregated form. These data sets did not contain any personal identifiers when released by NACO for statistical analysis.

In India, the ANC HSS sites are chosen from public health facilities keeping in view geographic representation, availability of required sample size and the existence of infrastructure for blood specimen collection, storage and transportation to the laboratory\(^7\). A consecutive sample of 400 pregnant women was taken from those who attended ante-natal clinics first time in their pregnancy during a three month period when surveillance was conducted (usually from October to December). Their socio-demographic information was collected on a questionnaire. Coded blood specimens were sent to the testing laboratories in the State for HIV testing using a two test strategy (ELISA-rapid/rapid-rapid) in such a way that the test result cannot be linked to the woman. Every surveillance site and laboratory was inspected at least once during the surveillance round to assess the quality. All HIV positives and 5 per cent of the negative specimen were sent to reference laboratories for quality assurance. Since 1998, the number of ANC HSS sites has increased from 92 to 646. Of the 608 districts in the country, 474 had at least one site, and 245516 pregnant women were tested in 2007.

The PPTCT programme, started in 2002, utilizes 4567 Integrated Counselling and Testing Centers (ICTCs)\(^8\) largely located in public sector hospitals. Provider-initiated counselling and testing (opt-out) strategy is followed. Personal identifiers are recorded in a confidential register. The socio-demographics and test results are entered in another register, which identifies women only by a unique Personal Identification Digit. The data are aggregated in a monthly site report, which is electronically transmitted to NACO. A client is declared HIV positive when all the three tests are found positive (same blood specimen is tested three times by different rapid kits). Every quarter 20 per cent of the HIV positives and 5 per cent of the negative specimen are sent to reference laboratory for quality assurance. Site performance is assessed by district supervisors at least once every month. Only NACO approved kits are used in the HSS and PPTCT programme. The number of PPTCT sites increased from 1896 in 2003 to 2974 in 2007. During this period reporting has improved from about 5 per cent to nearly 70 per cent. The acceptance of HIV testing improved from 27 per cent in 2003 to 74 per cent in 2007. PPTCT centers tested 2558104 pregnant women in 2007.

Out of the 827 PPTCT sites, 750 sites that had PPTCT programme as well as ANC HSS during 2005 to 2007 were included in the analysis from 27 States of India. The data for year 2002 to 2004 were not included as the number of sites, where both PPTCT and HSS were conducted, was too few to have a valid comparison. Reported data were checked for quality, *i.e.*, range and consistency checks. In PPTCT data, 77 sites (9 in 2005, 32 in 2006 and 36 in 2007) were excluded due to data recording or reporting errors such as numerators more
than the denominators, etc. Pregnant women presenting directly for labour in PPTCT centres were also not included in the analyses. Scatter plots of HIV prevalence from PPTCT and ANC HSS were examined at the State, district, and site level, and also according to the level of HIV test acceptance and Pearson’s correlation coefficients were calculated. HIV prevalence and 95 per cent confidence interval (CI) was estimated from PPTCT and ANC HSS data from year 2005 to 2007.

Results & Discussion

On an average, during 2005-2007, HIV test acceptance ranged from 66 to 72 per cent, although large variations in test acceptance existed between the States (7% to 100%). Overall, HIV prevalence in the PPTCT was similar to that of HSS (Table). The correlation of HIV prevalence between PPTCT and ANC HSS was higher at the State level (r = 0.9) than at the district or site level (r = 0.6). The correlation was very low (r = 0.1) in sites where less than 50 per cent pregnant women had accepted HIV test.

Only 134 sites had PPTCT as well ANC HSS in 2005 which increased to 317 sites in 2006 and 376 sites in 2007. As the number of sites increased where both PPTCT and ANC HSS were carried out, the HIV prevalence in PPTCT and ANC HSS has come more closer to each other (Table). The correlation between HSS and PPTCT were high at State level compared to the district or site level. Lower correlation at district and site level could be due to sampler size for HSS at the site and district level, although PPTCT tested larger number of pregnant women at each site and district. In HSS, the sample size tested at a site or district (most districts have only two sites) is only 400-800 whereas in each of the States there are several sites, hence, at State level aggregation of sites leads to larger sample size, e.g., if a State has 30 districts, the sample size at State level would be 12,000 to 24,000.

HIV prevalence in HSS and PPTCT also tends to come closer as the test acceptance increases in PPTCT. At less than 50 per cent acceptance the correlation at site level was 0.1 which improved as the acceptance level increased. HIV test acceptance rates are exceptionally high in Thailand where most women have ANC check up in public facilities. In Kenya, comparison within the same clinics that had both UAT surveillance and PMTCT programme revealed median HIV prevalence of 12.8 per cent in UAT surveillance and 14.4 per cent in PMTCT, when only 48 to 69 per cent women accepted testing in PMTCT programme. The age-adjusted HIV prevalence from UAT and PMTCT were found to be similar (11.1 and 10.9% respectively) in northern Uganda. In Botswana also, HIV prevalence estimates from UAT and PMTCT did not differ significantly by age-group or geographic regions. Thailand has started using PMTCT data for ANC HSS system as the HIV prevalence in the two sources was found to be comparable. In India, representativeness of PPTCT is likely to increase further in future as PPTCT programme coverage and HIV test acceptance increase.

In Kenya, Ethiopia and Zimbabwe, HIV prevalence among women participating in the PMTCT programme differed from those who did not participate. Selection bias, if any due to refusal of HIV test, could not be evaluated in this study as individual-level data on socio-demographic characteristics related to HIV were not available. In routinely collected programme data quality and complete reporting can be a problem. In 2007, only about 70 per cent PPTCT centers sent complete monthly reports. High workload in the PPTCT programme may also compromise the quality of data recording. Range and consistency checks showed that data of some sites was unreliable indicating that PPTCT data were not routinely checked for errors. However, such errors can be rectified easily by checking the quality of the reports, and ensuring

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of sites</th>
<th>Average PPTCT acceptance %</th>
<th>Data source</th>
<th>No. of pregnant women tested</th>
<th>HIV prevalence %</th>
<th>95% confidence interval</th>
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<tr>
<td>2005</td>
<td>125</td>
<td>72</td>
<td>HSS</td>
<td>49081</td>
<td>0.79</td>
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<td></td>
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<tr>
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<td>HSS</td>
<td>111394</td>
<td>0.81</td>
<td>0.75, 0.86</td>
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<td>PPTCT</td>
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<td>0.75</td>
<td>0.72, 0.77</td>
</tr>
<tr>
<td>2007</td>
<td>340</td>
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<td>HSS</td>
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<td>0.61</td>
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<td></td>
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<tr>
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<td>HSS</td>
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<td>0.72</td>
<td>0.69, 0.75</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>PPTCT</td>
<td>1556728</td>
<td>0.70</td>
<td>0.69, 0.72</td>
</tr>
</tbody>
</table>
that each site reports regularly. As PPTCT programme has a large number of sites and tests a large number of women each year, it is well suited to provide reliable HIV trends at district level provided quality is maintained. ANC HSS sites test a small sample of women (only 400 to 800 per district) which may not provide reliable time trends at district or sub district level.

Another question is whether PPTCT programme data can predict HIV prevalence in general population. Estimates from ANC attendees may be biased as these women are younger, sexually active, fertile, and seek care in public facilities. However, surveillance data from ANC can be used for monitoring HIV trends. It has indeed been used for estimating HIV prevalence in the general population. In India, National Family Health Survey has reported lower prevalence in the community than that derived from ANC HSS. Hence, to reduce potential biases introduced by a single data source, triangulation of multiple data sources such as population-based demographic and health surveys, sentinel surveillance among high risk groups, and ANC clinic attendees including PPTCT programme data should be used for estimation of HIV prevalence trends in general population.

To conclude, PPTCT programme data have potential of providing HIV prevalence trends at district and sub district level in India. As the programme coverage expands and its quality improves, it is likely to have more precision and representativeness than the ANC HSS data. PPTCT programme should consider computerization of individual-level data on socio-demographic characteristics that are related to HIV so that bias, if any for test acceptance can be evaluated and adjusted in the analysis.

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References


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