

Cost-benefit analysis of implementing Nucleic Acid Amplification Testing for Transfusion Transmissible Infections: 6.5 year experience from a tertiary care centre.

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INTRODUCTION

- Despite safety measures, the risk of Transfusion Transmissible Infections (TTIs) remains due to testing limitations.
- Nucleic Acid Testing (NAT) improves transfusion safety by reducing both residual risk and the window period for detection.
- The cost-benefit of NAT is assessed by comparing its costs to the economic benefits of preventing infections and related morbidity.

AIMS & OBJECTIVES

- To perform the cost-benefit analysis of universal NAT screening for HIV, HBV, and HCV by comparing the costs of NAT to the economic benefits of preventing infections.

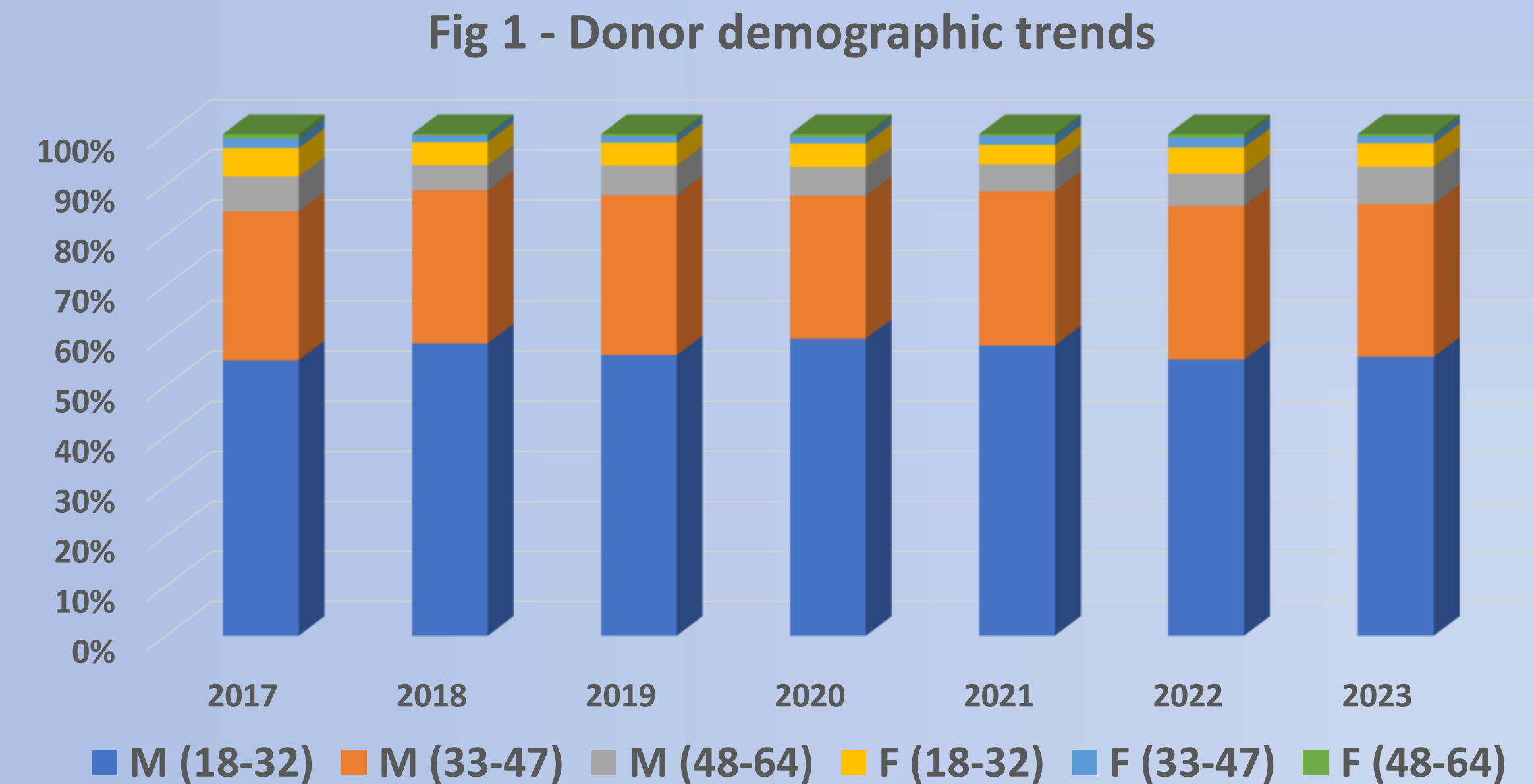
MATERIALS & METHODS

- Retrospective study
- Study period – 6.5 years - June 2017 to December 2023
- Reviewed donor data, serological screening, and NAT results for HIV, HBV, and HCV.
- MiniPool (6 samples) PCR-based NAT was performed using Cobas s201 (Roche Diagnostics).

- The additional infections detected by NAT that were missed by serology represent the NAT yield.
- A cost-benefit analysis, using value of statistical life in India, assessed the infections prevented relative to cost of NAT.

RESULTS

- Donor demographics – 1,02,929 total donors.
- Figure 1 – Donor demographic trends over the study period.**



- The serological reactivity rate was 0.79%, while the NAT reactivity rate was 0.114%.
- Table 1 – Year-wise infection testing data**

Year	Total donors	Serology reactive	NAT reactive	NAT Yield	HBV	HIV
2017	10433	74	3	2	2	0
2018	16251	99	5	2	2	0
2019	17241	123	14	3	3	0
2020	12344	107	29	1	1	0
2021	15012	127	28	3	3	0
2022	16073	160	36	2	1	1
2023	15575	124	34	1	1	0

- The **NAT yield was 0.0136%**, detecting 13 HBV, 1 HIV, and no HCV cases.
- Each unit has 3 potential recipients.
- In total, **42 TTIs were averted**, with residual risks of 0.0029 for HIV, 0.027 for HBV, and 0.00043 for HCV.
- Table 1 – Cost benefit analysis table.**

Cost Benefit Calculation	Estimated cost
Cost incurred by 1 HBV recipient	Rs.29,70,000
Cost incurred by 1 HIV recipient	Rs.32,90,000
Total Health Care Cost	Rs.12,57,00,000
Averted infections (39 HBV + 3 HIV)	42
Average additional cost of MP NAT tested unit for patient	Rs.850
Minimum cost benefit to patient	Rs.29,69,150

- Cost incurred include** – Diagnosis, medication, doctor visits, laboratory tests, hospitalization, counselling and miscellaneous costs.

CONCLUSION

- Investing 600 rupees in NAT-tested blood products saves each recipient about 30 lakhs in treatment costs.
- NAT is a cost-effective tool for TTI screening in tertiary hospitals.
- The cost-benefit analysis shows that it reduces TTI incidence and healthcare costs, underscoring its value in enhancing blood safety and saving lives.
- For tertiary care centres, NAT enhances blood safety and reduces legal implications from TTI, underscoring the benefits of advanced testing for better health outcomes and lower costs.