

RESEARCH ARTICLE

Index testing among HIV-positive patients is feasible and successful in identifying additional HIV infections in Pakistan

Arshad Altaf,¹ Syed Sharaf Ali Shah,² Safdar Pasha,³ Altaf Ahmed Soomro,⁴ Nazia Farrukh,⁵ Rafiq Khanani⁶

Abstract

Objective: To assess the feasibility of index testing approach to test the parents and siblings of human immunodeficiency virus (HIV)-positive children, and identify HIV-positive individuals.

Methods: The study was conducted at Ratodero, Pakistan. Study participants were enrolled from September 2019 to February 2020. The list of HIV-positive persons was provided by the Sindh AIDS Control Programme. Families of 706 HIV-positive persons were approached and all of them agreed to participate. The first test was performed by trained outreach workers. All those with a reactive first test were transported to the nearest health facility for further testing and confirmation. Mothers and siblings were tested at home while additional visits were carried out to reach the fathers.

Results: A total of 1766 persons were tested through HIV index testing. Biological siblings accounted for 81% of the contacts. We were able to test 413/463 (89.2%) mothers, 232/413 (56.2%) fathers and 1121/1392 (80.5%) siblings. Out of these, 7 mothers (1.7%) and 22 siblings (2.0%) were confirmed to be HIV-positive, while no one was found to be positive among the fathers. The overall HIV prevalence was 1.6% (29/1766). All HIV-positive persons were guided for treatment and care.

Conclusion: Results indicate that index-testing approach is feasible in Pakistan to expand HIV testing services through home visits.

Keywords: Human immunodeficiency virus, HIV, HIV testing, Pakistan, Index testing, HIV outbreak, Prevalence. (JPMA 71: S-6 [Suppl. 4]; 2021) DOI: <https://doi.org/10.47391/JPMA.0001>

Introduction

Pakistan is facing multiple challenges to contain the human immunodeficiency virus (HIV) epidemic in the general as well as within the key population. The HIV response has not made effective impact among those who are most vulnerable, and the low-risk population is affected by the epidemic more frequently. The HIV outbreak among children and women which occurred Ratodero in April 2019 is one such example.^{1,2}

A large proportion of people living with HIV (PLHIV) do not have access to antiretroviral drugs (ARVs) even though ARVs are available freely at multiple health facilities in the country. In 2018, there were 160,000 PLHIV in Pakistan and only 14% knew their HIV status and 10% were on ARVs. The 90-90-90 targets require that, by 2020, 90% of people living with HIV will know their HIV status, 90% of people who know their HIV-positive status will be accessing treatment, and 90% of people on treatment will have suppressed viral loads. In terms of all PLHIV, reaching the 90-90-90 targets means that 81% of PLHIV are on

treatment and 73% of them are virally suppressed.³

Historically the epidemic in Pakistan was confined among key population including people who inject drugs (PWIDs), male sex workers (MSWs), men who have sex with men (MSM), transgender (TG) and female sex workers (FSWs).⁴ Children in Pakistan had not been an affected population till April 2019 when an HIV outbreak was reported from Ratodero, which is a small town 28 kilometres away from Larkana. HIV testing following the confirmation of the outbreak among children in Ratodero led to testing of 31,239 individuals in the area and 930 (3%) were confirmed to be HIV-positive, out of which 763 (82%) were children (less than 16 years) and 604 (79%) of these were five years or younger.¹ The outbreak investigation by a team of international experts from the World Health Organization (WHO) supported by Pakistan Field Epidemiology Training Program (PFETP) and Sindh Acquired Immunodeficiency Syndrome (AIDS) Control Programme identified iatrogenic transmission via unsafe injection practices and poor infection control as the most likely driver of the outbreak.⁵

Larkana, a rural town in the Sindh province, has encountered three HIV outbreaks at different times. The first one occurred in 2003 among PWIDs. Seventeen PWIDs out of 175 (9.7%) were confirmed to be HIV-

¹Independent Consultant, Karachi, (Staff member in the WHO Eastern Mediterranean Regional Office in Cairo, Egypt), ^{2,4-6}Bridge Consultants Foundation, Karachi, ³World Health Organization, Islamabad, Pakistan.

Correspondence: Arshad Altaf. Email: arshad.altaf@gmail.com

positive.⁶ In the second outbreak in 2019, 19 out of 20 (95%) dialysis patients were found to be HIV-positive.⁷

After the HIV outbreak in Ratodero, a community engagement project was initiated to educate and counsel the affected community, link HIV-positive children and adults to care and treatment, and support and follow up for ARV adherence and prevention of loss-to-follow-up. Majority of mothers whose children were diagnosed as HIV-positive did not know their HIV status.

According to WHO, index testing is often referred to as index case, index patient or index partner HIV testing. This is a focused HIV testing service (HTS) approach in which the household, family members (including children) and partners of people diagnosed with HIV are offered HTS.⁸ This study was conducted to test the feasibility of using index testing approach to test the parents and siblings of HIV-positive children, identify HIV-positive individuals and link them to treatment, care and support in Ratodero, Pakistan.

Methods

Bridge Consultants Foundation was subcontracted in June 2019 to implement this project in Ratodero, Pakistan. Bridge is a non-governmental organisation (NGO) registered as a trust in Pakistan since 2004. It works in prevention and control of communicable diseases including HIV and tuberculosis. Index clients were identified from two sources: 1) through the list of HIV-positive persons diagnosed through HIV testing initiatives provided by the Sindh AIDS Control Programme; 2) visits of homes in the community by outreach workers of the project. The data was collected from 1st September 2019 till 20th February 2020.

Implementation site

Ratodero is a small town with an estimated population of 150,000-200,000. It is also a taluka situated in district Larkana of Sindh province. A 'taluka' is a term used for any administrative unit within a district in Sindh province of Pakistan. The approximate population of Larkana district is 1.5 million persons.⁹ The average household size in Ratodero has been documented as 8.5 persons and approximately 55% of the population lives below the poverty line.¹⁰

HIV index testing process

The mobile team comprising of a trained female counsellor and male laboratory technician offered free HIV testing to mothers, fathers and siblings of HIV-positive children who did not know their HIV status. Home visits were conducted by the project team. In instances where fathers/husbands

were not available and had gone out for their livelihood, another attempt was made. If they could not be contacted on the second home visit, they were traced by going to the agriculture fields. After getting informed consent from the participants, a drop of blood was obtained under aseptic conditions by pricking the index finger. The test was conducted using Alere™ HIV Combo rapid diagnostic testing kit prequalified by WHO. Privacy and confidentiality was ensured during the process. Details of each individual was collected in a register which remained accessible to the person collecting the data during the day time, which she/he would bring it back to the site office and keep in a locked drawer, which was accessible by her/him and the project manager. Each household had at least one room which was used for pre- and post-test counselling. The project's van was used for this purpose for males who were tested in the fields. Those who tested negative were counselled and reassured. Those whose first test was reactive were transported in the project vehicle to HIV testing and treatment centre of Ratodero taluka hospital for confirmatory tests. If the family was residing in Ratodero town it took approximately 15 minutes to transport the person to the health facility for further testing. If the family was residing in villages around Ratodero town, it took 30-40 minutes to transport the person to the health facility. The other two tests could not be performed in the field according to the instructions from the Sindh AIDS Control Programme — each positive person had to be brought to the health facility.

Further two tests were performed using SD Bioline HIV-1/2 3.0 and Uni-Gold™ HIV rapid diagnostic kits which were also WHO prequalified. Individuals reactive on all three tests were diagnosed as HIV-positive and were registered for treatment at Ratodero ARV centre on the same day. The whole index testing process was monitored by the project manager on regular basis.

Ethics

The data was collected with help of list of HIV-positive children provided by the Sindh AIDS Control Programme. Informed consent was obtained before the home visit from all PLHIV who were identified as index clients and their parents. Informed consent was also obtained from all those who were tested for HIV in the index testing model. Consent was taken from the parents or guardians of the children present at the homes. Ethical clearance for the study was obtained from the Ethical Review Committee of Bridge Consultants Foundation.

Results

A total of 726 index clients were identified during

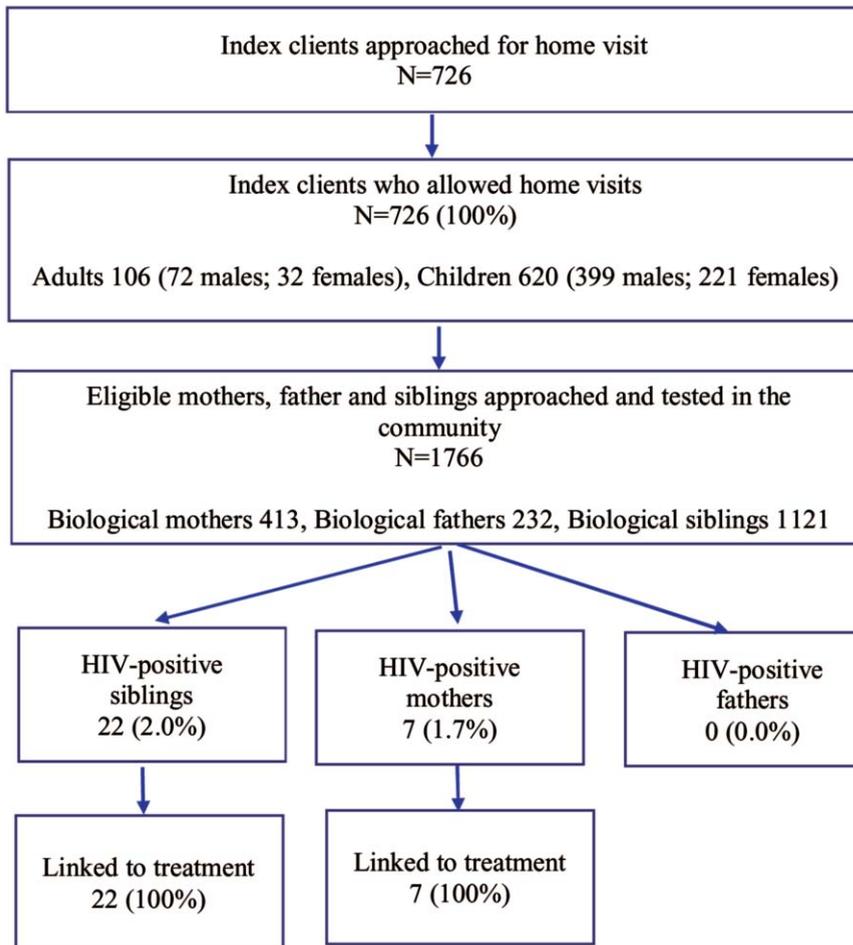


Figure-1: Testing services utilising the human immunodeficiency virus (HIV) index testing approach.

September 2019 and February 2020. Out of these 726, 106 were adults and 621 were children. A total of 463 mothers, 404 fathers and 1392 siblings of the index contacts had not been tested for HIV previously. The index contacts were contacted and consented for HIV testing and home visits. Home and community field visits helped in testing 413/463 (89.2%) mothers, 232/404 (56.2%) fathers and 1121/1392 (80.5%) siblings. Out of these 1766 clients seven mothers (1.7%), 22 siblings (2.0%) were confirmed HIV positive (Figure-1). The age range of the HIV-positive mothers was 18-36 years, while those of siblings was 3 months to 14 years. Of the siblings, 11 were males and 11 were females. None of the fathers were HIV-positive. The overall HIV positivity was 1.6% (29/1766).

There were no refusals for the testing. However, some fathers could not be tested because of their absence at home at the time of mobile team visit, as majority of the men worked during the day time.

The husbands of six HIV-positive mothers were HIV-

negative. One could not be traced as he was out of the country for work.

Discussion

The study demonstrates that HIV index testing approach is feasible in Pakistan to provide HIV testing services to families including parents and siblings through home visits, as has been done in the past in Lesotho and Kenya.^{11,12} There were no refusals in our study. Another important finding was that while HIV-positivity rate among index contact siblings (2.0%) and mothers (1.6%) was high, it was zero among fathers.

A few important findings have to be highlighted and questioned. First question is that mothers were found to be positive, while none of the fathers have been, even though 89% of the mothers and 57% of the fathers of HIV-positive children were traced. The husbands of six HIV positive mothers were HIV-negative while one could not be traced as he was working out of Pakistan. While we did not ask any questions related to sexual practices, we want to cautiously state that these HIV-positive women did not seem to have any other partner besides their husbands. In spite of our best efforts which comprised of two home visits and two visits of the agricultural fields outside of home community visits to trace the fathers, we were able to get hold of a little over half of them. It is possible that the remaining were working in localities beyond our project's outreach hence were missed.

One of the key risk factors identified during the 2019 outbreak was exposure to unsafe therapeutic injections.⁸ In a paper published in 2019 WHO had presented findings of a review of injection practices based on Demographic Health Survey (DHS) data of 42 countries.¹³ One of its important findings was that women tend to receive more injections and while the annual number of unsafe injections reduced in 81% of countries, in Pakistan the number of unsafe injections was the highest and did not decrease between 2006 and 2012. The paper also reported that the number of unsafe injections was one of the highest in Pakistan among 16 countries and among females, unsafe injections did not change substantially between 2006 and 2012 (0.71 per person per year and

0.80 per person per year, respectively).¹³

Janjua et al had estimated the prevalence and risk factors associated with hepatitis C infection among men and women in Karachi. In their findings, they had reported that among women, hepatitis C infection was significantly associated with increasing age, ethnicity, having received \geq two blood transfusions [adjusted odd ratio=2.32], \geq five injections [adjusted odds ratio=1.47], \geq three hospitalisations and dental treatment. While the risk factors for men were extramarital sex, at least once a week shave from barber, hospitalisation and increasing age.¹⁴ We spoke with two family physicians who work as general practitioners (GPs) in an urban setting. Anecdotal evidence (after speaking to two GPs) suggests that women tend to visit GPs more compared to men because they also take small children to GPs while their husbands are away earning a livelihood. It is quite possible that during those visits women also seek healthcare for their problems and this could be one of the reasons that they receive more therapeutic injections or intravenous infusions.

What is perplexing is why there is low infectivity among fathers of index cases even though we were able to trace 57% of them. Our hypothesis is that in this particular case we may have missed some of the HIV-positive fathers as some of them may not be residing in Ratodero or may be working outside the area in a different town or country and may not be exposed to unsafe healthcare practices. We suggest further research on this issue.

Index testing can be an effective approach in order to increase the yield of HIV testing (first 90 of the 90-90-90 targets) in a country like Pakistan where only 14% know their status. Index testing can also be expanded among key population to target their stable partners especially stable partners of MSM and TGs and spouses of HIV-positive PWIDs. Sindh AIDS Control Programme had established 46 sentinel sites in the province. Healthcare providers in these public facilities were trained on management of sexually transmitted infections and HIV counselling and testing. However, these sentinel sites were never optimally utilised even when free hepatitis B and hepatitis C testing was offered. WHO 2019 HIV testing guidelines recommend differentiated HIV testing services which is a strategic mix of tailored approaches depending on each community/key population. Social network-based approach, community-based testing, provider-initiated testing, task-sharing-testing by lay providers and HIV self-testing are some of the approaches that can be used in Pakistan.¹⁵ Private practitioners working as GPs in Pakistan can be trained to exploit provider initiated counselling and testing.

Our study had a number of limitations. First, we could not capture behavioural data. We were also not able to reach out many fathers. When we started index testing, each family insisted upon us to screen the children of their relatives which would have meant screening at least 2500-3000 adults and children for which we did not have the kits or the human resource. But given the ground situation, that would have helped in identifying more HIV-positive persons from the community. Although we had referred them to the nearby Rural Health Centre, our experience has informed us that only referral does not work that well in Pakistan.

Based on our experience we sum up with two recommendations. First is to provincial and national AIDS Control Programmes, policy makers, UN partners and others that index testing should be expanded to its full capacity, as there may be many such endemic pockets in the country that have not been identified. This approach will help in identifying HIV positive at the community level. Second, index testing should immediately be instituted to approach, test and link partners of key population to treatment and support.

Acknowledgement: We are thankful to Sindh AIDS Control Programme for providing the testing kits to conduct this study. We are extremely grateful to UNICEF for providing financial support to implement this community engagement project.

Disclaimer: None.

Conflicts of Interest: None.

Funding Disclosure: None.

References

1. Mir F, Mahmood F, Siddiqui AR, Baqi S, Abidi SH, Kazi AM et al. HIV infection predominantly affecting children in Sindh, Pakistan, 2019: a cross sectional study of an outbreak. *Lancet Infect Dis* 2020;20:362-70. doi: 10.1016/S1473-3099(19)30743-1.
2. Altaf A, Iqbal S, Shah SA. A third major human immunodeficiency virus (HIV) outbreak in Larkana, Pakistan: caused by unsafe injection practices. *J Pak Med Assoc* 2019;69:1068-9.
3. UNAIDS. Pakistan country page. [Internet] [cited 2020 Mar 03] Available from: <https://www.unaids.org/en/regionscountries/countries/pakistan>.
4. Reza T, Melesse DY, Shafer LA, Salim M, Altaf A, Sonia A, et al. Patterns and trends in Pakistan's heterogeneous HIV epidemic. *Sex Transm Infect* 2013;89(Suppl 2):ii4-10. doi: 10.1136/ssextrans-2012-050872.
5. WHO. Disease outbreak news-HIV cases Pakistan 2019 [Internet] 2019 Jul 03 [cited 2021 Mar 03]. Available from: <https://www.who.int/csr/don/03-july-2019-hiv-cases-pakistan/en/>.
6. Shah SA, Altaf A, Mujeeb SA, Memon A. An outbreak of HIV infection among injection drug users in a small town in Pakistan: potential for national implications. *Int J STD AIDS* 2004;15:209.
7. Altaf A, Pasha S, Vermund S, Shah SA. Second outbreak of HIV in Larkana. *J Pak Med Assoc* 2016;66:1510-1.

8. WHO. Guidelines on HIV self-testing and partner notification: Supplement to consolidated guidelines on HIV testing services. [Internet] 2016 [cited 2020 Mar 03] Available from: <https://apps.who.int/iris/bitstream/handle/10665/251655/9789241549868-eng.pdf;jsessionid=9016FFB35631FD2EA515BA3516C42CA9?sequence=1>
 9. Pakistan Bureau of Statistics. District Wise Census Result 2017. [Internet] [cited 2020 Mar 03] Available from: http://www.pbs.gov.pk/sites/default/files//DISTRICT_WISE_CENSUS_RESULTS_CENSUS_2017.pdf
 10. Khan S, Saadi FA. Socio economic survey of Ratodero Taluka, District Larkana, Sindh. [Internet] 2008 [cited 2020 Mar 03] Available from URL: <http://www.rspn.org/wp-content/uploads/2014/06/Socioeconomic-Baseline-Survey-Ratodero-Taluka-in-Sindh-2008.pdf>
 11. Lewis Kulzer J, Penner JA, Marima R, Oyaro P, Oyanga AO, Shade SB, et al. Family model of HIV care and treatment: a retrospective study in Kenya. *J Int AIDS Soc* 2012;15:8. doi: 10.1186/1758-2652-15-8.
 12. Jubilee M, Park FJ, Chipango K, Pule K, Machinda A, Tarubekera N. HIV index testing to improve HIV positivity rate and linkage to care and treatment of sexual partners, adolescents and children of PLHIV in Lesotho. *PLoS One* 2019;14:e0212762. doi: 10.1371/journal.pone.0212762.
 13. Hayashi T, Hutin YJ, Bulterys M, Altaf A, Allegranzi B. Injection practices in 2011-2015: a review using data from demographic and health surveys (DHS). *BMC Health Serv Res* 2019;19:600. doi: 10.1186/s12913-019-4366-9.
 14. Janjua NZ, Hamza HB, Islam M, Tirmizi SF, Siddiqui A, Jafri W, et al. Health care risk factors among women and personal behaviours among men explain the high prevalence of hepatitis C virus infection in Karachi, Pakistan. *J Viral Hepat* 2010;17:317-26. doi: 10.1111/j.1365-2893.2009.01230.x.
 15. WHO Policy Brief. Consolidated Guidelines on HIV Testing Services for a Changing Epidemic. [Internet] 2019 Nov 27 [cited 2020 Apr 01] Available from: <https://www.who.int/publications-detail/consolidated-guidelines-on-hiv-testing-services-for-a-changing-epidemic>.
-