



## CHANGING AWARENESS, TESTING AND TRANSMISSION OF HIV IN PREGNANCY

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### ABSTRACT

**INTRODUCTION:** Human immunodeficiency virus (HIV) infection is a global health concern, with sexual transmission being predominant in India, accounting for 86% of cases. Despite a decline in HIV incidence, the prevalence remains significant, affecting approximately 2.3 million people in India. Henceforth, this study aimed to assess changes in the level of testing and mother-to-child transmission (MTCT).

**METHODOLOGY:** A retrospective descriptive study was conducted at the Prevention of Mother-to-Child Transmission (PMTCT) centre, analyzing records of patients from January 2012 to December 2013 and January 2021 to December 2022. Data included testing, sociodemographic factors, and pregnancy outcomes.

**RESULTS:** In 2012-2013, 11,232 patients were tested, with a 0.5% prevalence among antenatal patients. The recent period of 2021-2022 saw increased testing (20,767), with a decreased prevalence of 0.3%. Notably, the MTCT rate dropped to 3%. Analysis of age, parity, literacy, and residential distribution revealed changing trends. Migrant labourers remained predominant, and antenatal outcomes showed a shift over time.

**CONCLUSION:** Seropositivity among antenatal populations poses a significant challenge. While national programs show progress, there is a need to address complexities in HIV seropositivity. Bridging gaps in reproductive health and targeted interventions are imperative.

**KEYWORDS:** HIV, Prevention, Mother-to-child transmission, Antenatal population, PMTCT.

### INTRODUCTION

Human immunodeficiency virus (HIV) infection poses a global health challenge, necessitating comprehensive attention across all societal levels. In India, sexual transmission accounts for 86% of reported cases, followed by mother-to-child transmission (MTCT), injectable drug use, and exposure through blood and blood products.<sup>[1]</sup> Over the years, there has been a substantial decline in HIV

incidence in India, decreasing from 0.64 per 1000 uninfected population in 1996 to 0.05 in 2021.<sup>[2]</sup> Despite a prevalence of 0.22% among adults aged 15–49 in 2019, the sheer numbers translate to approximately 2.3 million people living with HIV (PLHIV).<sup>[1]</sup> Preventing new infections remains a cornerstone of India's national health policy. MTCT stands out as the primary source of HIV infection among children globally, affecting 1.7 million children in 2021 leading to 98,000 fatalities.<sup>[3-5]</sup> In India, the national prevalence of MTCT of HIV was reported at 8.76% in 2020.<sup>[6,7]</sup> India hosts the third-largest HIV-infected population globally, with approximately 2.39 million individuals living with the virus, including an estimated 145,000 children under the age of 15 affected by HIV/AIDS.<sup>[8,9]</sup> Children account for 7% of all new HIV infections, with NACO estimating that out of roughly 30 million annual pregnancies in India, more than 22,000 pregnant women are infected with HIV.<sup>[10-12]</sup> Given the potential burden on morbidity and mortality, particularly among the antenatal population, this study aimed to investigate the sociodemographic factors of HIV-positive antenatal women attending the Prevention of Mother-to-Child Transmission (PMTCT) centre at BRD Medical College over the past decade. Additionally, the study aimed to assess changes in the level of testing and MTCT over this period. Public awareness through integrated programs and their effective implementation is pivotal in achieving the goal of mitigating the impact of HIV, especially concerning pregnant women. This research contributes to ongoing efforts to understand and address the complex dynamics of HIV transmission.

## **MATERIAL AND METHODS**

This retrospective descriptive study was conducted at the Prevention of Mother-to-Child Transmission (PMTCT) centre of BRD Medical College in Gorakhpur, Uttar Pradesh. The study aimed to analyze and compare records of patients attending the Obstetrics and Gynaecology Outpatient Department (OPD) and Inpatient Department (IPD) over two distinct periods: January 2012 to December 2013 (2 years) and January 2021 to December 2022 (2 years). The study population included both pregnant women accessing healthcare services at the PMTCT centre and their spouses who tested positive. Data pertaining to testing, sociodemographic factors, and pregnancy outcomes were meticulously collected from the hospital's PMTCT records for the specified time frames. The research design employed in this investigation was retrospective, allowing for examining historical patient data. Ethical approval for data usage was obtained from the college's ethical committee, ensuring adherence to ethical standards in research. The comprehensive analysis of these records aimed to provide valuable insights into the trends and changes in PMTCT-related factors over the specified study periods. The statistical analysis involved calculating frequencies, numbers, and percentages for the collected data, which were then presented in tables and figures. These visual representations provided a comprehensive overview of HIV prevalence trends among antenatal populations, enhancing the interpretability of key findings.

## **RESULTS**

In 2012-2013, 11,232 patients were tested, with 7,925 being antenatal patients. Among antenatal patients, 40 tested positive for HIV, constituting a prevalence of 0.5%. This translated to a 0.35% HIV-positive rate among all tests conducted during this period.

Disturbingly, 13% of infants born to HIV-positive mothers were infected with the virus. In the more recent period of 2021-2022, the total number of patients tested increased to 20,767, with 13,970 being antenatal patients. The positive rate among antenatal patients decreased to 0.3%, and the overall HIV-positive rate dropped to 0.22%.

Encouragingly, the MTCT rate notably decreased to 3%, indicating improved prevention measures implemented at the PMTCT Centre. (Tab-1) In terms of age distribution, the majority of HIV-positive patients in both periods fell within the 20-25 age group, with a slight decrease from 55% in 2012-2013 to 48.9% in 2021-2022. Parity analysis revealed that a significant proportion of patients were multiparous in both periods, slightly increasing from 57.5% to 59.6%.

Regarding literacy status, there was a noticeable decline in illiteracy from 32.5% to 17.1%, while the percentage of patients with secondary education or higher increased. Furthermore, a shift in

residential distribution indicated a decrease in rural patients from 60% to 53.2%, with a corresponding increase in urban patients. (Tab-2) Among the 40 patients in 2012-2013, most were identified as migrant labourers, constituting 45% of the sample, followed by individuals in government/private services (20%).

Notably, none of the patients in this period were reported as unemployed. (Fig-1) In 2021-2022, migrant labourers remained the predominant group (46.8%). (Fig-2) In 2012-2013, the majority experienced live births (77.5%), while a notable proportion encountered stillbirths or spontaneous abortions (20%).

Minimal cases involved Medical Termination of Pregnancy (MTP), constituting 2.5% of the outcomes. In 2021-2022, a similar pattern emerged as the majority still had live births (72.3%).

There was a noticeable decrease in stillbirths or spontaneous abortions, accounting for 14.9% of the outcomes. Notably, the proportion of cases involving Medical Termination of Pregnancy increased to 12.8%, reflecting a shift in antenatal outcomes over time.

(Tab-3) These findings emphasize the importance of ongoing monitoring and intervention strategies within the PMTCT program to enhance maternal and child health outcomes among HIV-positive individuals.

Parameters	2012-2013	2021-2022
Total number of patients tested	11232	20767
No of Antenatal Patients tested	7925	13970
No of Antenatal Patients positive	40	47
Percentage of HIV-positive Antenatal Patients	0.5%	0.3%
Percentage of HIV positive Antenatal Patients from the total tests done	0.35%	0.22%
No. of babies infected (MTCT)	4(13%)	1(3%)

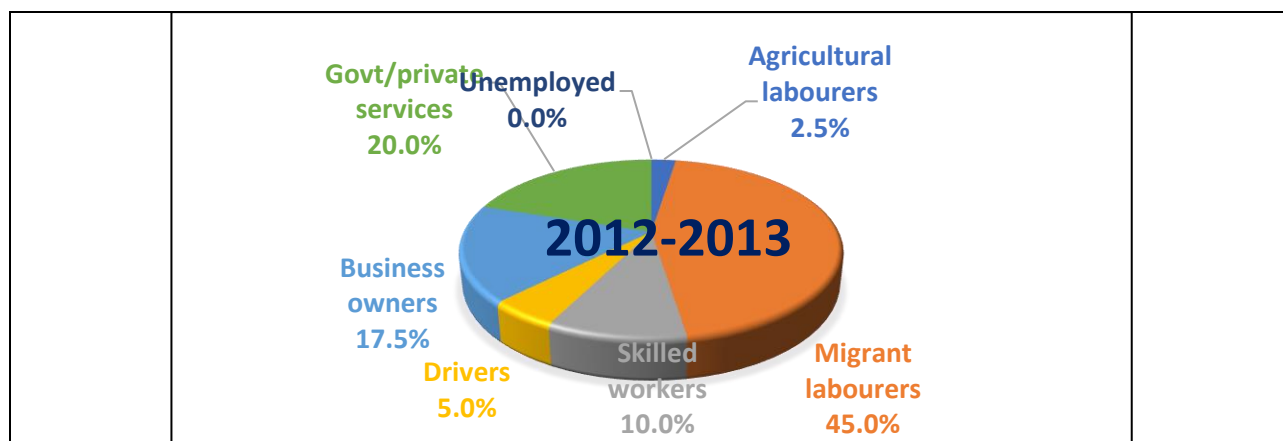
**Table 1:** Comparative Analysis of HIV Testing and Mother-to-Child Transmission Rates

Sociodemographic Characteristics		2012-2013 (N=40)	2021-2022 (N=47)
Age (Years)	<20	0	1 (2.1%)
	20-25	22(55%)	23 (48.9%)
	25-30	12(30%)	14 (29.8%)
	30-35	5(12.5%)	8 (17.1%)
	35-40	1(2.5%)	1 (2.1%)
Parity	Primiparous	17(42.5%)	19 (40.4%)
	Multiparous	23(57.5%)	28 (59.6%)
Literacy status	Illiterate	13(32.5%)	8(17.1%)
	Primary	6(15%)	5(10.6%)
	Secondary	16(40%)	23(48.9%)
	Graduation and above	5(12.5%)	11(23.4%)
Residential Distribution	Rural	24(60%)	25(53.2%)
	Urban	16(40%)	22(46.8%)

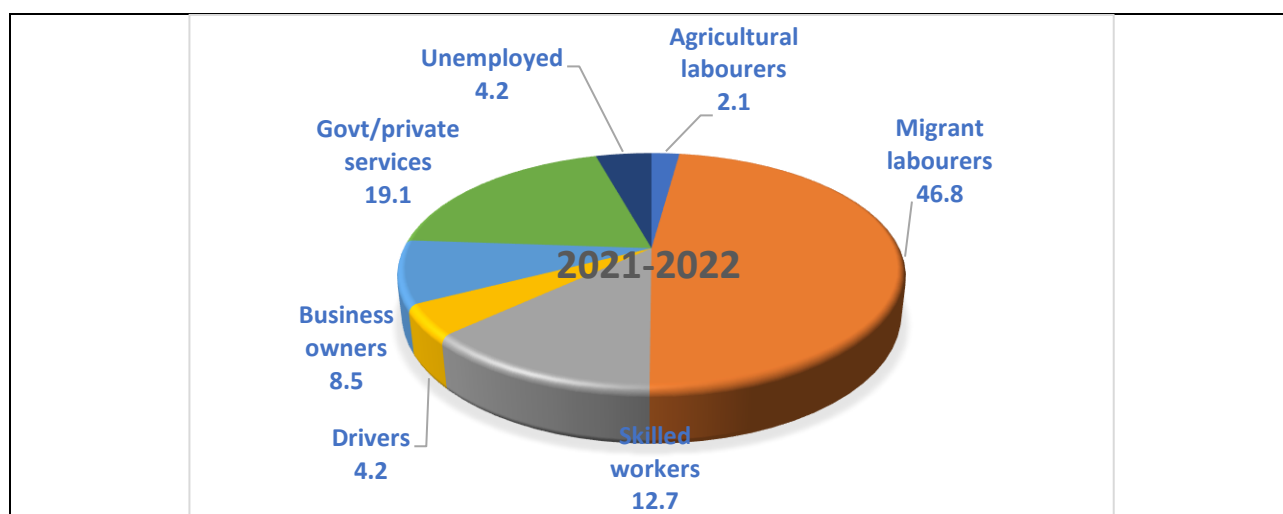
**Table 2:** Sociodemographic Characteristics of HIV-Positive Patients

Antenatal Outcome	2012-2013 (N=40)	2021-2022 (N=47)
Live Birth	31(77.5%)	34(72.3%)
Still Birth or Spontaneous abortions	8(20%)	7(14.9%)
MTP	1(2.5%)	6(12.8%)

**Table 3:** Antenatal Outcomes among HIV-Positive Patients



**Figure 1:** Distribution of women admitted in 2012-2013 concerning husband's occupations



**Figure 2:** Distribution of women admitted in 2021-2022 concerning husband's occupations

## DISCUSSION

The data presented in this study sheds light on the current scenario of HIV prevalence and Prevention of Mother-to-Child Transmission (PMTCT) needs in Uttar Pradesh (UP), a state that stands out with one of the highest annual new HIV infections and PMTCT requirements in India. The estimation of PMTCT service needs serves as a crucial indicator for identifying priority areas nationwide and ensuring comprehensive treatment coverage.<sup>[2]</sup> Comparing recent data, it is encouraging to note a declining trend among attendees of Antenatal Care (ANC) clinics in India, with the prevalence rate reported at 0.29%.<sup>[1]</sup> This figure is notably favourable when juxtaposed against some low-income countries (LICs), where prevalence rates range significantly higher, reaching as much as 29%-79.6%.<sup>[13,14]</sup> Specifically focusing on our centre, an important finding emerges as the percentage of HIV-positive antenatal patients declined from 0.5% to 0.3% during the two study periods. This suggests a positive shift in the prevalence of HIV among pregnant women attending our facility. Examining the age profiles of patients in our study, a similarity was observed with a study by Potty et al. in 2019, which identified 41.9% of patients falling within the 20-25 age group.<sup>[15]</sup> Similarly, Deshpande P et al. noted that in their study, most patients were aged between 26-30 years, constituting 32% of the participants.<sup>[16]</sup> Additionally, Deynu and Nutor highlighted that nearly a quarter (22.3%) of the respondents in their study were aged 15-19 years.<sup>[14]</sup> These findings underscore the importance of considering age demographics in HIV prevalence studies, as different age groups may exhibit varying vulnerability and risk factors. The study conducted by Hazarika et al. aligns with our findings, reinforcing the notion that lower levels of awareness about HIV infections among women and rural residents contribute to higher seropositivity rates.<sup>[17]</sup> Consistent with this trend, our investigation reveals a similar pattern, with a higher proportion of reactive cases among antenatal women from

rural areas than their urban counterparts. The study by Pachua et al. provides additional support to these observations, as they identified factors such as rural living, poverty, and illiteracy associated with higher seropositivity in their population.<sup>[18]</sup> This correlation is consistent with our study, where a larger number of reactive cases were observed among antenatal women residing in rural areas. Notably, the study conducted by Deynu and Nutor further strengthens these findings by reporting that the majority of their HIV-positive patients were from rural areas, constituting 80.1% of the study population.<sup>[14]</sup> This underscores the persistent challenge of addressing HIV infections in rural settings, where factors such as limited awareness, poverty, and lower education levels contribute to an increased risk of seropositivity. Collectively, these findings emphasize the need for targeted interventions and awareness campaigns, particularly in rural areas, to address the specific challenges contributing to higher HIV seropositivity rates. Efforts should focus on education, poverty alleviation, and community outreach programs to bridge the knowledge gap and reduce the prevalence of HIV infections, aligning with the broader goal of creating more inclusive and effective public health strategies. In our study, a noteworthy observation is the decrease in the percentage of illiterate women from 32.5% to 17.1%, accompanied by an increase in the proportion of women with secondary school and graduate education. This shift may indicate a positive trend toward increased literacy, potentially contributing to greater utilization of hospital services. It is well-established that lower levels of education are associated with challenges such as misinformation, stigma, reluctance to access services, and the potential for disease transmission. Interestingly, our findings diverge from those reported by Deynu and Nutor, where most patients had primary education.<sup>[14]</sup> One plausible interpretation is that improved literacy rates may encourage women to seek and utilize hospital services more effectively. The impact of education on health-seeking behaviour is critical, as it not only influences awareness but also plays a role in breaking down barriers associated with stigma and misinformation. However, the association between educational level and knowledge of MTCT reported by Deynu and Nutor differs from other studies.<sup>[19-21]</sup> Women with higher levels of education were less likely to possess adequate knowledge of MTCT and its elimination compared to those with no formal education. This finding contrasts with previous research where women with primary or higher education levels demonstrated increased knowledge of MTCT. Another study found no significant association between the knowledge of childbearing women on MTCT and their highest level of education.<sup>[22]</sup> These discrepancies may be attributed to variations in adult literacy rates<sup>[23]</sup> and geographical differences among these countries. Furthermore, it is essential to consider the role of financial independence, as financially empowered women with higher education levels may opt for private health facilities over government hospitals. In such private facilities, adherence to Elimination of Mother-to-Child Transmission (EMTCT) protocols and guidelines may not be uniformly implemented. Additionally, private medical facilities may lack organized health education and promotion sessions, contributing to limited information dissemination on EMTCT, even among highly educated women. The concept of "bridge" populations, acting as intermediaries for transmission between high-risk groups, such as female sex workers and the general population, is well-established. These bridge populations often include migrant labourers. Shankar et al., in their study, highlighted the occupations of spouses of antenatal patients, revealing that a majority were engaged in manual labour and driving (52%).<sup>[24]</sup> Consistent with this, our study echoes similar findings, indicating that a significant proportion of spouses were migrant labourers (48% and 45%). This group often acts as a conduit for transmission between high-risk and general populations. A notable aspect of our study is the observed decrease in MTCT rates, which declined from 13% to 3% between the two study periods. This positive trend aligns with a meta-analysis conducted in 2020 by Bhatta et al., which reported a pooled HIV prevalence of MTCT at 8.78% in India.<sup>[6]</sup> The reduction in MTCT rates can be attributed to implementing proper antenatal care, institutional deliveries, and anti-retroviral prophylaxis, collectively contributing to lowering MTCT rates to less than 5%.<sup>[25]</sup> Additionally, our study reveals a noteworthy finding concerning the choice of termination post-HIV diagnosis. We observed an increase from 2.5% in 2012-2013 to 12.8% in 2021-22, indicating that a higher proportion of females are opting for medical termination of pregnancy (MTP) over the perceived risk of bearing children exposed to HIV. This trend suggests a growing awareness among

HIV-positive individuals about the available options and the importance of making informed decisions to mitigate the risk of vertical transmission.

## CONCLUSION

In conclusion, the observed seropositivity among the antenatal population at the PMTCT Centre of BRD Medical College in Gorakhpur poses a significant challenge for policymakers. Although national programs have been implemented with increased stringency, counselling has improved, and widespread testing for infection has become more prevalent, the three principles of ICE (Information, Communication, and Education) have played a pivotal role in achieving these outcomes. However, there is still a considerable distance to cover in addressing the complexities of HIV seropositivity within the antenatal demographic. The imperative for "Bridging the Gaps in Reproductive Health" is underscored, emphasizing the need for comprehensive and targeted interventions to further enhance the effectiveness of prevention and intervention strategies. One limitation of this study is the retrospective nature of the analysis, which may have inherent biases and limitations associated with relying on historical medical records. Future studies should consider incorporating prospective data collection methods to provide a more real-time and dynamic understanding of the evolving trends in HIV seropositivity among antenatal populations.

## Conflict of Interest

All authors declare no conflict of interest.

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## Consent

As per international or university standards, the authors have collected and preserved written participant consent.

## Ethical Approval

As per international or university standards, the author(s) has collected and preserved written ethical permission.

## REFERENCES

1. Park K. In: Parks Textbook of Preventive and Social Medicine. 26th ed. S.I.: BHANOT;2021.p.386.
2. National AIDS Control Organization & ICMR-National Institute of Medical Statistics. HIV Estimations 2021: Technical Report. New Delhi: NACO, Ministry of Health and Family Welfare, Government of India, 2022. [http://naco.gov.in/sites/default/files/HIV%20Estimations%202021%20Report\\_1.pdf](http://naco.gov.in/sites/default/files/HIV%20Estimations%202021%20Report_1.pdf) [Accessed on 23/01/24].
3. World Health Organization. HIV. The Global Health Observatory. Available from: <https://www.who.int/data/gho/data/themes/hiv-aids>.
4. Haile ZT, Teweldeberhan AK, Chertok IR. Correlates of women's knowledge of mother-to-child transmission of HIV and its prevention in Tanzania: a population-based study. *AIDS care*. 2016 Jan 2;28(1):70-8.
5. Haffejee F, Ports KA, Mosavel M. Knowledge and attitudes about HIV infection and prevention of mother to child transmission of HIV in an urban, low income community in Durban, South Africa: Perspectives of residents and health care volunteers. *health sa gesondheid*. 2016;21:171-8.
6. Bhatta M, Dutta N, Nandi S, Dutta S, Saha MK. Mother-to-child HIV transmission and its correlates in India: systematic review and meta-analysis. *BMC pregnancy and childbirth*. 2020 Dec;20:1-5.

7. Bhatta M, Nandi S, Dutta N, Dutta S, Saha MK. HIV care among elderly population: systematic review and meta-analysis. *AIDS research and human retroviruses*. 2020 Jun 1;36(6):475-89.
8. Suryavanshi N, Mave V, Kadam A, Kanade S, Sivalenka S, Kumar VS, Harvey P, Gupta R, Hegde A, Gupte N, Gupta A. Challenges and opportunities for outreach workers in the prevention of mother to child transmission of HIV (PMTCT) program in India. *PLoS One*. 2018;13(9):e0203425.
9. Sinha A, Roy M. An ICMR task force study of prevention of parent to child transmission (PPTCT) service delivery in India. *Indian J Public Health*. 2008;52(4):200–2.
10. World Health Organization & UNICEF. Global monitoring framework and strategy for the global plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive (EMTCT), April 2012. 2012.
11. Nath A. Pediatric HIV in India: current scenario and the way forward. *Indian J Public Health*. 2017;61(2):124.
12. NACO. Annual technical report: India HIV estimations 2017.
13. Adam S. HIV and pregnancy. *In Obstetrics and Gynaecology Forum*. 2015 May 1;25(2):19-22.
14. Deynu M, Nutor JJ. Determinants of comprehensive knowledge on mother-to-child transmission of HIV and its prevention among childbearing women in Rwanda: insights from the 2020 Rwandan Demographic and Health Survey. *BMC public health*. 2023 Dec;23(1):1-4.
15. Potty RS, Sinha A, Sethumadhavan R, Isac S, Washington R. Incidence, prevalence and associated factors of mother-to-child transmission of HIV, among children exposed to maternal HIV, in Belgaum district, Karnataka, India. *BMC Public Health*. 2019 Dec;19(1):1-0.
16. Deshpande PS. Knowledge & Awareness of HIV Testing in Pregnant Women and Their Husband Attending Obstetrics & Gynaecology Department at a Tertiary Care Centre in Central India During Antenatal Care. *International Journal of Medical and Biomedical Studies*.2020;4(2):360-63.
17. Hazarika I. Knowledge, attitude, beliefs and practices in HIV/AIDS in India: Identifying the gender and rural–urban differences. *Asian Pacific Journal of Tropical Medicine*. 2010;3(10):821–7.
18. Pachuau LN, Tannous C, Agho KE. Factors associated with knowledge, attitudes, and prevention towards HIV/AIDS among adults 15–49 years in Mizoram, North East India: a cross-sectional study. *International journal of environmental research and public health*. 2021 Dec 31;19(1):440.
19. Olopha PO, Fasanbaku AO, Gayawan E. Spatial pattern and determinants of sufficient knowledge of mother to child transmission of HIV and its prevention among Nigerian women. *Plos one*. 2021 Jun 25;16(6):e0253705.
20. Luba TR, Feng Z, Gebremedhin SA, Erena AN, Nasser AM, Bishwajit G, Tang S. Knowledge about mother–to–child transmission of HIV, its prevention and associated factors among Ethiopian women. *Journal of global health*. 2017 Dec;7(2):020414.
21. Alemu YM, Ambaw F, Wilder-Smith A. Utilization of HIV testing services among pregnant mothers in low income primary care settings in northern Ethiopia: a cross sectional study. *BMC pregnancy and childbirth*. 2017 Dec;17:1-8.
22. Masaka A, Dikeleko P, Moleta K, David M, Kaisara T, Ramphelletswe F, Rweggerera GM. Determinants of comprehensive knowledge of mother to child transmission (MTCT) of HIV and its prevention among Zimbabwean women: Analysis of 2015 Zimbabwe Demographic and Health Survey. *Alexandria Journal of Medicine*. 2019 Jan 2;55(1):68-75.
23. Education Statistics | Country. - Country at a Glance - Rwanda. Available from: <https://datatopics.worldbank.org/education/country/rwanda>. Cited 2024 Jan 24
24. Shankar AV, Pisal H, Patil O, Joshi A, Suryavanshi N, Shrotri A, et al. Women’s acceptability and husband’s support of rapid HIV testing of pregnant women in India. *AIDS Care*. 2003;15(6):871–4.
25. Cohn Se, Clark RA. Human immunodeficiency virus infection in women. In: Mandell, Douglas, and Bennett’s principles and practice of infectious diseases, updated edition. 8th ed. Philadelphia, PA: Elsevier/Saunders 2015:1590-1615.e10