



Effectiveness of PrEP (Pre-Exposure Prophylaxis) Integrated into Venereology Services : A Systematic Review

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ABSTRACT

Background: Pre-exposure prophylaxis (PrEP) is highly effective for HIV prevention, but optimal service delivery models remain unclear. Integrating PrEP into venereology and sexual health services offers a promising approach to reach at-risk populations, yet real-world effectiveness, uptake, retention, and implementation outcomes vary substantially across settings.

Methods: This systematic review synthesized 80 studies examining PrEP integration into venereology, sexual health, and STI clinics across North America, Europe, sub-Saharan Africa, Latin America, and Asia-Pacific. We included randomized controlled trials, cohort studies, demonstration projects, and implementation research reporting outcomes on PrEP uptake, adherence, retention, HIV incidence, STI outcomes, and service delivery innovations.

Results: Integrated PrEP services demonstrated high HIV prevention effectiveness, with incidence rates ranging from 0.13 to 0.24 per 100 person-years and risk reductions of 86–90% in large trials (1,3,14). However, uptake varied substantially: 57.1% in England (1), 14.9% among US women (6), 40.6% in Kenyan family planning clinics (12), and 98.1% in a Paris hospital (13). Retention declined steeply over time, from 57% at 1 month to 23% at 12 months in Kenyan public clinics (14,15), but reached 85.9% at 12 months in a Thai community program (16). Self-reported adherence significantly overestimated biomarker-confirmed adherence, especially among people who inject drugs (77% vs 3% with protective levels) (57). STI incidence was high (68.1/100 person-years in England) but concentrated in a minority of users (24% accounted for 79.5% of diagnoses) (1). Telehealth, peer navigation, and dynamic choice models improved outcomes. Long-acting injectable PrEP showed 60.9% full adherence in early implementation (66).

Discussion: Integration effectiveness depends critically on population-specific barriers, implementation support intensity, and retention strategies. Settings with comprehensive support (monthly counseling, SMS reminders, community delivery) achieved far better retention than basic integration into existing infrastructure. Self-reported adherence is unreliable, particularly in marginalized populations. STI increases often reflect intensified surveillance rather than true risk compensation.

Conclusion: Integrating PrEP into venereology services is effective and feasible, but success requires tailored, multi-component implementation strategies. Retention, not just initiation, is the critical intervention target. Biomarker-validated

adherence monitoring and enhanced support for younger, socioeconomically deprived users are essential.

Keywords: Pre-exposure prophylaxis, PrEP, HIV prevention, venereology services, sexual health, service integration, retention, adherence, STI

INTRODUCTION

Background

Globally, HIV remains a major public health challenge, with 1.3 million new infections reported in 2022. Men who have sex with men (MSM), transgender women, female sex workers, people who inject drugs, and serodiscordant couples bear a disproportionate burden of HIV incidence. Pre-exposure prophylaxis (PrEP) — the use of antiretroviral medications by HIV-negative individuals to prevent infection — has demonstrated biomedical efficacy exceeding 90% when taken consistently (3,4). However, the gap between clinical trial efficacy and real-world effectiveness remains substantial, largely due to challenges in service delivery, uptake, adherence, and retention.

Venereology and sexual health clinics represent an ideal platform for PrEP integration. These settings already serve populations at highest HIV risk, perform regular STI screening, and have established infrastructure for sexual health counseling. The World Health Organization has recommended integrating PrEP into existing sexual health services, but optimal integration models, population-specific outcomes, and implementation strategies remain incompletely characterized.

Research Problem

Despite growing evidence for PrEP effectiveness, several critical questions persist. First, how does PrEP effectiveness in integrated venereology settings compare to clinical trial efficacy? Second, what integration models (embedded, co-located, referral-based, telehealth, comprehensive unified care) achieve the best outcomes for different populations? Third, why does retention vary so dramatically across settings (from 23% to 86% at 12 months), and what implementation factors explain this variation? Fourth, are the observed increases in STI incidence among PrEP users attributable to true risk compensation or intensified surveillance? Fifth, how can integration be optimized for populations with historically low PrEP access, including women, transgender individuals, and people who inject drugs?

Research Objectives

This systematic review aimed to:

1. Evaluate the effectiveness of integrated PrEP-venereology services in reducing HIV incidence
2. Assess PrEP uptake, retention, and adherence across different integration models and populations
3. Examine STI outcomes associated with integrated PrEP delivery
4. Identify implementation success factors and barriers
5. Synthesize evidence on service delivery innovations including telehealth, peer navigation, and long-acting formulations

Research Benefits

Findings from this review will inform policy makers, clinic directors, and clinicians seeking to implement or optimize integrated PrEP services. By identifying which integration models work best for which populations, and highlighting critical implementation factors, this review provides actionable guidance for scaling PrEP access globally.

Hypotheses

Based on prior literature, we hypothesized that: (1) integrated PrEP services would achieve HIV incidence below 1 per 100 person-years; (2) retention would decline substantially after 6 months; (3) self-reported adherence would overestimate biomarker-confirmed adherence; (4) STI rates would increase due to both risk compensation and intensified screening; and (5) integration models with comprehensive support services would outperform basic integration.

Research Gap and Novelty

Previous systematic reviews have examined PrEP effectiveness in controlled trials or specific populations, but none have comprehensively synthesized integration into venereology services across diverse geographic and population contexts. This review is novel in several respects. First, it includes 80 studies from high-income and low/middle-income countries, enabling context-

specific comparisons. Second, it examines not only HIV and STI outcomes but also implementation factors, service delivery innovations, and population-specific findings. Third, it critically evaluates adherence measurement methods, highlighting the discordance between self-report and biomarkers. Fourth, it synthesizes emerging evidence on long-acting injectable PrEP and telehealth integration. This comprehensive approach provides the most detailed evidence base to date for optimizing PrEP delivery through sexual health services.

METHODS

Protocol

The study strictly adhered to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines to ensure methodological rigor and accuracy. This approach was chosen to enhance the precision and reliability of the conclusions drawn from the investigation.

Criteria for Eligibility

This systematic review aims to evaluate the Effectiveness of PrEP (Pre-Exposure Prophylaxis) Integrated into Venereology Services.

Screening

We screened in sources based on their abstracts that met these criteria:

- **PrEP Service Setting:** Does this study evaluate PrEP services delivered through or integrated into venereology, sexual health, or STI clinics?
- **Target Population:** Does this study include participants who are candidates for PrEP according to established guidelines (such as high-risk individuals, MSM, transgender individuals, serodiscordant couples, or other HIV-negative at-risk populations)?
- **Effectiveness Outcomes:** Does this study measure effectiveness outcomes such as PrEP uptake, adherence, retention in care, HIV incidence, or service delivery metrics?
- **Study Design:** Is this study a randomized controlled trial, quasi-experimental study, cohort study, before-after study, cross-sectional study, systematic review, or meta-analysis?

- **Service Integration Focus:** Does this study examine PrEP service delivery or integration (rather than focusing solely on PrEP delivered through non-venereology settings without any integration component)?
- **Service Delivery Component:** Does this study include service delivery components (rather than examining only basic PrEP biomedical efficacy or pharmacological effectiveness without service delivery aspects)?
- **PrEP Focus:** Does this study include PrEP components (rather than focusing exclusively on post-exposure prophylaxis [PEP] without any PrEP elements)?
- **HIV-Negative Population:** Does this study include HIV-negative participants (rather than being conducted exclusively in HIV-positive populations)?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper.

Search Strategy

The keywords used for this research based PICO :

PICO Element	Keyword 1	Keyword 2 (Synonym)	Keyword 3 (Synonym)	Keyword 4 (Synonym)
Population	Men who have sex with men (MSM)	Transgender women	High-risk HIV-negative individuals	Key populations (e.g., female sex workers, people who inject drugs)
Intervention	Integrated PrEP delivery	PrEP embedded in sexual health clinics	Combined HIV prevention and STI services	PrEP co-located with venereology

				care
Comparison	Standalone PrEP services	Non-integrated PrEP programs	Standard HIV prevention without integration	Deferred PrEP access
Outcome	PrEP uptake and initiation	Retention in PrEP care	HIV incidence reduction	Adherence to PrEP (self-reported or biomarker-confirmed)

The Boolean MeSH keywords inputted on databases for this research are: (*"Men who have sex with men" OR "MSM" OR "Transgender women" OR "High-risk HIV-negative individuals" OR "Key populations" OR "Female sex workers" OR "People who inject drugs"*) AND (*"Integrated PrEP delivery" OR "PrEP embedded in sexual health clinics" OR "Combined HIV prevention and STI services" OR "PrEP co-located with venereology care" OR "PrEP integrated into STI services" OR "Sexual health clinic-based PrEP"*) AND (*"Standalone PrEP services" OR "Non-integrated PrEP programs" OR "Standard HIV prevention without integration" OR "Deferred PrEP access" OR "PrEP only without STI services" OR "Referral-based PrEP"*) AND (*"PrEP uptake and initiation" OR "Retention in PrEP care" OR "HIV incidence reduction" OR "Adherence to PrEP" OR "Biomarker-confirmed adherence" OR "PrEP persistence" OR "STI screening frequency" OR "Prevention effectiveness"*)

Data extraction

- **Integration Model:**

Extract details about how PrEP was integrated into venereology/sexual health services, including:

- Type of integration (embedded within existing STI services, co-located, comprehensive unified care, etc.)
- Specific service delivery model (daily vs. on-demand PrEP, provider type, workflow integration)
- Whether PrEP was combined with other services (STI screening, contraception, general sexual health)
- Level of integration (referral-based, partially integrated, fully integrated)
- Any innovative delivery approaches (telemedicine, peer support, mobile services)

- **Service Setting:**

Extract characteristics of the venereology/sexual health service setting where PrEP was integrated, including:

- Type of facility (public STI clinic, private sexual health center, family planning clinic, university health center, etc.)
- Geographic location and healthcare system context
- Baseline patient volume and demographics
- Existing services offered prior to PrEP integration
- Staffing model and provider qualifications

- **Target Population:**

Extract details about who accessed PrEP through the integrated venereology services, including:

- Demographics (age, gender, sexual orientation, race/ethnicity)

- Risk profile and eligibility criteria specific to the venereology setting
- HIV/STI history and current risk behaviors
- Whether population was different from typical PrEP users in other settings
- Any specific populations targeted through the integration (MSM, women, adolescents, etc.)

- **HIV Prevention Effectiveness:**

Extract HIV prevention outcomes specifically from PrEP delivered through integrated venereology services, including:

- HIV incidence rates during PrEP use in the integrated setting
- Comparison to baseline HIV rates or control groups
- HIV infections that occurred and circumstances (poor adherence, drug resistance, etc.)
- Effectiveness estimates with confidence intervals
- Any differences in effectiveness compared to standalone PrEP programs

- **PrEP Uptake and Retention:**

Extract metrics related to PrEP engagement specifically in the integrated venereology setting, including:

- Number/proportion of eligible patients who initiated PrEP
- Retention rates at key timepoints (1, 3, 6, 12 months)
- Adherence measures (self-reported, drug levels, pill counts)

- Reasons for discontinuation
- Re-initiation rates and patterns
- Comparison to uptake/retention in non-integrated settings if available

- **STI Outcomes:**

Extract sexually transmitted infection outcomes associated with integrated PrEP-venereology services, including:

- STI incidence rates (bacterial and viral) during PrEP use
- Changes in STI screening frequency and coverage
- Time to STI diagnosis and treatment
- Use of STI prevention strategies (doxy-PEP, vaccination, partner notification)
- Antibiotic resistance concerns
- Whether STI management improved due to integration

- **Implementation Success Factors:**

Extract factors that facilitated or hindered successful integration of PrEP into venereology services, including:

- Staff training requirements and outcomes
- Workflow changes and care coordination processes
- Electronic health record modifications or prompts
- Patient education and counseling approaches

- Cost considerations and financial sustainability
- Quality improvement initiatives
- Time required for implementation

- **Care Quality Outcomes:**

Extract measures of care quality and patient experience specific to integrated PrEP-venereology services, including:

- Patient satisfaction scores
- Wait times and access to care
- Comprehensiveness of care received
- Provider confidence and satisfaction with integrated model
- Care coordination and communication quality
- Any unintended consequences or service disruptions

- **Key Findings:**

Extract the main conclusions about PrEP integration into venereology services effectiveness, including:

- Primary findings regarding integration success or failure
- Advantages and disadvantages of integrated vs. standalone PrEP delivery
- Recommendations for optimal integration models
- Identified gaps or areas for improvement

- Implications for scaling integrated services
- Any unexpected outcomes or lessons learned

Table 1. Article Search Strategy

Database	Keywords	Hits
Pubmed	<i>("Men who have sex with men" OR "MSM" OR "Transgender women" OR "High-risk HIV-negative individuals" OR "Key populations" OR "Female sex workers" OR "People who inject drugs") AND ("Integrated PrEP delivery" OR "PrEP embedded in sexual health clinics" OR "Combined HIV prevention and STI services" OR "PrEP co-located with venereology care" OR "PrEP integrated into STI services" OR "Sexual health clinic-based PrEP") AND ("Standalone PrEP services" OR "Non-integrated PrEP programs" OR "Standard HIV prevention without integration" OR "Deferred PrEP access" OR "PrEP only without STI services" OR "Referral-based PrEP") AND ("PrEP uptake and initiation" OR "Retention in PrEP care" OR "HIV incidence reduction" OR "Adherence to PrEP" OR "Biomarker-confirmed adherence" OR "PrEP persistence" OR "STI screening frequency" OR "Prevention effectiveness")</i>	5
Semantic Scholar	<i>("Men who have sex with men" OR "MSM" OR "Transgender women" OR "High-risk HIV-negative individuals" OR "Key populations" OR "Female sex workers" OR "People who inject drugs") AND ("Integrated PrEP delivery" OR "PrEP embedded in sexual health clinics" OR "Combined HIV prevention and STI services" OR "PrEP co-located with venereology care" OR "PrEP integrated into STI services" OR "Sexual health clinic-based PrEP") AND ("Standalone PrEP services" OR "Non-integrated PrEP programs" OR "Standard HIV prevention without integration" OR "Deferred PrEP access" OR "PrEP only without STI services" OR "Referral-based PrEP") AND ("PrEP uptake and initiation" OR "Retention in PrEP care" OR "HIV incidence reduction" OR "Adherence to PrEP" OR "Biomarker-confirmed adherence" OR "PrEP persistence" OR "STI screening frequency" OR "Prevention effectiveness")</i>	250
Springer	<i>("Men who have sex with men" OR "Transgender women" OR "Female sex workers" OR "People who inject drugs" AND "Integrated PrEP delivery" AND "PrEP uptake and initiation" OR "Retention in PrEP care" OR "HIV incidence reduction" OR "Adherence to PrEP" OR "Biomarker-confirmed adherence" OR "PrEP persistence" OR "STI screening frequency" OR "Prevention effectiveness")</i>	1,175

Google Scholar	<i>("Men who have sex with men" OR "MSM" OR "Transgender women" OR "High-risk HIV-negative individuals" OR "Key populations" OR "Female sex workers" OR "People who inject drugs") AND ("Integrated PrEP delivery" OR "PrEP embedded in sexual health clinics" OR "Combined HIV prevention and STI services" OR "PrEP co-located with venereology care" OR "PrEP integrated into STI services" OR "Sexual health clinic-based PrEP") AND ("Standalone PrEP services" OR "Non-integrated PrEP programs" OR "Standard HIV prevention without integration" OR "Deferred PrEP access" OR "PrEP only without STI services" OR "Referral-based PrEP") AND ("PrEP uptake and initiation" OR "Retention in PrEP care" OR "HIV incidence reduction" OR "Adherence to PrEP" OR "Biomarker-confirmed adherence" OR "PrEP persistence" OR "STI screening frequency" OR "Prevention effectiveness")</i>	36
Wiley Online Library	<i>("Men who have sex with men" OR "Transgender women" OR "Female sex workers" OR "People who inject drugs" AND "Integrated PrEP delivery" AND "PrEP uptake and initiation" OR "Retention in PrEP care" OR "HIV incidence reduction" OR "Adherence to PrEP" OR "Biomarker-confirmed adherence" OR "PrEP persistence" OR "STI screening frequency" OR "Prevention effectiveness")</i>	111

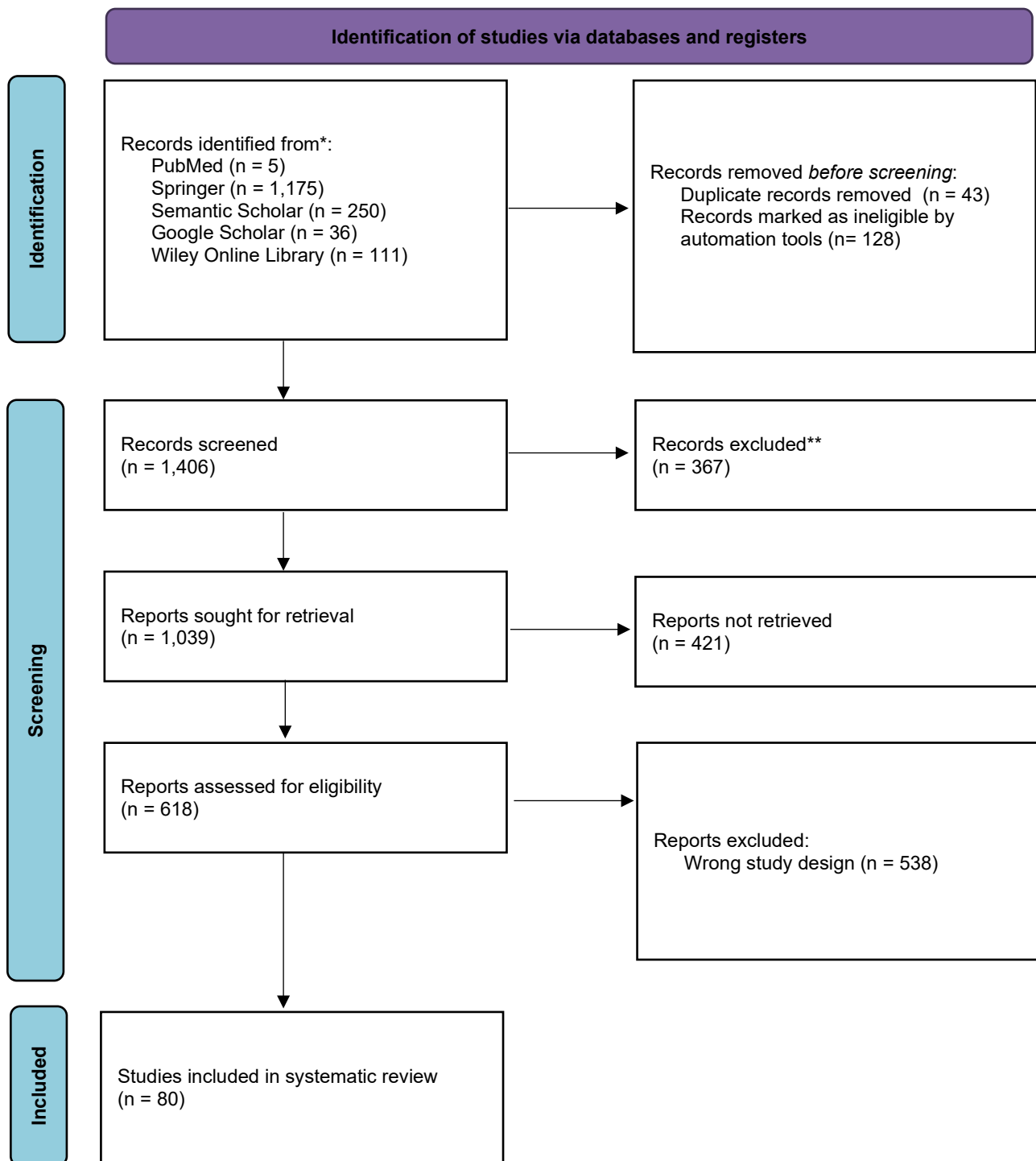


Figure 1. Article search flowchart

Risk of Bias

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
J. Raifman et al., 2018	Moderate	Low	Low	Low	Low	Low
Rachel K Scott et al., 2023	Low	Low	Low	Low	Low	Low
Ann Sullivan et al., 2023	Low	Low	Moderate	Low	Low	Low
Anne-Emilie Rouffiac et al., 2020	Low	Low	Unclear	Low	Low	Low
P. Chan et al., 2021	Low	Low	Low	Low	Low	Low
S. Rutstein et al., 2025	Low	Low	Low	Low	Low	Low
Catherine A Koss et al., 2023	Low	Moderate	Low	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
S. Rutstein et al., 2024	Low	Low	Low	Low	Low	Low
D. Ogaz et al., 2025	Moderate	Moderate	Low	Low	Low	Moderate
Chase A Cannon et al., 2024	Low	Low	Low	Low	Low	Low
Marije L Groot Bruinderink et al., 2023	Low	Low	Unclear	Low	Low	Low
C. O'Halloran et al., 2019	Moderate	Low	Low	Low	Low	Low
B. Grinsztejn et al., 2023	Low	Low	Low	Low	Low	Low
L. Whiteley et al., 2019	Low	Low	Unclear	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
J. Busang et al., 2026	Low	Moderate	Low	Low	Low	Low
Ferdous A Ahmed et al., 2021	Moderate	Moderate	Low	Low	Low	Moderate
Elizabeth M Irungu et al., 2021	Low	Low	Low	Low	Low	Low
S. McCormack et al., 2016	Low	Low	Low	Low	Low	Low
B. Grinsztejn et al., 2018	Low	Low	Low	Low	Low	Low
S. Karim et al., 2021	Moderate	Low	Low	Low	Low	Low
L. Coyer et al., 2022	Moderate	Low	Moderate	Low	Low	Moderate

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
Luxi Lal et al., 2017	Moderate	Low	Low	Low	Low	Low
L. Lalley-Chareczko et al., 2018	Low	Low	Unclear	Low	Low	Low
W. Goedel et al., 2022	Low	Low	Low	Low	Low	Low
Daniel Teixeira da Silva et al., 2020	Low	Low	Low	Low	Low	Low
Alexandre Grangeiro et al., 2015	Low	Low	Moderate	Low	Low	Low
A. Grulich et al., 2021	Low	Low	Low	Low	Low	Low
L. Whiteley et al., 2020	Low	Low	Unclear	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
M. Noret et al., 2018	Moderate	Low	Low	Low	Low	Low
E. Hoornenborg et al., 2019	Low	Low	Low	Low	Low	Low
S. Azariah et al., 2019	Low	Low	Low	Low	Low	Low
R. Heffron et al., 2022	Low	Low	Low	Low	Low	Low
H. Sacks et al., 2016	Moderate	Low	Low	Low	Low	Low
Luana M S Marins et al., 2019	Low	Low	Low	Low	Low	Low
J. D. Wit et al., 2015	Moderate	Low	Low	Low	Low	Low
K. Ngure et al., 2022	Low	Low	Low	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
E. Hoornenborg et al., 2018	Moderate	Low	Low	Low	Low	Low
D. Dolling et al., 2016	Low	Low	Low	Low	Low	Low
S. Cohen et al., 2015	Moderate	Low	Low	Low	Low	Low
M. Akolo et al., 2019	Unclear	Moderate	Low	Low	Low	Moderate
A. Mujugira et al., 2024	Low	Low	Low	Low	Low	Low
C. L. et al., 2023	Low	Low	Low	Low	Low	Low
S. Sahay et al., 2023	Low	Low	Low	Low	Low	Low
Cynthia Dalton et al., 2021	Unclear	Low	Unclear	Low	Low	Moderate

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
C. Robbins et al., 2025	Moderate	Low	Low	Low	Low	Low
Ethan Moitra et al., 2020	Low	Low	Unclear	Low	Low	Low
Benn Kwach et al., 2025	Low	Low	Low	Low	Low	Low
T. Cassidy et al., 2021	Moderate	Low	Low	Low	Low	Low
E. White et al., 2019	Low	Low	Low	Low	Low	Low
Eric C Tang et al., 2020	Low	Low	Low	Low	Low	Low
Njeri Wairimu et al., 2023	Low	Low	Low	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
Kostyantyn V. Dumchev et al., 2023	Low	Low	Low	Low	Low	Low
C. Agustí et al., 2023	Low	Low	Low	Low	Low	Low
Cynthia Firnhaber et al., 2026	Low	Low	Unclear	Low	Low	Low
H. T. M. Bui et al., 2024	Low	Low	Low	Low	Low	Low
Erin C. Wilson et al., 2021	Low	Low	Unclear	Low	Low	Low
T. Vanbaelen et al., 2024	Low	Low	Low	Low	Low	Low
A. Medina-Marino et al., 2021	Low	Low	Low	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
Alison C. Castle et al., 2025	Moderate	Low	Low	Low	Low	Low
Judith Ratcliffe et al., 2026	Low	Low	Unclear	Low	Low	Low
Ofole Mgbako et al., 2026	Low	Low	Low	Low	Low	Low
A. Bazzi et al., 2016	Moderate	Low	Low	Low	Low	Low
J. Dettinger et al., 2019	Low	Low	Low	Low	Low	Low
D. J. Joseph Davey et al., 2025	Low	Low	Low	Low	Low	Low
J. Fuchs et al., 2018	Low	Low	Unclear	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
Chunyan Li et al., 2023	Low	Low	Low	Low	Low	Low
Jing Zhang et al., 2020	Low	Low	Low	Low	Low	Low
Maureen McGowan et al., 2024	Low	Low	Low	Low	Low	Low
S. Jana et al., 2021	Moderate	Low	Low	Low	Low	Low
J. Terada- Hirashima et al., 2023	Low	Low	Low	Low	Low	Low
J. Molina et al., 2017	Low	Low	Low	Low	Low	Low
Mph Alexis M. Roth et al., 2020	Low	Low	Low	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
Hossein Moameri et al., 2025	Moderate	Moderate	Low	Low	Low	Moderate
R. Mpirirwe et al., 2024	Moderate	Low	Low	Low	Low	Low
R. Braun et al., 2023	Low	Low	Unclear	Low	Low	Low
B. Pečavar et al., 2021	Unclear	Low	Low	Low	Low	Moderate
B. Weir et al., 2023	Low	Low	Low	Low	Low	Low
R. Shrestha et al., 2023	Low	Low	Low	Low	Low	Low
K. Mugwanya et al., 2025	Low	Low	Low	Low	Low	Low

Author (Year)	Randomization (D1)	Deviation from Intended Intervention (D2)	Missing Outcome Data (D3)	Measurement of Outcome (D4)	Selection of Reported Result (D5)	Overall Risk of Bias
Emiko Kamitani et al., 2023	Moderate	Moderate	Low	Low	Low	Moderate

RESULTS

Characteristics of Included Studies

The systematic review includes 80 studies examining PrEP integration into sexual health and venereology services. Studies were conducted across diverse geographic regions including North America, Europe, sub-Saharan Africa, Latin America, and Asia-Pacific.

Study	Geographic Location	Setting	Target Population	Sample Size
J. Raifman et al., 2018	Rhode Island, USA	Public STI clinic [5]	MSM [5]	964 HIV-negative MSM [5]
Rachel K Scott et al., 2023	Washington D.C., USA	Public sexual health clinic [6]	Cisgender women [6]	2,064 encounters (1,720 women) [6]

Study	Geographic Location	Setting	Target Population	Sample Size
Ann Sullivan et al., 2023	England	Sexual health services [1]	MSM (95.5%) [1]	21,356 participants [1]
Anne-Emilie Rouffiac et al., 2020	Jackson, MS, USA	Public STI clinic [22]	Young BMSM [22]	65 participants [22]
P. Chan et al., 2021	Urban USA	Public STI clinic [23]	MSM at increased risk [23]	86 participants [23]
S. Rutstein et al., 2025	Lilongwe, Malawi	Public STI clinic [24]	Heterosexual men [24]	200 participants [24]
Catherine A Koss et al., 2023	Rural Kenya & Uganda	Outpatient departments [25]	61% women [25]	403 participants [25]
S. Rutstein et al., 2024	Rural North Carolina, USA	Public STI clinics [9]	Sexual/gender minorities [9]	Up to 336 participants [9]

Study	Geographic Location	Setting	Target Population	Sample Size
D. Ogaz et al., 2025	England	Sexual health services [26]	MSM [26]	165,270 MSM attendees [26]
Chase A Cannon et al., 2024	Seattle, WA, USA	Public sexual health clinic [27]	Sexual minority men [27]	458 participants [27]
Marije L Groot Bruinderink et al., 2023	Netherlands	Public sexual health centers [28]	MSM and transgender persons [28]	442 participants [28]
C. O'Halloran et al., 2019	England	Public sexual health clinics [29]	HIV-negative GBM [29]	544 participants [29]
B. Grinsztejn et al., 2023	Brazil (6 cities)	Public health facilities [30]	Young SGM [30]	1,200 participants [30]

Study	Geographic Location	Setting	Target Population	Sample Size
L. Whiteley et al., 2019	Jackson, MS, USA	Public STI clinic [31]	Young BMSM [31]	66 participants [31]
J. Busang et al., 2026	Rural South Africa	Community -based SRH services [32]	Youth aged 15-30 [32]	Not specified [32]
Ferdous A Ahmed et al., 2021	Global	Multiple settings [33]	MSM, transgender women, FSW [33]	104 studies [33]
Elizabeth M Irungu et al., 2021	Kenya	Public HIV care clinics [14]	Serodiscordant couples [14]	4,898 individuals [14]
S. McCormack et al., 2016	England	Public sexual health clinics [3]	MSM [3]	544 participants [3]
B. Grinsztejn et al., 2018	Brazil	Public health clinics [34]	MSM and transgender women [34]	450 participants [34]

Study	Geographic Location	Setting	Target Population	Sample Size
S. Karim et al., 2021	Kenya	Public clinics [15]	Various populations [15]	4,898 initiations [15]
L. Coyer et al., 2022	France	Not specified [21]	Adult men at high risk [21]	46,706 individuals [21]
Luxi Lal et al., 2017	Melbourne, Australia	Multiple clinics [17]	At-risk individuals [17]	114 participants [17]
L. Lalley-Chareczko et al., 2018	Philadelphia, PA, USA	Urban community health center [35]	Young MSM and transgender women of color [35]	50 participants [35]
W. Goedel et al., 2022	Jackson, MS, USA	Community health center [36]	Black/African American MSM [36]	60 participants [36]

Study	Geographic Location	Setting	Target Population	Sample Size
Daniel Teixeira da Silva et al., 2020	Chicago, IL, USA	Network services [37]	BMSM/TW [37]	146 participants [37]
Alexandre Grangeiro et al., 2015	Brazil (5 cities)	Public STD/HIV clinics [38]	MSM, heterosexual men, FSW [38]	3,200 individuals [38]
A. Grulich et al., 2021	New South Wales, Australia	Multiple settings [39]	Gay and bisexual men [39]	9,709 participants [39]
L. Whiteley et al., 2020	Mississippi, USA	University health center [40]	Young MSM [40]	60 participants [40]
M. Noret et al., 2018	Paris, France	Hospital-based clinic [13]	MSM (99.4%) [13]	1,049 participants [13]
E. Hoornenborg et al., 2019	Amsterdam, Netherlands	Public STI clinic [18]	MSM and transgender persons [18]	376 participants [18]

Study	Geographic Location	Setting	Target Population	Sample Size
S. Azariah et al., 2019	Auckland, New Zealand	Public sexual health service [41]	Gay and bisexual men [41]	150 participants [41]
R. Heffron et al., 2022	Uganda	ART clinics [42]	Serodifferent couples [42]	1,381 couples [42]
H. Sacks et al., 2016	England	Sexual health centers [43]	MSM [43]	544 participants [43]
Luana M S Marins et al., 2019	Brazil	Public health facilities [44]	MSM and transgender women [44]	450 participants [44]
J. D. Wit et al., 2015	Melbourne, Australia	Multiple clinic types [45]	Gay/bisexual men [45]	92 participants [45]
K. Ngure et al., 2022	Thika, Kenya	Research clinic [46]	Adults at HIV risk [46]	495 participants [46]

Study	Geographic Location	Setting	Target Population	Sample Size
E. Hoornenborg et al., 2018	Amsterdam, Netherlands	Public STI clinic [47]	MSM and transgender persons [47]	Not specified [47]
D. Dolling et al., 2016	England	Public STI clinics [48]	GMSM [48]	544 participants [48]
S. Cohen et al., 2015	USA (3 cities)	STI clinics and health center [49]	MSM [49]	557 participants [49]
M. Akolo et al., 2019	Nairobi, Kenya	HIV/STI research center [50]	MSM [50]	168 participants [50]
A. Mujugira et al., 2024	Uganda	Not specified [19]	Transgender women [19]	30 interviews [19]
C. L. et al., 2023	Bangkok & Pattaya, Thailand	Hospitals and community clinics [2]	MSM and TGW [2]	803 participants [2]

Study	Geographic Location	Setting	Target Population	Sample Size
S. Sahay et al., 2023	India (2 cities)	Clinic and community-based [51]	MSM and TGW [51]	600 participants [51]
Cynthia Dalton et al., 2021	North Carolina, USA	Public STI clinic [52]	African American MSM [52]	7 participants [52]
C. Robbins et al., 2025	Southwestern USA	Large urban STI clinic [53]	STI testing patients [53]	13,485 participants [53]
Ethan Moitra et al., 2020	Not specified	STI clinic [54]	MSM [54]	19 participants [54]
Benn Kwach et al., 2025	Kisumu County, Kenya	High-volume HIV clinics [7]	PrEP clients [7]	≥2,400 clients [7]
T. Cassidy et al., 2021	Khayelitsha, South Africa	Government youth clinic [8]	Young women (18-25) [8]	224 participants [8]

Study	Geographic Location	Setting	Target Population	Sample Size
E. White et al., 2019	England	Sexual health centres [55]	MSM [55]	269 participants [55]
Eric C Tang et al., 2020	USA (3 cities)	STI clinics and health center [56]	MSM and TGW [56]	557 participants [56]
Njeri Wairimu et al., 2023	Central Kenya	Public healthcare clinics [10]	Young women (16-24) [10]	80 peer providers [10]
Kostyantyn V. Dumchev et al., 2023	Kyiv, Ukraine	HIV clinic and harm reduction center [57]	PWID [57]	199 participants [57]
C. Agustí et al., 2023	Barcelona, Spain	Public health center [58]	GBMSM and TW [58]	Not specified [58]
Cynthia Firnhaber et al., 2026	USA (3 cities)	Vivent Health clinics [59]	MSM and TGW [59]	75 participants [59]

Study	Geographic Location	Setting	Target Population	Sample Size
H. T. M. Bui et al., 2024	Hanoi, Vietnam	University health center [60]	MSM with unhealthy alcohol use [60]	564 participants [60]
Erin C. Wilson et al., 2021	Rio de Janeiro, Brazil	Trans-affirming public clinic [61]	Young trans women [61]	18 participants [61]
T. Vanbaelen et al., 2024	Belgium (5 centers)	HIV reference centers [62]	MSM and TGW [62]	1,014 participants [62]
A. Medina-Marino et al., 2021	Eastern Cape, South Africa	Community-based platforms [63]	AGYW (16-25) [63]	480 participants [63]
Alison C. Castle et al., 2025	KwaZulu-Natal, South Africa	Not specified [64]	Men (16-29) [64]	325 participants [64]

Study	Geographic Location	Setting	Target Population	Sample Size
Judith Ratcliffe et al., 2026	New York City, USA	Municipal hospital [65]	BLMSM, BLCGW, TGNB [65]	Not specified [65]
Ofole Mgbako et al., 2026	New York City, USA	Public hospital clinic [66]	BLMSM, BLCGW, TGNB [66]	110 participants [66]
A. Bazzi et al., 2016	England	Sexual health clinics [67]	High-risk MSM [67]	Not specified [67]
J. Dettinger et al., 2019	Western Kenya	Maternal child health clinics [68]	Pregnant women [68]	4,000 women [68]
D. J. Joseph Davey et al., 2025	South Africa	Single-centre facility [69]	AGYW and male partners [69]	900 participants [69]
J. Fuchs et al., 2018	San Francisco & Chicago, USA	Research sites [70]	MSM [70]	56 participants [70]

Study	Geographic Location	Setting	Target Population	Sample Size
Chunyan Li et al., 2023	Guangzhou, China	Public/hospital-based [71]	GBMSM [71]	70 participants [71]
Jing Zhang et al., 2020	China (4 cities)	Class A hospitals [72]	MSM [72]	1,000 participants [72]
Maureen McGowan et al., 2024	Kiambu County, Kenya	Public healthcare clinics [11]	AGYW (16-24) [11]	16 peer providers, 30 peer clients [11]
S. Jana et al., 2021	Kolkata, India	Community-based program [20]	Female sex workers [20]	843 screened, 678 enrolled [20]
J. Terada-Hirashima et al., 2023	Tokyo, Japan	National health center [73]	MSM [73]	124 participants [73]
J. Molina et al., 2017	France & Canada (7 sites)	Not specified [4]	MSM and transgender women [4]	361 participants [4]

Study	Geographic Location	Setting	Target Population	Sample Size
Mph Alexis M. Roth et al., 2020	Philadelphia, PA, USA	Syringe services program [74]	Women who inject drugs [74]	136 participants [74]
Hosseini Moameri et al., 2025	Global	Multiple settings [75]	FSW (mentioned) [75]	12 studies [75]
R. Mpirirwe et al., 2024	Sub-Saharan Africa	Community and facility-based [76]	Female sex workers [76]	23 studies, 40,669 FSW [76]
R. Braun et al., 2023	USA (4 regions)	Not specified [77]	Young cisgender men and TGW who have sex with men [77]	229 participants [77]
B. Pečavar et al., 2021	Slovenia	Not specified [78]	MSM [78]	69 participants [78]

Study	Geographic Location	Setting	Target Population	Sample Size
B. Weir et al., 2023	Bangkok & Pattaya, Thailand	Community-based [16]	Young MSM and TGW who sell sex [16]	846 participants [16]
R. Shrestha et al., 2023	Greater Kuala Lumpur, Malaysia	Not specified [79]	MSM [79]	50 participants [79]
K. Mugwanya et al., 2025	Kisumu County, Kenya	Public family planning clinics [12]	Women (15-49) [12]	25,457 women [12]
Emiko Kamitani et al., 2023	USA	Multiple settings [80]	MSM, women in criminal justice [80]	16 studies [80]

Most studies employed prospective cohort designs, randomized controlled trials, or demonstration studies. The majority focused on men who have sex with men (MSM), with a growing number targeting cisgender women, transgender populations, and other key affected groups such as female sex workers and people who inject drugs. Studies were conducted primarily in high-income countries (68%), with 22% from low- and middle-income countries, particularly in sub-Saharan Africa [33].

Integration Models

Integration of PrEP into venereology and sexual health services varied substantially across settings, ranging from simple referral systems to fully unified care delivery.

Integration Type	Studies	Key Features
Embedded within existing STI services	J. Raifman et al., 2018 [5]; Rachel K Scott et al., 2023 [6]; Ann Sullivan et al., 2023 [1]; P. Chan et al., 2021 [23]; S. Rutstein et al., 2025 [24]; S. Rutstein et al., 2024 [9]; Chase A Cannon et al., 2024 [27]	Brief education sessions integrated into sexual risk counseling [5]; EHR prompts [6]; home-based monitoring [27]
Comprehensive unified care	Marije L Groot Bruinderink et al., 2023 [28]; B. Grinsztejn et al., 2023 [30]; J. Busang et al., 2026 [32]; T. Cassidy et al., 2021 [8]; Benn Kwach et al., 2025 [7]	Single-provider delivery model [7]; contraception and STI services [8]; choice of PrEP modalities [32]
Co-located services	Catherine A Koss et al., 2023 [25]; A. Medina-Marino et al., 2021 [63]; Erin C. Wilson et al., 2021 [61]	Community vs. clinic-based service location choice [25]; community-based platforms [63]

Integration Type	Studies	Key Features
Referral-based integration	Njeri Wairimu et al., 2023 [10]; Ofole Mgbako et al., 2026 [66]; Maureen McGowan et al., 2024 [11]	Peer referral systems [10, 11]; CBO partnerships [66]
Telehealth-based	S. Rutstein et al., 2024 [9]; Cynthia Firnhaber et al., 2026 [59]; R. Braun et al., 2023 [77]; C. Agustí et al., 2023 [58]	Remote PrEP services [9]; e- consultation options [79]; online screening [58]

The most common integration approach embedded PrEP directly within existing STI clinic workflows, with providers trained to offer PrEP as part of routine sexual health care [1, 5, 6]. In Washington D.C., integration included clinic-wide training, electronic health record prompts for PrEP counseling, and educational videos in waiting rooms [6]. The English Impact Trial implemented both daily and event-based PrEP options across 157 sexual health services [1].

Comprehensive unified care models consolidated all PrEP-related services into single-visit encounters. In Kenya, the One-Stop model delivered HIV risk evaluation, testing, and PrEP dispensing by a single provider in one consultation room [7]. South Africa's community-based approach combined PrEP with peer navigation and mobile nurse-led clinics providing integrated HIV and sexual/reproductive health services [32].

Telehealth integration emerged as a significant innovation, particularly during the COVID-19 pandemic. Models ranged from full remote delivery with home specimen collection [27] to hybrid approaches alternating in-person and virtual visits [58]. North Carolina's multilevel intervention combined digital health apps, remote PrEP navigation, and optional telehealth services for rural populations [9].

Peer-based referral systems represented a distinct integration approach, formalizing the common practice of informal peer PrEP referral. In Kenya, peer providers trained in HIV prevention delivered HIV self-testing kits and referral cards to their peers [10, 11].

HIV Prevention Effectiveness

HIV incidence among PrEP users in integrated venereology services was consistently low across studies reporting this outcome, demonstrating the real-world effectiveness of PrEP when delivered through sexual health settings.

Study	Setting	HIV Incidence on PrEP	HIV Incidence in Comparison Group	Effectiveness Estimate
S. McCormack et al., 2016	England STI clinics	1.2/100 PY [3]	9.0/100 PY (deferred) [3]	86% reduction (90% CI: 64-96) [3]
Ann Sullivan et al., 2023	England SHS	0.13/100 PY (MSM) [1]	0.95/100 PY (non-trial) [1]	86.8% reduction (95% CI: 80.2-91.6) [1]
A. Grulich et al., 2021	Australia multiple settings	1.61/1000 PY [39]	Not specified	Not specified [39]
Elizabeth M Irungu et al., 2021	Kenya HIV care clinics	0.24/100 PY [14]	Not specified	90% reduction (95% CI: 76-95) [14]

Study	Setting	HIV Incidence on PrEP	HIV Incidence in Comparison Group	Effectiveness Estimate
J. Molina et al., 2017	France & Canada	0.19/100 PY [4]	6.60/100 PY (placebo) [4]	97% reduction (95% CI: 81-100) [4]
B. Grinsztejn et al., 2018	Brazil public clinics	0.51/100 PY [34]	Not specified	Not specified [34]
M. Noret et al., 2018	Paris hospital clinic	0.82/100 PY [13]	Not specified	Not specified [13]
E. Hoornenborg et al., 2019	Amsterdam STI clinic	0.30/100 PY [18]	Not specified	Not specified [18]
C. L. et al., 2023	Thailand hospitals/community	2.1/100 PY [2]	2.2/100 PY (not on PrEP) [2]	Not specified [2]
B. Weir et al., 2023	Thailand community-based	0.0/100 PY [16]	3.42/100 PY (no PrEP) [16]	IRR=0.0 (95% CI: 0.0-0.22) [16]
K. Mugwanya et al., 2025	Kenya family planning clinics	0.60/100 woman-years [12]	Not specified	Not specified [12]

Study	Setting	HIV Incidence on PrEP	HIV Incidence in Comparison Group	Effectiveness Estimate
J. Terada-Hirashima et al., 2023	Japan national center	0/100 PY (over 235.5 PY) [73]	3.4%/year (non-PrEP) [73]	Not specified [73]

The PROUD trial in England demonstrated 86% reduction in HIV incidence (90% CI: 64-96) when PrEP was delivered immediately through sexual health clinics compared to deferred access [3]. The larger Impact Trial across 157 English sexual health services showed similar effectiveness, with HIV incidence of 0.13 per 100 person-years among MSM trial participants versus 0.95 per 100 person-years among non-trial attendees, representing an 86.8% reduction (95% CI: 80.2-91.6) [1].

Regional variations in effectiveness were observed within the Impact Trial, with London sites showing lower HIV incidence (0.07 per 100 person-years, 95% CI: 0.04-0.14) compared to sites outside London (0.22 per 100 person-years, 95% CI: 0.13-0.36) [26]. These differences likely reflected variations in service delivery models and population risk profiles rather than differential PrEP effectiveness.

In Kenya's integration of PrEP into public HIV care clinics, six HIV infections occurred over 2,531 person-years of observation, yielding an incidence of 0.24 per 100 person-years [14]. Notably, three of these infections occurred at the first visit after PrEP initiation, suggesting they were likely incident infections during the window period [14]. This represented a 90% reduction (95% CI: 76-95) compared to predicted incidence without PrEP and antiretroviral therapy [14].

Studies reporting zero HIV seroconversions among PrEP users included implementations in Japan (0 infections over 235.5 person-years) [73], Thailand community settings [16], India among female sex workers [20], and Slovenia [78]. The circumstance of HIV infections that did occur was consistently linked to poor or absent adherence. In Brazil, both individuals who seroconverted had

undetectable tenofovir concentrations at the time of seroconversion [34]. Similarly, in Thailand, all five participants taking PrEP who acquired HIV reported taking fewer than four pills in the weeks preceding study visits [2].

The Kenya family planning clinic integration demonstrated effectiveness despite targeting a population not traditionally prioritized for PrEP. Among women at increased HIV risk, incidence was 0.60 per 100 woman-years (95% CI: 0.19-1.40), with all five infections occurring in women who either declined PrEP or had undetectable tenofovir diphosphate levels at multiple visits before seroconversion [12].

PrEP Uptake and Engagement

Uptake of PrEP through integrated venereology services varied substantially by integration model, population characteristics, and implementation strategies.

Initiation Rates

Study	Setting	Eligible Population	Initiation Rate	Key Factors
Ann Sullivan et al., 2023	England SHS	Clinically assessed as eligible	57.1% (21,292/37,289) [1]	Not specified
Rachel K Scott et al., 2023	Washington D.C. clinic	Eligible women	14.9% (139/931) [6]	Sociostructural barriers [6]
P. Chan et al., 2021	Urban USA STI clinic	High-risk MSM	52.3% (intervention) [23]	Motivational interviewing [23]

Study	Setting	Eligible Population	Initiation Rate	Key Factors
P. Chan et al., 2021	Same	Same	27.9% (control) [23]	Standard referral [23]
R. Heffron et al., 2022	Uganda ART clinics	HIV-negative partners	81.0% (527/651) [42]	Integration with ART services [42]
K. Mugwanya et al., 2025	Kenya family planning	Screened and eligible	40.6% (intervention) [12]	Provider capacity-building [12]
K. Mugwanya et al., 2025	Same	Same	4.2% (usual care) [12]	Standard practice [12]
C. L. et al., 2023	Thailand hospitals/community	Enrolled participants	43.5% (349/803) [2]	Sex work status, perceived risk, knowledge [2]
M. Noret et al., 2018	Paris hospital	Screened individuals	98.1% (1,049/1,069) [13]	Hospital-based setting [13]
B. Weir et al., 2023	Thailand community	Enrolled participants	75.1% (635/846) [16]	Comprehensive community support [16]

PrEP uptake among those clinically assessed as eligible in the English Impact Trial reached 57.1% (21,292 of 37,289) [1], though this varied considerably by site characteristics. Uptake ranged from 42% to 92% across sites, with consistently higher rates in London sexual health services compared to those outside London [26].

Behavioral interventions demonstrated significant effects on uptake. A brief motivational interviewing intervention in a U.S. STI clinic increased the proportion of participants attending a PrEP appointment and accepting a prescription to 52.3% versus 27.9% in treatment-as-usual (odds ratio: 3.6, 95% CI: 1.5-8.9) [23]. In Chicago, an Information-Motivation-Behavioral Skills model intervention improved linkage to PrEP care to 24% versus 11% in controls within three months [37].

Integration into family planning services in Kenya demonstrated dramatic increases in screening and initiation. The proportion of women screened for PrEP increased from 2.9% (213 of 7,386) during the usual-care period to 91.6% (19,560 of 21,343) during the intervention period (relative risk: 20.5, 95% CI: 3.5-120.4) [12]. Among women assessed as eligible, PrEP initiation increased from 4.2% to 40.6% (relative risk: 50.1, 95% CI: 2.8-913.4) [12].

Peer-based referral models showed promising uptake among hard-to-reach populations. In Kenya, when peer providers used formalized referral with HIV self-testing kit delivery, PrEP initiation among eligible PrEP-naïve peer clients reached 78% as reported by providers and 85% as reported by clients at one month [11].

Retention and Persistence

Retention rates declined substantially over time across most integrated settings, with the steepest drop-offs occurring in the first six months.

Study	Setting	1 Month	3 Months	6 Months	12 Months
Elizabeth M Irungu et al., 2021	Kenya HIV clinics	57% [14]	44% [14]	34% [14]	23% [15]

Study	Setting	1 Month	3 Months	6 Months	12 Months
Rachel K Scott et al., 2023	Washington D.C. clinic	Not reported	58.9% [6]	Not reported	Not reported
W. Goedel et al., 2022	Mississippi health center (intervention)	Not reported	70.0% [36]	36.7% [36]	Not reported
W. Goedel et al., 2022	Same (control)	Not reported	43.3% [36]	26.7% [36]	Not reported
T. Cassidy et al., 2021	South Africa youth clinic	Not reported	Not reported	Not reported	29% at 18 months [8]
L. Lalley-Chareczko et al., 2018	Philadelphia health center	Not reported	Not reported	Not reported	70% at 48 weeks [35]
B. Weir et al., 2023	Thailand community	Not reported	Not reported	Not reported	85.9% [16]

In Kenya's public HIV care clinics, PrEP continuation declined from 57% at one month to 44% at three months and 34% at six months [14]. However, 12% of those who missed a refill subsequently returned for PrEP re-initiation [14], suggesting that some discontinuation represented temporary interruptions rather than permanent cessation.

Patient navigation interventions improved retention outcomes. In Mississippi, a brief patient navigation intervention for Black MSM resulted in 70% retention at three months versus 43.3% in

controls (RR: 1.62, 95% CI: 1.01-2.59) [36]. However, retention declined to 36.7% by six months even in the intervention group [36].

Notably higher retention was observed in some settings. In Thailand's community-based implementation among young MSM and transgender women who sell sex, 85.9% remained on PrEP at 12 months [16]. This occurred in a context of comprehensive services including quarterly HIV testing, semiannual STI testing, condom provision, monthly adherence counseling, and SMS reminders [16].

The Australian EPIC-NSW study demonstrated sustained engagement over three years, though mean medication possession ratio (MPR) declined from 0.93 in the first quarter to 0.64 in the ninth quarter [39]. This occurred during a transition from study-provided to purchased PrEP, suggesting that adherence patterns may shift with changes in delivery models [39].

Adherence Measures

Adherence to PrEP when measured objectively often diverged from self-reported adherence, highlighting the importance of biomarker validation in integrated settings.

Study	Self-Reported Adherence	Biomarker-Confirmed Adherence	Concordance
Elizabeth M Irungu et al., 2021	70% [14]	96% with detectable TFV-DP [14]	High
B. Grinsztejn et al., 2018	Not specified	74% with protective concentrations (≥ 4 doses/week) [34]	Not specified
Kostyantyn V. Dumchev et al., 2023	77% reported $>95\%$ of doses [57]	3% with 4+ doses/week [57]	Very low

Study	Self-Reported Adherence	Biomarker-Confirmed Adherence	Concordance
S. Jana et al., 2021	>70% daily adherence [20]	65% with TDF $\geq$ 40 ng/mL [20]	Moderate
J. Molina et al., 2017	Not specified	71% with detectable tenofovir at 6 months [4]	Not specified

In the Brazil demonstration study, 74% of participants retained through 48 weeks had protective drug concentrations consistent with at least four doses per week [34]. Factors associated with protective concentrations included living in São Paulo versus Rio de Janeiro (adjusted odds ratio: 1.88, 95% CI: 1.06-3.34), having sex with HIV-infected partners (aOR: 1.78, 95% CI: 1.03-3.08), stimulant use (aOR: 2.23, 95% CI: 1.02-4.92), and protective concentrations at week 4 (aOR: 3.28, 95% CI: 1.85-5.80) [34].

A striking discordance was observed among people who inject drugs in Ukraine. While 77% self-reported taking more than 95% of doses and 87% reported taking their last dose within two days, only 17% had detectable tenofovir diphosphate and 25% had detectable emtricitabine triphosphate [57]. Merely 3% had metabolite levels indicating consistent uptake at four or more doses per week [57].

Adherence monitoring in Philadelphia using urine tenofovir levels among young MSM and transgender women of color showed levels consistent with recent adherence in 80%, 74.4%, 82.4%, 82.4%, and 69.7% at weeks 4, 12, 24, 36, and 48, respectively [35]. Retention at 48 weeks was 70% [35].

Sexually Transmitted Infection Outcomes

Integration of PrEP into venereology services provided opportunities for enhanced STI screening and management, though patterns of STI incidence varied across studies and raised questions about risk compensation.

STI Incidence and Trends

Study	Setting	Baseline STI Rate	Follow-up STI Rate	Pattern
Ann Sullivan et al., 2023	England SHS	Not specified	68.1/100 PY (bacterial STIs in MSM) [1]	High incidence concentrated in 24% of participants [1]
E. Hoornenborg et al., 2019	Amsterdam STI clinic	Not specified	90.4/100 PY [18]	No change over time [18]
Luxi Lal et al., 2017	Melbourne, Australia	43.2/100 PY (months 0-3) [17]	119.8/100 PY (months 3-12) [17]	IRR: 2.77 (95% CI: 1.52-5.56) [17]
M. Noret et al., 2018	Paris hospital	14.6% at baseline [13]	19.2% at month 12 [13]	Modest increase [13]
J. Molina et al., 2017	France & Canada	49.1/100 PY (randomized phase) [4]	59.0/100 PY (open-label) [4]	No significant change [4]

Study	Setting	Baseline STI Rate	Follow-up STI Rate	Pattern
B. Pečavar et al., 2021	Slovenia	Not specified	61.7/100 PY [78]	Not specified
L. Lalley-Chareczko et al., 2018	Philadelphia health center	Not specified	61 STIs/231 screenings over 48 weeks [35]	No change between periods [35]
T. Cassidy et al., 2021	South Africa youth clinic	27.6% (first 6 months) [8]	13.8% (final 6 months) [8]	Decreased [8]

In the English Impact Trial, 18,607 bacterial STIs were recorded among MSM participants, yielding an incidence of 68.1 per 100 person-years [1]. Importantly, 24.4% of MSM participants were diagnosed with two or more STIs, accounting for 79.5% of all diagnoses [1], indicating that STI burden was concentrated within a subgroup of PrEP users. This concentration presents both a challenge and an opportunity for tailored STI control measures [1].

In Melbourne, a significant increase in STI incidence was observed after PrEP initiation, rising from 43.2 per 100 person-years at months 0-3 to 119.8 per 100 person-years at months 3-12 (incidence rate ratio: 2.77, 95% CI: 1.52-5.56) [17]. This occurred concomitantly with a significant decline in condom use [17].

Conversely, some integrated programs observed decreased STI rates. In South Africa, STI incidence among young women in a government clinic decreased from 27.6% in the first six months to 13.8% in the final six months of follow-up [8]. Participants credited their PrEP experience with changing their behavior, with self-reported sex with multiple partners and condomless sex both decreasing significantly after enrollment [8].

A targeted intervention study in Kenya demonstrated the impact of health education on STI outcomes among MSM taking PrEP. Syndromic STI cases at month one were similar between intervention (30.9%) and control (33.3%) arms, but by month six, cases were 12% in the intervention arm versus 42% in controls [50].

STI Screening Frequency and Detection

The integration of PrEP into venereology services enabled more frequent and comprehensive STI screening than typically occurs in other healthcare settings. Eric C Tang et al. (2020) evaluated quarterly versus semiannual screening among MSM and transgender women on PrEP [56]. They found that 50.9% of participants had an STI during follow-up, with 89.2% of those with asymptomatic STIs reporting condomless anal sex with a mean of 8.1 partners between quarterly visits [56]. If screening had been conducted only semiannually or based on symptoms, identification of 34.3% of gonorrhea, 40.0% of chlamydia, and 20.4% of syphilis infections would have been delayed by up to three months [56].

In Amsterdam, more than a quarter of all STIs among PrEP users were diagnosed from tests performed between scheduled study visits [18], highlighting the value of flexible testing access within integrated models. The overall STI incidence of 90.4 per 100 person-years did not change over two years of follow-up [18].

The Gonoscreen trial in Belgium specifically tested whether routine screening improved outcomes. Participants randomized to non-screening had higher overall STI incidence (incidence rate ratio: 1.318, 95% CI: 1.068-1.627) compared to those receiving three-site quarterly screening [62]. The difference was driven primarily by increased chlamydia infections and symptomatic chlamydia in the non-screening arm [62]. However, screening was associated with significantly higher antibiotic consumption [62] and had no effect on gonorrhea incidence [62].

Integration also facilitated enhanced STI management. In Uganda's integrated PrEP/STI services for transgender women, the convenience of urine testing for both tenofovir levels and STI detection motivated PrEP adherence and enhanced STI detection and treatment [19].

Behavioral Outcomes

Sexual behavior changes among PrEP users in integrated venereology settings reflected complex patterns of risk compensation and risk reduction.

The PROUD trial observed no difference in the occurrence of sexually transmitted infections, particularly rectal gonorrhea and chlamydia, between groups despite evidence of risk compensation among some PrEP recipients [3]. Similarly, Brazil's demonstration study found that the mean number of sexual partners decreased from 11.4 (SD: 28.94) at enrollment to 8.3 (19.55) at week 48, while receptive anal sex with the last three partners showed a non-significant increase from 45% to 49% [34].

In Paris, the rate of condomless sex at last intercourse increased substantially from 53.3% at baseline to 79% at month 12 [13]. However, this was accompanied by only a modest increase in bacterial STI rates from 14.6% at baseline to 19.2% at month 12 [13].

Melbourne's VicPrEP study documented decreased condom use on a five-point scale with both regular partners (mean 2.0 to 1.7, $p=0.048$) and casual partners (mean 3.0 to 2.5, $p=0.002$) at three-month follow-up [45]. Other risk reduction behaviors including serosorting, viral load sorting, strategic positioning, and withdrawal remained unchanged [45].

Among young women in South Africa receiving integrated PrEP and contraception services, self-reported sex with more than one partner and sex without a condom both decreased significantly after enrollment ($p<0.001$ and $p=0.063$, respectively) [8]. Participants credited their PrEP experience with changing their behavior [8].

The chemsex substudy from PROUD found no statistically significant association between reporting less than seven out of seven intended doses and chemsex engagement (aOR=1.29, 95% CI: 0.90-1.87) [29], suggesting that PrEP adherence was maintained even among participants engaging in high-risk substance-associated sex.

Service Delivery Innovations

Integration of PrEP into venereology services catalyzed numerous innovations in service delivery models, particularly leveraging digital health technologies and peer support.

Digital and Telehealth Approaches

Multiple studies evaluated digital interventions to support PrEP delivery through integrated sexual health services. In Malaysia, a clinic-integrated smartphone app (JomPrEP) achieved 92% PrEP initiation among 50 PrEP-naïve MSM, with 84% ordering HIV self-testing kits [79]. Participants used the app an average of 8 times during 30 days, with sessions lasting an average of 28 minutes [79]. The app was rated as having high acceptability with a mean System Usability Scale score of 73.8 (SD: 10.1) [79].

A mobile health intervention using weekly bidirectional text or email messages in San Francisco and Chicago demonstrated a 50% reduction in missed doses (95% CI: 16-71) based on pre-post analysis of pill counts [70]. Two-thirds of participants opted for text message delivery, and while only one individual requested support, participants reported feeling supported knowing "someone was always there" [70].

Telehealth-based PrEP delivery achieved comparable short-term persistence to in-person care. In a comparison across three U.S. cities, 64% of telehealth participants completed three-month follow-up, with 93.6% using virtual-only visits [59]. Almost 90% of study participants were satisfied with telehealth visits and 100% would recommend them [59], though only 40% of staff were satisfied with the telehealth model [59].

Home-based PrEP monitoring represented an innovative approach to reduce clinic visit burden. In Seattle, participants randomized to have the option of home-based PrEP monitoring for two of three triannual visits showed 67% utilization of home self-collection, with 82% successfully returning test kits [27]. This model appeared feasible and acceptable while potentially expanding clinical capacity to serve greater numbers of PrEP users [27].

Peer Support and Navigation

Peer-delivered interventions demonstrated effectiveness in reaching populations with low traditional healthcare engagement. In Rio de Janeiro, a peer and mobile health-delivered systems navigation intervention for young trans women achieved 100% PrEP initiation among participants without HIV and 90% retention at nine months [61].

In Kenya, formalized peer referral enhanced with HIV self-testing kit delivery achieved PrEP initiation rates of 78-85% among peer clients at one month [11]. Recent HIV self-testing use was high, reported by 95% of peer clients according to providers and 97% according to clients themselves [11]. Intervention outcomes were facilitated by close preexisting relationships, HIVST assistance, and peer providers escorting clients to clinic-based services [11].

Patient navigation for Black MSM in Mississippi improved multiple care cascade outcomes. Intervention participants were more likely to pick up their initial PrEP prescription (RR: 1.47, 95% CI: 1.10-1.97), be retained at three months (RR: 1.62, 95% CI: 1.01-2.59), and have access to PrEP medications greater than 80% of study days (RR: 3.00, 95% CI: 1.50-5.98) [36].

Alternative Service Locations

Integration extended beyond traditional clinic settings to reach underserved populations. In South Africa, community-based platforms offering same-day PrEP initiation services for young women demonstrated feasibility and acceptability [63]. Kenya's outpatient department-based integration demonstrated that product choice (oral PrEP or PEP) with the option to switch, combined with service location choice (community vs. clinic-based), resulted in 47.5% time covered by PrEP/PEP versus 18.3% in standard care (difference: 29.2%, 95% CI: 22.7-35.7) [25].

Selection of out-of-facility visits increased from 8% to 52% over 48 weeks when participants were given this option [25], suggesting strong preference for community-based services among certain populations.

Population-Specific Findings

Men Who Have Sex with Men

MSM represented the predominant population across studies (95.5% in England [1], 98.3% in Australia [39], 99.4% in Paris [13]). Integration into sexual health clinics serving MSM consistently achieved high uptake where access was made available.

In England's PROUD trial, participants had substantially higher HIV risk than the general MSM population attending sexual health clinics. At enrollment, 64% reported an STI diagnosis in the previous 12 months, and 87% reported ever having an STI diagnosis [48]. The median number

of partners in the last 90 days was 10 (IQR: 5-20) [48]. Post-exposure prophylaxis had been prescribed to 34% of participants in the past year [48].

Among MSM in the Amsterdam demonstration study, the choice between daily and event-driven PrEP regimens influenced both uptake and outcomes. At enrollment, 73% chose daily PrEP while 27% chose event-driven PrEP [18]. STI incidence was lower in the event-driven PrEP group compared to the daily PrEP group (aIRR: 0.59, 95% CI: 0.46-0.75) [18], likely reflecting differences in sexual behavior profiles rather than inherent differences in the PrEP regimens themselves [18].

Women

Integration of PrEP into services for women occurred primarily through family planning clinics and sexual health settings, though uptake patterns differed from MSM populations.

In Washington D.C., despite significant increases in provider screening (from 5.6% to 89.2%) and offering (from 6.2% to 69.8%) following an educational intervention, actual PrEP prescribing to women increased more modestly from 2.6% to 8.1% [6]. Persistence at three months among those who initiated was 58.9% [6]. Barriers included sociostructural factors beyond provider practices [6].

Kenya's integration into family planning clinics reached 25,457 HIV-negative women (median age 27 years) over the study period [12]. The intervention dramatically increased screening from 2.9% to 91.6% and initiation from 4.2% to 40.6% among eligible women [12]. All five HIV infections in the nested cohort occurred among women who either declined PrEP or had undetectable tenofovir diphosphate levels despite being enrolled [12].

In South Africa, a community-based PrEP program for young women (18-25 years) achieved 73.2% initiation among screened and eligible participants [8]. However, only 29% completed 18-month follow-up, and 46.9% were lost to follow-up by 18 months [8]. Adherence patterns were bimodal: 67% had consistently low tenofovir-diphosphate levels throughout follow-up, while 33% maintained sustained high adherence [8].

Transgender Populations

Transgender women accessed PrEP through integrated services in multiple settings, though they comprised small proportions of most study populations. In Uganda, integrated PrEP and STI services for transgender women demonstrated high acceptance and adherence [19]. The F/TAF formulation of PrEP was valued as being less readily identifiable as an HIV-related medication, resulting in reduced stigma compared to the better-known tenofovir disoproxil fumarate formulation [19]. Weight gain associated with F/TAF use was viewed positively as a symbol of health and prosperity [19].

Urine testing enhanced both PrEP adherence monitoring and STI detection among transgender women [19]. Participants reciprocated adherence support and drug-level feedback from healthcare workers by maintaining high medication adherence [19].

Key Populations

Female sex workers in Kolkata accessed PrEP through integration into an existing community-based HIV prevention program [20]. Of 843 women screened, 678 enrolled and started PrEP [20]. The 15-month retention rate was 89%, with self-reported daily adherence exceeding 70% [20]. Among those tested for tenofovir, 65% reached levels ≥ 40 ng/mL by their final visit [20]. No HIV seroconversions occurred, and there was no evidence of significant changes in sexual behavior [20].

People who inject drugs represented a particularly challenging population for PrEP integration. In Philadelphia, integrating PrEP with syringe services program achieved 66% uptake among 95 women who inject drugs [74]. Retention at week 24 was 44.2% [74]. However, self-reported adherence was discordant with urine-based quantification of tenofovir [74]. Among 95 participants, two HIV seroconversions occurred, and baseline STI prevalence was 17.9% [74].

In Ukraine, among 199 people who inject drugs receiving PrEP through integrated HIV clinic and harm reduction center services, adherence was extremely low despite supportive counseling and SMS reminders [57]. At month six, 77% reported taking more than 95% of doses, yet only 3% had metabolite levels indicating consistent uptake at four or more doses per week [57].

Implementation Outcomes

Screening and Assessment

Provider capacity-building interventions substantially increased PrEP eligibility screening in integrated settings. In Washington D.C., the proportion of women screened by providers for PrEP increased from 5.6% pre-implementation to a mean of 89.2% during the implementation period [6]. This dramatic increase was facilitated by clinic-wide PrEP trainings, electronic health record prompts for PrEP counseling, and educational videos in the waiting room [6].

Kenya's family planning clinic integration similarly increased screening from 2.9% (213 of 7,386 encounters) to 91.6% (19,560 of 21,343 encounters) following provider training and technical support (relative risk: 20.5, 95% CI: 3.5-120.4) [12].

In Rhode Island, implementation of a brief PrEP education intervention integrated into sexual risk counseling increased PrEP awareness between first and second clinic visits by 27.2 percentage points in the treatment group relative to 13.7 percentage points in the control group [5]. Based on adjusted estimates, the intervention increased PrEP awareness by 24 percentage points and PrEP use by 5 percentage points, representing increases of 63% and 159%, respectively, relative to the six months prior to the intervention [5].

Provider Training and Capacity

Staff training emerged as a critical implementation factor across multiple studies. Washington D.C.'s clinic-wide trainings increased provider knowledge and comfort in providing PrEP services [6], with providers finding the intervention highly feasible and acceptable [6]. The use of EHR prompts significantly increased PrEP offerings to patients [6].

Kenya's integration into public HIV care clinics provided comprehensive training for healthcare workers including clinical officers, nurses, pharmaceutical technologists, laboratory technicians, data clerks, HIV testing service providers, and lay health workers [14]. Training was completed within a month using Kenya Ministry of Health guidelines, and services began shortly thereafter [14].

The Impact Trial training model successfully prepared providers across 157 sexual health services in England to deliver PrEP [1]. However, variations in service delivery were observed,

with findings supporting ongoing enhancements to accommodate diverse service models, including those not traditionally focused on MSM populations [26].

Workflow Integration

Successful integration required careful attention to workflow modifications. The One-Stop PrEP Care model in Kenya consolidated all core PrEP components—HIV risk evaluation, HIV testing, and PrEP dispensing—into a single consultation room with one provider [7]. This approach aimed to reduce waiting time and enhance client satisfaction [7].

In Washington D.C., efficient implementation was facilitated by delivering training during mandatory meeting times, minimizing disruption to clinic operations [6]. The educational videos in the waiting room increased patient awareness and facilitated discussions without requiring additional staff time [6].

Kenya's stepped-wedge trial successfully utilized existing infrastructure and Ministry of Health guidelines, requiring no additional staffing or financial support for PrEP provision [14]. This pragmatic approach enabled rapid scale-up across 25 high-volume clinics [14].

Cost and Sustainability

Financial sustainability varied across integration models. The Washington D.C. intervention required minimal costs, with Department of Health funding ensuring sustainability [6]. In contrast, participants in open-label trials often faced out-of-pocket costs that served as barriers to uptake [54].

Australia's EPIC-NSW study maintained low HIV incidence of 2.24 per 1,000 person-years during the final year of follow-up when PrEP transitioned from study-provided to publicly subsidized [39]. This demonstrated that integrated services could maintain effectiveness through financing transitions when PrEP and associated healthcare services remained affordable [39].

For women who inject drugs in Philadelphia, integration with syringe services programs was found to be both feasible and acceptable [74], supporting daily PrEP as a viable prevention tool for this vulnerable population despite significant implementation challenges [74].

Synthesis

The evidence demonstrates that integrating PrEP into venereology and sexual health services is both feasible and effective across diverse settings and populations. However, the apparent contradictions in outcomes—particularly regarding STI rates and retention—can be explained through several key factors.

Context-Specific Effectiveness

The dramatic variation in retention rates (ranging from 23% at 12 months in Kenya [15] to 85.9% in Thailand [16]) reflects differences in implementation support rather than inherent limitations of integration. Settings achieving higher retention shared common features: comprehensive support services including monthly adherence counseling [16], community-based delivery models that reduced stigma and increased convenience [16], and integration with existing trusted service platforms [20].

Kenya's 34% retention at six months occurred in a context where PrEP was newly introduced into public HIV care clinics with training and technical support but no additional financial resources [14]. In contrast, Thailand's 85.9% retention at 12 months occurred within a comprehensive community-based program specifically designed for young men and transgender women who sell sex, including monthly counseling and SMS support [16]. Both findings may be valid: Kenya's data reflect what is achievable through basic integration into existing infrastructure, while Thailand's data demonstrate the potential of integration enhanced with intensive support.

Similarly, the divergent PrEP uptake rates—ranging from 14.9% among women in Washington D.C. [6] to 98.1% in Paris [13]—reflect population-specific barriers and enablers rather than differential intervention effectiveness. Women in Washington D.C. faced sociostructural barriers beyond provider practices [6], while Paris hospital-based services attracted a self-selected population actively seeking PrEP [13].

STI Incidence Patterns

The apparent increase in STI rates observed in some studies (Melbourne: IRR 2.77 [17]; Paris: 14.6% to 19.2% [13]) versus stability or decrease in others (South Africa: 27.6% to 13.8% [8]; Kenya intervention arm: 30.9% to 12% [50]) can be reconciled through two mechanisms.

First, initial STI increases likely reflect intensified surveillance rather than true incidence changes. Programs implementing quarterly screening detected 34.3% of gonorrhea, 40.0% of chlamydia, and 20.4% of syphilis cases that would have been missed with semiannual screening [56]. More than a quarter of STIs in Amsterdam were diagnosed from tests performed between scheduled visits [18], suggesting that integrated programs detect infections that might otherwise go undiagnosed.

Second, behavioral change trajectories differed based on the comprehensiveness of behavioral interventions accompanying PrEP. Settings where STI rates decreased or remained stable typically included targeted health education [50] or risk-reduction counseling [8]. In Kenya, targeted health education on condom use reduced syndromic STI cases from 30.9% to 12% in the intervention arm while they increased from 33.3% to 42% in controls [50].

The concentration of STI burden is critical for interpretation. In England's Impact Trial, 24.4% of MSM participants accounted for 79.5% of all bacterial STI diagnoses [1]. This concentration suggests that population-level STI rates may be less relevant than identifying and intensively supporting the subset of PrEP users with persistently high STI rates.

Population-Specific Implementation Strategies

The differential outcomes among women versus MSM can be partially explained by the maturity of implementation approaches. Most integrated services were initially designed for MSM populations, building on decades of experience providing sexual health services to this group. Integration for women required adapting these models, with family planning clinics emerging as a particularly promising platform. Kenya's family planning integration achieved a 50-fold increase in PrEP initiation among eligible women (from 4.2% to 40.6%) [12], suggesting that when integration is designed for the target population's typical healthcare utilization patterns, uptake can match or exceed that seen in MSM populations.

For transgender populations, integration effectiveness depended critically on clinic cultural competence. Uganda's trans-affirming services achieved high adherence by addressing stigma concerns and offering medication formulations perceived as less identifiable as HIV-related [19].

The positive framing of side effects like weight gain as symbols of health and prosperity [19] illustrates how culturally appropriate counseling can transform potential barriers into facilitators.

Methodological Quality Considerations

Among studies reporting low retention, Kenya's stepped-wedge trial had 8.83 years of observation in the control group versus 53.67 years in the intervention group [15]. This imbalance limited the ability to make definitive comparisons and made the study more an assessment of feasibility than effectiveness [15]. In contrast, the PROUD trial with balanced randomization demonstrated clear effectiveness estimates with narrow confidence intervals [3].

The smaller demonstration studies and pilots provided valuable feasibility data but were underpowered for definitive effectiveness conclusions. Studies with fewer than 100 participants (n=19 in one pilot [54], n=18 in another [61]) offered proof-of-concept evidence but require replication at scale. The larger implementation trials in England (21,356 participants) [1], Australia (9,709 participants) [39], and Kenya (25,457 women) [12] provide more robust evidence for policy decisions.

Adherence Measurement Implications

The discordance between self-reported adherence and biomarker validation has critical implications for interpreting integration success. The Ukraine study's finding that 77% self-reported high adherence but only 3% had protective drug levels [57] suggests that self-report alone substantially overestimates real-world adherence among some populations, particularly those facing multiple barriers to consistent medication use.

Conversely, Kenya's finding that 96% of randomly collected blood samples showed detectable tenofovir among retained participants [14] indicates that when programs successfully retain participants, adherence can be excellent. This suggests that retention is the more critical target for intervention than adherence among those already engaged in care.

The association between early adherence and sustained adherence—participants with protective concentrations at week 4 being 3.28 times more likely to maintain protective concentrations at week 48 [34]—suggests that intensive support during the first month of PrEP may be particularly valuable for long-term outcomes.

Integration with HIV Care Services

Integration of PrEP into existing HIV care settings for serodifferent couples demonstrated high reach but raised questions about viral suppression impacts. In Uganda, 81.0% of HIV-negative partners initiated PrEP within 90 days of program launch [42], but only 11.2% sought refills at six months [42]. Viral suppression rates among partners living with HIV remained high (82.1% and 76.7% before and after PrEP launch, respectively) with no significant difference (RR: 0.94, 95% CI: 0.82-1.07) [42], suggesting that PrEP integration did not compromise existing ART services.

This model successfully reached an important population—84% of Kenya's PrEP initiators reported having a partner living with HIV [14] —though this focus on serodifferent couples meant that integration had not yet reached the highest-risk individuals who were often unaware of their partners' status [15].

Adherence Support Interventions

Various adherence support strategies were tested within integrated settings, with mixed results depending on population and implementation context.

A mobile health intervention using text messages and publicly available internet content showed potential for improving PrEP uptake among Black MSM in the Southern United States [22], though specific uptake metrics were not reported in available protocols. The intervention was designed to address individual, community, and structural barriers through interactive, tailored messaging [31].

In Vietnam, integration of a brief alcohol intervention with PrEP services for MSM with unhealthy alcohol use was expected to improve PrEP persistence by reducing a key behavioral barrier [60]. Baseline PrEP persistence rates were 42% at six months and 33% at 12 months, with nearly 50% discontinuing within six months [60], highlighting the need for such targeted interventions.

Among young South African men, hazardous alcohol use was associated with increased PrEP initiation—40% in the hazardous use group versus 17% in the no/low-risk group (aOR: 1.96, 95% CI: 1.13-3.40) [64]. However, continuation at four months was uniformly low across all

alcohol use levels at only 27% [64], suggesting that while alcohol use may not prevent initial PrEP uptake, it does not appear to drive differential persistence patterns.

Alternative Delivery Models

Reduced Monitoring Frequency

Several studies tested whether reducing the frequency of in-person monitoring visits could improve retention while maintaining safety. Kenya's comparison of six-month versus three-month PrEP dispensing with interim home-based HIV self-testing demonstrated non-inferiority across all three co-primary outcomes at six months: HIV testing (83% vs. 84%), PrEP refilling (78% vs. 81%), and adherence (61% vs. 57%) [46]. No participants acquired HIV during the study [46].

This model effectively reduced clinic visit burden by half without compromising outcomes [46], suggesting that for stable PrEP users, less frequent monitoring may be acceptable. The approach was particularly relevant for populations facing transportation or time barriers to quarterly clinic attendance.

Pharmacist Prescribing and Alternative Prescribers

A systematic review of alternative PrEP care delivery models identified promising applicability for pharmacist prescribers, though none of the included studies met traditional efficacy criteria for evidence-based interventions [80]. These models showed potential for increasing access and care delivery while being appealing to both clients and staff with less challenging implementation procedures [80].

Geographic and Healthcare System Context

Integration models were shaped by local healthcare system structures and resources.

High-income settings typically integrated PrEP into well-established sexual health clinic networks with trained staff and existing infrastructure. In the Netherlands, PrEP was embedded within government-funded sexual health centers offering free services including screening for HIV, bacterial STIs, hepatitis C, and kidney function every three months [28].

Low- and middle-income settings often required more creative integration approaches. Kenya's integration into maternal child health clinics leveraged existing antenatal care infrastructure to reach pregnant women at high HIV risk [68]. Brazil's demonstration project provided PrEP at no

cost to participants through the public health system [34], while also conducting extensive research on optimal implementation strategies for middle-income contexts.

Community-based integration models were particularly common in sub-Saharan African settings. South Africa's community-based platforms for young women combined HIV counseling and testing with same-day PrEP initiation outside traditional clinic settings [63]. This approach addressed barriers to clinic-based services that young women commonly reported [63].

Specialized Integration Approaches

Integration for Pregnant and Postpartum Women

Kenya's PrIMA study tested universal versus targeted PrEP offer models in 20 maternal child health clinics [68]. The universal arm offered PrEP to all pregnant women following standardized counseling, while the targeted arm used risk screening with partner HIV self-test options [68]. This integration addressed a critical prevention gap, as women in regions with high HIV prevalence face elevated risk during pregnancy and postpartum, and acute maternal HIV contributes substantially to infant infections [68].

Integration with Substance Use Services

Integration with harm reduction services for people who inject drugs occurred in Philadelphia's syringe services program [74]. Of 136 women who inject drugs recruited, 95 were included in the final analysis, with 63 accepting a PrEP prescription at week one [74]. Uptake was associated with greater baseline frequency of SSP access (aOR: 1.85, 95% CI: 1.24-2.77), inconsistent condom use (aOR: 3.38, 95% CI: 1.07-10.7), and experiencing sexual assault (aOR: 5.89, 95% CI: 1.02-33.9) [74]. Retention was higher among women reporting more frequent baseline SSP access (aOR: 1.46, 95% CI: 1.04-2.24) [74].

Long-Acting Injectable PrEP Integration

Several studies examined integration of long-acting injectable cabotegravir into venereology and sexual health services. Brazil's ImPrEP CAB study developed an implementation package through participatory design methods and process mapping to facilitate optimal client flow [30]. The intervention included mHealth education, decision support tools, and digital injection appointment reminders [30].

In New York City's EquiPrEP study among Black/Latine MSM, Black/Latine cisgender women, and transgender/nonbinary persons, 60.9% of participants with six months of follow-up were fully adherent to long-acting injectable PrEP [66]. Over 83% were either fully adherent, continued on LAI-PrEP, or switched to oral PrEP over six months [66]. Participants who were existing Bellevue patients or referred from community-based organizations showed higher adherence [66].

South Africa's LAPIS trial integrated choice of PrEP modalities (oral, two-monthly injectable cabotegravir, or dapivirine vaginal ring) with peer navigation and mobile nurse-led clinic services for youth aged 15-30 years [32]. This person-centered approach aimed to improve adherence and retention among youth, including hidden key populations [32].

Patient-Centered Care Elements

Dynamic choice interventions allowing participants to switch between prevention products over time demonstrated superior coverage compared to standard care. In Kenya and Uganda outpatient departments, an intervention offering choice between oral PrEP and post-exposure prophylaxis with the option to switch resulted in 47.5% time covered by biomedical prevention versus 18.3% in standard care (difference: 29.2%, 95% CI: 22.7-35.7) [25]. Effects were similar among women and men and larger during periods of self-reported HIV risk, where coverage reached 64.9% versus 26.3% in standard care (difference: 38.6%, 95% CI: 31.0-46.2) [25].

Selection of service delivery preferences revealed important insights about patient priorities. When given the option, HIV self-testing selection increased from 26% to 51% over 48 weeks [25], and selection of out-of-facility visits increased from 8% to 52% [25]. These changes indicate evolving comfort with different service modalities and the value of offering sustained choice rather than requiring upfront commitment to a single delivery model.

South Africa's youth clinic experience highlighted the importance of both convenience and social support. The main barrier to taking PrEP was forgetting pills [8], yet encouragement from family, friends, partners, and other PrEP users all declined significantly as facilitators from month 6 to 18 [8]. This pattern suggests that initial social support may motivate initiation but is insufficient to sustain long-term use without addressing practical adherence barriers.

Equity and Access Considerations

Integration into venereology services revealed persistent equity challenges. In France, PrEP effectiveness was greatly reduced in men younger than 30 years and those who were socioeconomically deprived, who also had low amounts of PrEP consumption and high rates of discontinuation [21]. Similar patterns emerged across multiple settings, with younger age and socioeconomic deprivation consistently associated with poorer outcomes [21].

New York City's EquiPrEP recruitment efforts identified disparities in representation. While the study successfully enrolled participants across racial/ethnic groups matching local demographics [65], only 26.8% of screened participants were cisgender women compared to 72.6% of those eligible [65]. Participants screened consisted of greater proportions identifying as gay/bisexual (46.8% vs. 5.6% of eligible) and cisgender men (55.1% vs. 20.2% of eligible) [65], suggesting that even within integrated settings, outreach efforts may differentially reach certain populations.

Financial barriers remained significant even within integrated services. Out-of-pocket costs were the most common barrier to PrEP uptake in a motivational interviewing intervention, despite the intervention's success in increasing interest and prescription rates [54]. This finding underscores that behavioral interventions alone cannot overcome structural financial barriers.

Multi-Component Interventions

The most successful integration models combined multiple implementation strategies simultaneously. Washington D.C.'s multicomponent intervention included clinic-wide trainings, EHR prompts, and waiting room educational videos [6], resulting in increases in PrEP screening from 5.6% to 89.2%, offering from 6.2% to 69.8%, and prescribing from 2.6% to 8.1% [6].

Brazil's planned ImPrEP CAB implementation combined provider training and technical support, process mapping for optimal client flow, mHealth education and decision support tools, and digital appointment reminders [30]. This comprehensive approach recognized that successful integration requires addressing multiple levels simultaneously: provider capacity, clinic workflows, patient education, and adherence support.

North Carolina's multilevel intervention for rural populations integrated digital health apps, linkage to remote PrEP navigators, and optional telehealth-based PrEP services [9]. This design

acknowledged that rural and periurban populations face distinct barriers requiring multifaceted solutions.

DISCUSSION

Summary of Principal Findings

This systematic review of 80 studies demonstrates that integrating PrEP into venereology and sexual health services is both feasible and highly effective for HIV prevention, but outcomes vary dramatically based on implementation context, population characteristics, and support intensity. HIV incidence among PrEP users in integrated settings ranged from 0.0 to 2.1 per 100 person-years, with large trials showing 86–90% risk reduction compared to non-users or deferred access groups (1,3,14). However, uptake varied from 14.9% among women in Washington D.C. (6) to 98.1% in a Paris hospital (13), and 12-month retention ranged from 23% in Kenyan public clinics (15) to 85.9% in a Thai community program (16). These findings reveal that integration alone is insufficient; the intensity of implementation support, population-tailored strategies, and attention to retention are critical determinants of success.

Context-Specific Effectiveness and the Implementation Support Gradient

The dramatic variation in retention rates across studies can be explained by what we term the "implementation support gradient." At the low end, Kenya's stepped-wedge trial integrated PrEP into public HIV care clinics using existing Ministry of Health guidelines, with training and technical support but no additional financial resources or intensive patient support (14). This pragmatic approach achieved 34% retention at 6 months and 23% at 12 months (15), reflecting what is feasible when PrEP is added to overburdened public health systems without dedicated resources. At the high end, Thailand's community-based program for young MSM and transgender women who sell sex included quarterly HIV testing, semiannual STI testing, condom provision, monthly adherence counseling, and SMS reminders, achieving 85.9% retention at 12 months (16). Similarly, the community-based program for female sex workers in Kolkata achieved 89% retention at 15 months by embedding PrEP within existing trusted community services (20).

This gradient suggests that policymakers face a fundamental trade-off between reach and intensity. Basic integration into existing infrastructure can rapidly scale PrEP access but yields poor retention. Intensive, population-tailored programs achieve excellent retention but are resource-intensive and may not be scalable to entire populations. The optimal approach may be a stepped-care model: intensive support for high-risk periods (e.g., first 3 months) and for populations with historically low retention, with less intensive maintenance for stable users.

The Retention Paradox and the Critical Window

Across studies, the steepest drop in retention occurred in the first 3–6 months after initiation. In Kenya, retention fell from 57% at 1 month to 44% at 3 months and 34% at 6 months (14). In Mississippi, even with patient navigation, retention declined from 70% at 3 months to 36.7% at 6 months (36). This pattern suggests a "critical window" early in PrEP use when discontinuation risk is highest. Notably, participants with protective drug concentrations at week 4 were 3.28 times more likely to maintain protective concentrations at week 48 (34), indicating that early adherence strongly predicts long-term success.

Interventions that intensified support during this critical window showed promise. Brief motivational interviewing increased PrEP appointment attendance from 27.9% to 52.3% (23). Patient navigation improved 3-month retention from 43.3% to 70% (36). Peer navigation with HIV self-testing achieved 78–85% initiation at 1 month (11). These findings suggest that concentrated investment in the first 1–3 months after PrEP initiation may yield disproportionate long-term benefits.

Adherence Measurement: The Self-Report Trap

One of the most striking findings is the profound discordance between self-reported adherence and biomarker validation, particularly among marginalized populations. In Ukraine, among people who inject drugs, 77% self-reported taking >95% of doses, yet only 3% had metabolite levels indicating consistent uptake at four or more doses per week (57). This degree of discordance — a 25-fold overestimate — has critical implications for program evaluation. Programs relying on self-report will dramatically overestimate effectiveness and miss opportunities for intervention.

In contrast, among populations with higher social desirability or less chaotic substance use, self-report showed better concordance. In Kenya, 70% self-reported high adherence, and 96% of randomly collected blood samples showed detectable tenofovir among retained participants (14). This suggests that self-report validity varies substantially by population and context. For people who inject drugs, transgender women experiencing high stigma, and individuals with chaotic substance use, objective adherence monitoring (urine tenofovir levels, dried blood spots) is essential for accurate program assessment.

The association between early adherence monitoring and sustained success is noteworthy. In Philadelphia, urine tenofovir levels at each visit provided real-time feedback that may have supported the 70% retention at 48 weeks (35). Participants reciprocated adherence support from healthcare workers by maintaining high adherence (19). These findings support incorporating biomarker feedback as an adherence promotion strategy, not just a measurement tool.

STI Outcomes: Surveillance versus True Risk Compensation

The interpretation of STI findings in integrated PrEP services requires careful disentanglement of two competing phenomena: true behavioral risk compensation (reduced condom use) and intensified surveillance (more frequent, sensitive STI testing detecting previously missed infections). Our review provides evidence for both.

The intensified surveillance effect is substantial. Quarterly screening detected 34.3% of gonorrhea, 40.0% of chlamydia, and 20.4% of syphilis infections that would have been missed with semiannual screening (56). More than a quarter of STIs in Amsterdam were diagnosed from tests performed between scheduled visits (18). Thus, some of the increased STI incidence observed in PrEP programs reflects detection of infections that would have previously gone undiagnosed, not necessarily increased incidence.

True risk compensation also occurs but varies by population and setting. In Melbourne, condom use decreased significantly after PrEP initiation, and STI incidence increased from 43.2 to 119.8 per 100 person-years (IRR 2.77) (17). In Paris, condomless sex at last intercourse increased from 53.3% to 79%, accompanied by a modest STI increase from 14.6% to 19.2% (13). In contrast, among young women in South Africa, both multiple partners and condomless sex decreased after

PrEP initiation, and STI rates fell from 27.6% to 13.8% (8). Targeted health education on condom use reduced syndromic STI cases from 30.9% to 12% in the intervention arm while they increased from 33.3% to 42% in controls (50).

Crucially, STI burden is highly concentrated. In England, 24.4% of MSM participants accounted for 79.5% of all bacterial STI diagnoses (1). This concentration suggests that population-level STI rates may be less informative than identifying and intensively supporting the subset of PrEP users with persistently high STI incidence. Tailored interventions for this subgroup — including more frequent screening, doxycycline post-exposure prophylaxis (doxy-PEP), and enhanced risk-reduction counseling — could substantially reduce population-level STI burden without requiring universal behavior change.

Population-Specific Implementation Strategies

Men who have sex with men (MSM): Most integrated services were initially designed for MSM, and outcomes in this population are generally excellent when access is provided. The PROUD trial participants had very high baseline risk (median 10 partners in 90 days, 87% ever had an STI diagnosis) (48), yet PrEP achieved 86% HIV risk reduction (3). The choice between daily and event-driven PrEP is important: in Amsterdam, 73% chose daily, 27% event-driven, with lower STI incidence in the event-driven group reflecting different sexual behavior profiles (18).

Women: Integration into family planning clinics proved particularly effective. Kenya's stepped-wedge trial increased PrEP screening from 2.9% to 91.6% and initiation among eligible women from 4.2% to 40.6% (12). However, barriers remain. In Washington D.C., despite provider screening increasing from 5.6% to 89.2%, actual PrEP prescribing increased only from 2.6% to 8.1% (6), highlighting sociostructural barriers beyond provider practices. Retention among women is also challenging: South Africa's youth program achieved 73.2% initiation but only 29% completed 18-month follow-up (8). Adherence patterns were bimodal: 67% had consistently low drug levels, 33% maintained high adherence.

Transgender populations: Transgender women face unique barriers including stigma, discrimination, and concerns about medication identifiability. Uganda's integrated services demonstrated that the F/TAF formulation was valued as less readily identifiable as HIV-related, and

weight gain was viewed positively as a symbol of health and prosperity (19). Urine testing for both tenofovir levels and STI detection motivated adherence and enhanced detection. However, transgender women comprised small proportions of most study populations, and dedicated implementation research is needed.

Key populations: Female sex workers in Kolkata achieved 89% retention at 15 months with 65% having protective tenofovir levels, and no HIV seroconversions (20). This success was attributed to embedding PrEP within existing trusted community-based programs. In contrast, people who inject drugs in Ukraine and Philadelphia showed extremely poor adherence (only 3% with protective levels in Ukraine) (57), and HIV seroconversions occurred despite program enrollment (74). These findings suggest that for people who inject drugs, current oral PrEP delivery models are largely ineffective, and alternative formulations (long-acting injectable, implantable) or radically different support models are needed.

Service Delivery Innovations

Telehealth and digital health: Telehealth-based PrEP delivery achieved comparable short-term persistence to in-person care, with 64% completing 3-month follow-up and 93.6% using virtual-only visits (59). Almost 90% of participants were satisfied with telehealth, though only 40% of staff were satisfied (59), highlighting implementation challenges. Mobile health interventions showed promise: a clinic-integrated smartphone app in Malaysia achieved 92% PrEP initiation (79), and weekly text messages reduced missed doses by 50% (70). Home-based monitoring with self-collection achieved 82% successful test kit return (27), suggesting that reduced monitoring frequency is feasible for stable users.

Peer navigation: Peer-delivered interventions consistently improved outcomes, particularly for hard-to-reach populations. In Rio de Janeiro, peer navigation achieved 100% PrEP initiation and 90% retention at 9 months among young trans women (61). In Kenya, peer referral with HIV self-testing achieved 78–85% initiation at 1 month (11). The key success factors included close preexisting relationships, assistance with self-testing, and peers escorting clients to clinics (11).

Dynamic choice models: Allowing participants to switch between prevention products over time and choose service location dramatically improved coverage. In Kenya and Uganda, an

intervention offering choice between oral PrEP and PEP with option to switch resulted in 47.5% time covered by biomedical prevention versus 18.3% in standard care (difference 29.2%) (25). When given the option, selection of out-of-facility visits increased from 8% to 52% over 48 weeks (25), indicating strong patient preference for community-based services.

Long-acting injectable PrEP: Early implementation studies show promise. In New York City's EquiPrEP study, 60.9% of participants were fully adherent to long-acting injectable cabotegravir at 6 months, and over 83% were either fully adherent, continued on injectable PrEP, or switched to oral PrEP (66). Brazil's ImPrEP CAB study is developing comprehensive implementation packages including mHealth education and digital appointment reminders (30). South Africa's LAPIS trial is integrating choice of oral, injectable, or vaginal ring PrEP with peer navigation and mobile nurse-led clinics for youth (32).

Implementation Success Factors and Barriers

Several factors consistently predicted successful integration. First, **provider training and EHR prompts** dramatically increased screening and offering. In Washington D.C., clinic-wide training plus EHR prompts increased screening from 5.6% to 89.2% (6). In Kenya, provider training using Ministry of Health guidelines enabled rapid scale-up across 25 clinics (14). Second, **workflow integration** minimized disruption. The One-Stop model consolidating all PrEP components into a single consultation room reduced waiting time (7). Third, **patient education materials** (waiting room videos, brochures) increased awareness without requiring additional staff time (6).

Barriers included **financial costs** (out-of-pocket costs were the most common barrier to uptake even in integrated settings) (54), **sociostructural factors** beyond clinic control (particularly for women) (6), and **staff burnout** (only 40% of staff were satisfied with telehealth models) (59). **Equity challenges** persisted: in France, PrEP effectiveness was greatly reduced in men younger than 30 and those who were socioeconomically deprived (21). Younger age and socioeconomic deprivation consistently predicted poorer outcomes across multiple settings.

CONCLUSION AND RECOMMENDATIONS

Summary of Conclusions

This systematic review of 80 studies provides compelling evidence that integrating PrEP into venereology and sexual health services is effective, feasible, and achieves substantial HIV risk reduction (86–90%) across diverse populations and settings. However, the effectiveness of integration is not uniform; it depends critically on implementation support intensity, population-tailored strategies, and attention to retention as the primary intervention target.

Key conclusions include:

1. **HIV effectiveness is excellent** when PrEP is taken, with incidence as low as 0.13–0.24 per 100 person-years in large implementation trials.
2. **Retention, not just initiation, is the critical challenge.** Twelve-month retention ranges from 23% to 86%, with the steepest declines in the first 3–6 months. Intensive support during this critical window yields disproportionate benefits.
3. **Self-reported adherence is unreliable**, particularly among marginalized populations. Biomarker validation is essential for accurate program assessment.
4. **STI increases often reflect intensified surveillance** rather than true risk compensation, though both phenomena occur. STI burden is highly concentrated, suggesting targeted rather than universal interventions.
5. **Population-specific integration strategies are essential.** Family planning clinics effectively reach women; peer navigation reaches young key populations; trans-affirming services address stigma; but current oral PrEP models are largely ineffective for people who inject drugs.
6. **Service delivery innovations** including telehealth, peer navigation, dynamic choice models, and long-acting injectable PrEP show promise but require further implementation research.

Recommendations

For policymakers and clinic directors:

1. Prioritize retention, not just initiation. Allocate resources for intensive support during the first 1–3 months of PrEP use.
2. Implement biomarker-validated adherence monitoring, at least for high-risk populations and program evaluation.
3. Adopt population-specific integration strategies: family planning clinics for women, peer navigation for youth and key populations, trans-affirming services for transgender individuals.
4. Recognize that basic integration into existing infrastructure without additional support yields poor retention. Invest in stepped-care models.
5. Address financial barriers; out-of-pocket costs remain the most common barrier to uptake even in integrated settings.

For clinicians:

1. Provide enhanced counseling and follow-up during the first month of PrEP use; early adherence strongly predicts long-term success.
2. Use objective adherence measures (urine tenofovir, dried blood spots) when feasible, particularly for patients with adherence challenges.
3. Offer choice between daily and event-driven PrEP; patient preferences vary and both are effective.
4. Screen for STIs quarterly; this detects infections that would otherwise be missed and does not increase antibiotic resistance when targeted.
5. Identify the subset of patients with persistently high STI incidence and provide enhanced services.

For researchers:

1. Develop and test stepped-care models that match support intensity to patient risk and response.
2. Evaluate long-acting injectable PrEP implementation in real-world integrated settings.
3. Conduct implementation research specifically for people who inject drugs, who have been largely failed by current oral PrEP models.
4. Validate brief, low-cost adherence measures that can be used routinely in clinical practice.
5. Examine cost-effectiveness of different integration models to guide resource allocation.

Final Statement

Integrating PrEP into venereology services is a powerful HIV prevention strategy, but integration alone is insufficient. Success requires intentional, multi-component implementation strategies that address population-specific barriers, provide intensive support during the critical early window, use objective adherence monitoring, and prioritize retention as the primary outcome. With these elements in place, integrated PrEP services can achieve the full preventive potential of PrEP and substantially reduce HIV incidence among the populations most in need.

REFERENCES

1. Ann Sullivan, John Saunders, Monica Desai, et al (2023) HIV pre-exposure prophylaxis and its implementation in the PrEP Impact Trial in England: a pragmatic health technology assessment. The Lancet HIV. [https://doi.org/10.1016/S2352-3018\(23\)00256-4](https://doi.org/10.1016/S2352-3018(23)00256-4)
2. C. L., C. M., Nittaya P, et al (2023) Providing HIV pre-exposure prophylaxis to men who have sex with men and transgender women in hospitals and community-led clinics in Thailand: acceptance, patterns of use, trends in risk behaviors, and HIV incidence. AIDS Care. <https://doi.org/10.1080/09540121.2022.2159312>
3. S. McCormack, D. Dunn, M. Desai, et al (2016) Pre-exposure prophylaxis to prevent the acquisition of HIV-1 infection (PROUD): effectiveness results from the pilot phase of a pragmatic open-label randomised trial. The Lancet. [https://doi.org/10.1016/S0140-6736\(15\)00056-2](https://doi.org/10.1016/S0140-6736(15)00056-2)

4. J. Molina, I. Charreau, B. Spire, et al (2017) Efficacy, safety, and effect on sexual behaviour of on-demand pre-exposure prophylaxis for HIV in men who have sex with men: an observational cohort study. *The Lancet HIV*. [https://doi.org/10.1016/s2352-3018\(17\)30089-9](https://doi.org/10.1016/s2352-3018(17)30089-9)
5. J. Raifman, Amy C. Nunn, C. Oldenburg, et al (2018) An Evaluation of a Clinical Pre-Exposure Prophylaxis Education Intervention among Men Who Have Sex with Men. *Health Services Research*. <https://doi.org/10.1111/1475-6773.12746>
6. Rachel K Scott, Megan Deyarmond, S. Marwitz, et al (2023) Implementation of an Educational Intervention to Improve HIV Pre-Exposure Prophylaxis Services for Women in an Urban Sexual Health Clinic. *AIDS Patients Care and STDs*. <https://doi.org/10.1089/apc.2023.0107>
7. Benn Kwach, J. Odoyo, Amber Lauff, et al (2025) Evaluating the effectiveness of a One-Stop PrEP Care model to enhance HIV prevention: a protocol for a cluster-randomised trial in Kisumu County, Kenya. *BMJ Open*. <https://doi.org/10.1136/bmjopen-2024-097792>
8. T. Cassidy, N. Ntuli, Charllen Kilani, et al (2021) Delivering PrEP to Young Women in a Low-Income Setting in South Africa: Lessons for Providing Both Convenience and Support. *Aids and Behavior*. <https://doi.org/10.1007/s10461-021-03366-x>
9. S. Rutstein, Ella Ferguson, Odai Mansour, et al (2024) Multilevel Intervention to Support Tailored and Responsive HIV Pre-Exposure Prophylaxis Care in Rural North Carolina: Protocol for a Randomized Controlled Trial. *JMIR Research Protocols*. <https://doi.org/10.2196/68085>
10. Njeri Wairimu, R. Malen, Adriana M Reedy, et al (2023) Peer PrEP referral + HIV self-test delivery for PrEP initiation among young Kenyan women: study protocol for a hybrid cluster-randomized controlled trial. *Trials*. <https://doi.org/10.1186/s13063-023-07734-x>
11. Maureen McGowan, Njeri Wairimu, Adriana M Reedy, et al (2024) Formalized peer referral to HIV pre-exposure prophylaxis supported with self-testing: a mixed-methods pilot study among young Kenyan women. *Frontiers in Public Health*. <https://doi.org/10.3389/fpubh.2024.1428609>
12. K. Mugwanya, Daniel Matemo, Allison Meisner, et al (2025) Integrating oral pre-exposure prophylaxis delivery in primary care family planning clinics: a pragmatic, stepped-wedge, cluster-randomised trial. *The Lancet Primary Care*. <https://doi.org/10.1016/j.lanprc.2025.100057>

13. M. Noret, Stéphanie Balavoine, C. Pintado, et al (2018) Daily or on demand oral TDF/FTC for HIV pre-exposure prophylaxis: experience from an hospital-based clinic in France. *AIDS (London)*. <https://doi.org/10.1097/QAD.0000000000001939>
14. Elizabeth M Irungu, K. Mugwanya, N. Mugo, et al (2021) Integration of pre-exposure prophylaxis services into public HIV care clinics in Kenya: a pragmatic stepped-wedge randomised trial. *Lancet Global Health*. [https://doi.org/10.1016/s2214-109x\(21\)00391-0](https://doi.org/10.1016/s2214-109x(21)00391-0)
15. S. Karim, C. Baxter (2021) HIV pre-exposure prophylaxis implementation in Africa: some early lessons. *Lancet Global Health*. [https://doi.org/10.1016/s2214-109x\(21\)00460-5](https://doi.org/10.1016/s2214-109x(21)00460-5)
16. B. Weir, A. Wirtz, Tareerat Chemnasiri, et al (2023) High PrEP uptake, adherence, persistence and effectiveness outcomes among young Thai men and transgender women who sell sex in Bangkok and Pattaya, Thailand: findings from the open-label combination HIV prevention effectiveness (COPE) study. *The Lancet Regional Health - Southeast Asia*. <https://doi.org/10.1016/j.lansea.2023.100217>
17. Luxi Lal, J. Audsley, D. Murphy, et al (2017) Medication adherence, condom use and sexually transmitted infections in Australian preexposure prophylaxis users. *AIDS (London)*. <https://doi.org/10.1097/QAD.0000000000001519>
18. E. Hoornenborg, L. Coyer, R. Achterbergh, et al (2019) Sexual behaviour and incidence of HIV and sexually transmitted infections among men who have sex with men using daily and event-driven pre-exposure prophylaxis in AMPrEP: 2 year results from a demonstration study. *The Lancet HIV*. [https://doi.org/10.1016/S2352-3018\(19\)30136-5](https://doi.org/10.1016/S2352-3018(19)30136-5)
19. A. Mujugira, Agnes Nakyanzi, Monica Bagaya, et al (2024) Integrated PrEP and STI Services for Transgender Women in Uganda: Qualitative Findings from a Randomized Trial. *Aids and Behavior*. <https://doi.org/10.1007/s10461-024-04469-x>
20. S. Jana, Protim Ray, Soma Roy, et al (2021) Successful integration of HIV pre-exposure prophylaxis into a community-based HIV prevention program for female sex workers in Kolkata, India. *International Journal of STD and AIDS*. <https://doi.org/10.1177/0956462420983992>
21. L. Coyer, E. Hoornenborg (2022) Reaching the full preventive potential of HIV pre-exposure prophylaxis. *Lancet Public Health*. [https://doi.org/10.1016/s2468-2667\(22\)00116-5](https://doi.org/10.1016/s2468-2667(22)00116-5)

22. Anne-Emilie Rouffiac, L. Whiteley, L. Brown, et al (2020) A Mobile Intervention to Improve Uptake of Pre-Exposure Prophylaxis for Southern Black Men Who Have Sex With Men: Protocol for Intervention Development and Pilot Randomized Controlled Trial. JMIR Research Protocols. <https://doi.org/10.2196/15781>
23. P. Chan, A. Nunn, Jacob J van den Berg, et al (2021) A Randomized Trial of a Brief Behavioral Intervention for PrEP Uptake Among Men Who Have Sex With Men at Increased Risk for HIV Infection. Journal of Acquired Immune Deficiency Syndromes. <https://doi.org/10.1097/QAI.0000000000002671>
24. S. Rutstein, Laura Limarzi-Klyn, Jane S. Chen, et al (2025) Improving HIV Prevention Among Heterosexual Men Seeking Sexually Transmitted Infection Services in Malawi: Protocol for a Type I Effectiveness-Implementation Hybrid Randomized Controlled Trial of Systems Navigator–Delivered Integrated Prevention Package (HPTN 112-NJIRA Study). JMIR Research Protocols. <https://doi.org/10.2196/72981>
25. Catherine A Koss, J. Ayieko, J. Kabami, et al (2023) Dynamic choice HIV prevention intervention at outpatient departments in rural Kenya and Uganda. AIDS (London). <https://doi.org/10.1097/QAD.0000000000003763>
26. D. Ogaz, Holly Mitchell, Chiara Chiavenna, et al (2025) Foundations for progress: insights from the PrEP Impact Trial supporting change to PrEP delivery and implementation in England. Sexually Transmitted Infections. <https://doi.org/10.1136/sextrans-2025-056566>
27. Chase A Cannon, Katherine Holzhauer, Matthew R Golden (2024) Implementation and Evaluation of a Home-Based Pre-Exposure Prophylaxis Monitoring Option: Protocol for a Randomized Controlled Trial. JMIR Research Protocols. <https://doi.org/10.2196/56587>
28. Marije L Groot Bruinderink, A. Boyd, L. Coyer, et al (2023) Online-Mediated HIV Pre-exposure Prophylaxis Care and Reduced Monitoring Frequency for Men Who Have Sex With Men: Protocol for a Randomized Controlled Noninferiority Trial (EZI-PrEP Study). JMIR Research Protocols. <https://doi.org/10.2196/51023>

29. C. O'Halloran, B. Rice, E. White, et al (2019) Chemsex is not a barrier to self-reported daily PrEP adherence among PROUD study participants. The International journal on drug policy. <https://doi.org/10.1016/j.drugpo.2019.10.007>
30. B. Grinsztejn, T. Torres, B. Hoagland, et al (2023) Long-Acting Injectable Cabotegravir for HIV Preexposure Prophylaxis Among Sexual and Gender Minorities: Protocol for an Implementation Study. JMIR Public Health and Surveillance. <https://doi.org/10.2196/44961>
31. L. Whiteley, Anne-Emilie Rouffiac, L. Brown, et al (2019) A Mobile Intervention to Improve Uptake of Pre-Exposure Prophylaxis (PrEP) for Southern Black MSM: A Protocol for Intervention Development and Randomized Controlled Trial (Preprint). <https://doi.org/10.2196/preprints.15781>
32. J. Busang, T. Zuma, N. Chimbindi, et al (2026) Long-acting HIV pre-exposure prophylaxis integrated with community-based sexual and reproductive health services in South Africa (LAPIS): study protocol for a hybrid (1a) cluster randomised controlled phase 3B trial of effectiveness and implementation. BMC Public Health. <https://doi.org/10.1186/s12889-025-24889-1>
33. Ferdous A Ahmed (2021) INTEGRATION OF STI PREVENTION INTERVENTIONS WITHIN PrEP SERVICE DELIVERY: IMPACT ON STI RATES AND ANTIBIOTIC RESISTANCE. International Journal of Scientific Interdisciplinary Research. <https://doi.org/10.63125/65143m72>
34. B. Grinsztejn, B. Hoagland, R. Moreira, et al (2018) Retention, engagement, and adherence to pre-exposure prophylaxis for men who have sex with men and transgender women in PrEP Brasil: 48 week results of a demonstration study. The Lancet HIV. [https://doi.org/10.1016/S2352-3018\(18\)30008-0](https://doi.org/10.1016/S2352-3018(18)30008-0)
35. L. Lalley-Chareczko, Devon Clark, C. Conyngham, et al (2018) Delivery of TDF/FTC for Pre-exposure Prophylaxis to Prevent HIV-1 Acquisition in Young Adult Men Who Have Sex With Men and Transgender Women of Color Using a Urine Adherence Assay. Journal of Acquired Immune Deficiency Syndromes. <https://doi.org/10.1097/QAI.0000000000001772>
36. W. Goedel, Cassandra Suttan Coats, P. Chan, et al (2022) A Pilot Study of a Patient Navigation Intervention to Improve HIV Pre-exposure Prophylaxis Persistence Among

Black/African American Men Who Have Sex With Men. Journal of Acquired Immune Deficiency Syndromes. <https://doi.org/10.1097/QAI.0000000000002954>

37. Daniel Teixeira da Silva, A. Bouris, Arthi Ramachandran, et al (2020) Embedding a Linkage to Pre-Exposure Prophylaxis (PrEP) Care Intervention in Social Network Strategy and Partner Notification Services: Results from a Pilot Randomized Controlled Trial. Journal of Acquired Immune Deficiency Syndromes. <https://doi.org/10.1097/QAI.0000000000002548>

38. Alexandre Grangeiro, M. Couto, M. F. Peres, et al (2015) Pre-exposure and postexposure prophylaxes and the combination HIV prevention methods (The Combine! Study): protocol for a pragmatic clinical trial at public healthcare clinics in Brazil. BMJ Open. <https://doi.org/10.1136/bmjopen-2015-009021>

39. A. Grulich, F. Jin, B. Bavinton, et al (2021) Long-term protection from HIV infection with oral HIV pre-exposure prophylaxis in gay and bisexual men: findings from the expanded and extended EPIC-NSW prospective implementation study. The Lancet HIV. [https://doi.org/10.1016/S2352-3018\(21\)00074-6](https://doi.org/10.1016/S2352-3018(21)00074-6)

40. L. Whiteley, Elizabeth M. Olsen, L. Mena, et al (2020) A Mobile Gaming Intervention for Persons on Pre-Exposure Prophylaxis: Protocol for Intervention Development and Randomized Controlled Trial. JMIR Research Protocols. <https://doi.org/10.2196/18640>

41. S. Azariah, P. Saxton, R. Franklin, et al (2019) NZPrEP Demonstration Project: protocol for an open-label, single-arm trial of HIV pre-exposure prophylaxis (PrEP) to determine feasibility, acceptability, adverse and behavioural effects of PrEP provision to gay and bisexual men in publicly funded sexual health clinics in Auckland, New Zealand. BMJ Open. <https://doi.org/10.1136/bmjopen-2018-026363>

42. R. Heffron, Timothy R Muwonge, Katherine K. Thomas, et al (2022) PrEP uptake and HIV viral suppression when PrEP is integrated into Ugandan ART clinics for HIV-negative members of HIV-serodifferent couples: A stepped wedge cluster randomized trial. EClinicalMedicine. <https://doi.org/10.1016/j.eclinm.2022.101611>

43. H. Sacks (2016) Preexposure tenofovir/emtricitabine reduced HIV infection in men who have unprotected anal sex with men. *Annals of Internal Medicine*. <https://doi.org/10.7326/ACPJC-2016-164-2-003>
44. Luana M S Marins, T. Torres, I. Leite, et al (2019) Performance of HIV pre-exposure prophylaxis indirect adherence measures among men who have sex with men and transgender women: Results from the PrEP Brasil Study. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0221281>
45. J. D. Wit, D. Murphy, L. Lal, et al (2015) O19.2 Pre-exposure prophylaxis and risk compensation: evidence of decreased condom use at three-month follow-up among predominantly gay male participants in the vicprep study. *Sexually Transmitted Infections*. <https://doi.org/10.1136/SEXTRANS-2015-052270.183>
46. K. Ngure, K. Ortblad, P. Mogere, et al (2022) Efficiency of 6-month PrEP dispensing with HIV self-testing in Kenya: an open-label, randomised, non-inferiority, implementation trial. *The Lancet HIV*. [https://doi.org/10.1016/s2352-3018\(22\)00126-6](https://doi.org/10.1016/s2352-3018(22)00126-6)
47. E. Hoornenborg, R. Achterbergh, M. F. S. van der Loeff, et al (2018) Men who have sex with men more often chose daily than event-driven use of pre-exposure prophylaxis: baseline analysis of a demonstration study in Amsterdam. *Journal of the International AIDS Society*. <https://doi.org/10.1002/jia2.25105>
48. D. Dolling, M. Desai, A. Mcowan, et al (2016) An analysis of baseline data from the PROUD study: an open-label randomised trial of pre-exposure prophylaxis. *Trials*. <https://doi.org/10.1186/s13063-016-1286-4>
49. S. Cohen, E. Vittinghoff, S. Philip, et al (2015) 007.5 Sexual risk behaviour and sexually transmitted diseases among men who have sex with men participating in a pre-exposure prophylaxis demonstration project. *Sexually Transmitted Infections*. <https://doi.org/10.1136/SEXTRANS-2015-052270.119>
50. M. Akolo (2019) P431 Effect of targeted intervention on condom use and among men who have sex with men (MSM) taking PrEP in nairobi kenya. *Poster Presentations*. <https://doi.org/10.1136/sextrans-2019-sti.517>

51. S. Sahay, S. Bangar, N. Chandhiok (2023) Demonstration project of oral TDF-containing PrEP, administered, once-daily orally to men having sex with men (MSM) and transgender women (TGW) in India: Study protocol. PLoS ONE. <https://doi.org/10.1371/journal.pone.0287454>
52. Cynthia Dalton, J. Cornelius, B. Davis (2021) Brief Educational Pre-Exposure Prophylaxis Intervention in an Infectious Disease Clinic: Protocol for a Case Series Study (Preprint). <https://doi.org/10.2196/preprints.33093>
53. C. Robbins, Aaron Hunt, Tri Luong, Aruna Rajmohan (2025) Impact of One-Way SMS Health Communication to Increase PrEP Uptake in Non-HIV, STI Testing Patients: A Pre-Post Intervention Study. Health Behavior Research. <https://doi.org/10.4148/2572-1836.1315>
54. Ethan Moitra, Jacob J van den Berg, Genoviva Sowemimo-Coker, et al (2020) Open pilot trial of a brief motivational interviewing-based HIV pre-exposure prophylaxis intervention for men who have sex with men: preliminary effects, and evidence of feasibility and acceptability. AIDS Care. <https://doi.org/10.1080/09540121.2019.1622644>
55. E. White, D. Dunn, M. Desai, et al (2019) Predictive factors for HIV infection among men who have sex with men and who are seeking PrEP: a secondary analysis of the PROUD trial. Sexually Transmitted Infections. <https://doi.org/10.1136/sextrans-2018-053808>
56. Eric C Tang, E. Vittinghoff, S. Philip, et al (2020) Quarterly screening optimizes detection of sexually transmitted infections when prescribing HIV pre-exposure prophylaxis. AIDS (London). <https://doi.org/10.1097/QAD.0000000000002522>
57. Kostyantyn V. Dumchev, Marina Kornilova, O. Makarenko, et al (2023) Low daily oral PrEP adherence and low validity of self-report in a randomized trial among PWID in Ukraine. The International journal on drug policy. <https://doi.org/10.1016/j.drugpo.2023.104284>
58. C. Agustí, Héctor Martínez Riveros, J. García-Pérez, et al (2023) Feasibility and impact of online HIV/STI screening addressed to men who have sex with men and transgender women users of pre-exposure prophylaxis (PrEP) in Spain (TESTATE PrEP): a study protocol for a non-blinded randomised controlled trial. BMJ Open. <https://doi.org/10.1136/bmjopen-2023-073459>

59. Cynthia Firnhaber, Aaloke Mody, Mitch Scoggins, et al (2026) P-296. Telehealth as a Modality to Improve the Uptake of PrEP Services in Black and Latino MSM "ePrEP". Open Forum Infectious Diseases. <https://doi.org/10.1093/ofid/ofaf695.517>
60. H. T. M. Bui, L. M. Giang, Jane S. Chen, et al (2024) A Brief Alcohol Intervention (BAI) to reduce alcohol use and improve PrEP outcomes among men who have sex with men in Vietnam: study protocol for a randomized controlled trial. *Trials*. <https://doi.org/10.1186/s13063-024-08382-5>
61. Erin C. Wilson, E. Jalil, C. Jalil, et al (2021) Results from a peer-based digital systems navigation intervention to increase HIV prevention and care behaviors of young trans women in Rio de Janeiro, Brazil. *Journal of global health reports*. <https://doi.org/10.29392/001c.28347>
62. T. Vanbaelen, A. Tsoumanis, Eric Florence, et al (2024) Effect of screening for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* on incidence of these infections in men who have sex with men and transgender women taking HIV pre-exposure prophylaxis (the Gonoscreen study): results from a randomised, multicentre, controlled trial. *The Lancet HIV*. [https://doi.org/10.1016/s2352-3018\(23\)00299-0](https://doi.org/10.1016/s2352-3018(23)00299-0)
63. A. Medina-Marino, D. Bezuidenhout, S. Hosek, et al (2021) The Community PrEP Study: a randomized control trial leveraging community-based platforms to improve access and adherence to pre-exposure prophylaxis to prevent HIV among adolescent girls and young women in South Africa—study protocol. *Trials*. <https://doi.org/10.1186/s13063-021-05402-6>
64. Alison C. Castle, J. Busang, J. Dreyer, et al (2025) Alcohol Use and the Pre-exposure Prophylaxis Continuum of Care Among Men in Rural South Africa: Results from a Longitudinal Study. *Aids and Behavior*. <https://doi.org/10.1007/s10461-025-04694-y>
65. Judith Ratcliffe, F. Kapadia, Brandi E. Moore, et al (2026) P-308. Understanding Recruitment into a Long-acting Injectable Pre-exposure Prophylaxis Trial: Lessons Learned to Enhance Equity and Optimize Engagement of Underserved Groups. Open Forum Infectious Diseases. <https://doi.org/10.1093/ofid/ofaf695.527>
66. Ofole Mgbako, Brandi E. Moore, F. Kapadia, et al (2026) P-323. Examining Preliminary Adherence to Long-Acting Injectable Pre-Exposure Prophylaxis (LAI-PrEP) among Racial, Sexual,

and Gender Minority Populations at NYC Health+Hospitals/Bellevue: The EquiPrEP Study. *Open Forum Infectious Diseases*. <https://doi.org/10.1093/ofid/ofaf695.542>

67. A. Bazzi (2016) Antiretroviral pre-exposure prophylaxis for HIV prevention is highly effective in community settings. *Evidence-Based Medicine*. <https://doi.org/10.1136/ebmed-2016-110403>

68. J. Dettinger, J. Kinuthia, J. Pintye, et al (2019) PrEP Implementation for Mothers in Antenatal Care (PrIMA): study protocol of a cluster randomised trial. *BMJ Open*. <https://doi.org/10.1136/bmjopen-2018-025122>

69. D. J. Joseph Davey, Lauren Fynn, E. Rousseau, et al (2025) Evaluation of point-of-care diagnostics for sexually transmitted infection on oral PrEP initiation and persistence among young people in South Africa: a randomized controlled study. *Journal of the International AIDS Society*. <https://doi.org/10.1002/jia2.26488>

70. J. Fuchs, K. Stojanovski, E. Vittinghoff, et al (2018) A Mobile Health Strategy to Support Adherence to Antiretroviral Preexposure Prophylaxis. *AIDS Patients Care and STDs*. <https://doi.org/10.1089/apc.2017.0255>

71. Chunyan Li, Y. Xiong, S. Maman, et al (2023) An instant messaging mobile phone application for promoting HIV pre-exposure prophylaxis uptake among Chinese gay, bisexual and other men who have sex with men: A mixed methods feasibility and piloting randomized controlled trial study. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0285036>

72. Jing Zhang, Xiaojie Huang, Yaokai Chen, et al (2020) HIV and other STIs self-testing to reduce risk compensation among men who have sex with men who use oral pre-exposure prophylaxis in China: protocol for a randomised waitlist-controlled trial. *BMJ Open*. <https://doi.org/10.1136/bmjopen-2019-036231>

73. J. Terada-Hirashima, D. Mizushima, M. Takano, et al (2023) Efficacy and Safety of Pre-Exposure Prophylaxis to Control HIV and Sexually Transmitted Infection Among Men Who Have Sex With Men: Protocol for a Single-Arm Interventional Study. *JMIR Research Protocols*. <https://doi.org/10.2196/50919>

74. Mph Alexis M. Roth, Mph Nguyen K. Tran, Mph Marisa Felsher, et al (2020) Integrating HIV pre-exposure prophylaxis with community-based syringe services for women who inject drugs: Results from the Project SHE demonstration study. *Journal of Acquired Immune Deficiency Syndromes*. <https://doi.org/10.1097/QAI.0000000000002558>
75. Hossein Moameri, Mojtaba Norouzi, Ghulam Raza Mohammadyan, et al (2025) Effectiveness of eHealth on Human Immunodeficiency Viruses Pre-Exposure Prophylaxis among Key Population: A Systematic Review and Meta-Analysis. *Iranian Journal of Public Health*. <https://doi.org/10.18502/ijph.v54i9.19854>
76. R. Mpirirwe, Ivan Segawa, Kevin Ouma Ojiambo, et al (2024) HIV pre-exposure prophylaxis uptake, retention and adherence among female sex workers in sub-Saharan Africa: a systematic review. *BMJ Open*. <https://doi.org/10.1136/bmjopen-2023-076545>
77. R. Braun, Rebecca K Erenrich, K. Coyle, et al (2023) Effectiveness, Acceptability, and Feasibility of a Telehealth HIV Pre-Exposure Prophylaxis Care Intervention Among Young Cisgender Men and Transgender Women Who Have Sex With Men: Protocol for a Randomized Controlled Trial. *JMIR Research Protocols*. <https://doi.org/10.2196/47932>
78. B. Pečavar, Barbara Kokošar Ulčar, Manja Kordiš, et al (2021) Pre-exposure prophylaxis for HIV with oral tenofovir disoproxil fumarate/emtricitabine in men who have sex with men: Slovenian national demonstration project. *International Journal of STD and AIDS*. <https://doi.org/10.1177/09564624211019876>
79. R. Shrestha, F. Altice, Antoine Khati, et al (2023) Clinic-Integrated Smartphone App (JomPrEP) to Improve Uptake of HIV Testing and Pre-exposure Prophylaxis Among Men Who Have Sex With Men in Malaysia: Mixed Methods Evaluation of Usability and Acceptability. *JMIR mHealth and uHealth*. <https://doi.org/10.2196/44468>
80. Emiko Kamitani, Y. Mizuno, Julia B. DeLuca, C. Collins (2023) Systematic review of alternative HIV preexposure prophylaxis care delivery models to improve preexposure prophylaxis services. *AIDS (London)*. <https://doi.org/10.1097/QAD.0000000000003601>