

Supplementary Material

A rapid review of pre-exposure prophylaxis for HIV in the Asia–Pacific region: recommendations for scale up and future directions

Partha Haldar^A, Sushena Reza-Paul^{B,E}, Roy Arokiam Daniel^A, Lisa Lazarus^B, Bharat Bhushan Rewari^C, Robert Lorway^B and R. Steen^D

^AAll India Institute of Medical Sciences, Centre for Community Medicine, New Delhi, India.

^BUniversity of Manitoba, Institute for Global Public Health, Rady Faculty of Health Sciences, Winnipeg, Manitoba, Canada.

^CWorld Health Organization Regional Office for South-East Asia, New Delhi, Delhi, India.

^DErasmus Medical Center, Department of Public Health, Rotterdam, Zuid-Holland, Netherlands.

^ECorresponding author. Email: sushenar@gmail.com

Table S1. PubMed search strategy for implementation of PrEP

Item	Search words	# Studies
1	Pre exposure prophylaxis [MeSH Terms] OR PrEP [tw]	3542
2	Implementation [tw] OR feasibility [tw] OR acceptability [tw]	177543
3	HIV [MeSH Terms]	51452
4	India [MeSH Terms] OR China [MeSH Terms] OR Thailand[MeSH Terms] OR Vietnam[MeSH Terms] OR Malaysia[MeSH Terms] OR Myanmar[MeSH Terms] OR Indonesia[MeSH Terms] OR Philippines[MeSH Terms] OR Pakistan[MeSH Terms]	418434
5	1 AND 2 AND 3 AND 4	100

Table S2. PubMed search strategy for cost effectiveness of PrEP

Item	Search words	# Studies
1	Pre exposure prophylaxis [MeSH Terms] OR PrEP [tw]	3542
2	HIV [MeSH Terms]	51452
3	Cost analysis [MeSH Terms] OR cost effectiveness [tw]	57816
4	India [MeSH Terms] OR China[MeSH Terms] OR Thailand[MeSH Terms] OR Vietnam[MeSH Terms] OR Malaysia[MeSH Terms] OR Myanmar[MeSH Terms] OR Indonesia[MeSH Terms] OR Philippines[MeSH Terms] OR Pakistan[MeSH Terms]	418434
5	1 AND 2 AND 3 AND 4	33

Table S3. PubMed search strategy for policy related documents on PrEP

Item	Search words	# Studies
1	Pre exposure prophylaxis [MeSH Terms] OR PrEP [tw]	3542
2	HIV [MeSH Terms]	51452
3	Policy [MeSH Terms] OR Guidelines [tw]	116252
4	India [MeSH Terms] OR China[MeSH Terms] OR Thailand[MeSH Terms] OR Vietnam[MeSH Terms] OR Malaysia[MeSH Terms] OR Myanmar[MeSH Terms] OR Indonesia[MeSH Terms] OR Philippines[MeSH Terms] OR Pakistan[MeSH Terms]	418434
5	1 AND 2 AND 3 AND 4	21

Table S4. Individual study details

Year of publication	Author name	Article ref	Country	Type of study	Research design	Sample size and type	Key elements of research question	Key measures	Outcomes/Results
2018	Utthappa CK et al.	21	India	Implementation of PrEP	Cross-sectional	271 MSM and 129 TGW	Determine acceptability of PrEP	Awareness, acceptance, facilitators and barriers of PrEP	Being married (among MSM), some education, risk perception, and once daily pill, were reported as facilitators of PrEP acceptance
2016	Mitchell KM et al.	22	India	Implementation of PrEP	Mathematical modelling	NA	Estimate the impact and efficiency of prioritizing PrEP to FSW and MSM in Bangalore	PrEP efficiency	PrEP could prevent a substantial proportion of infections amongst FSW and MSM in this setting (23% over 5 years, with 60% coverage and 50% adherence), which could avert 2.9% of infections over 5 years
2015	Chakrapani V et al.	23	India	Implementation of PrEP	Qualitative	61 MSM	Investigate implementation challenges of PrEP	Facilitators and barriers of PrEP acceptance	Community engagement, addressing stigma around PrEP use, and provision of free or subsidized PrEP are necessary for PrEP implementation
2019	Chakrapani V et al.	24	India	Implementation of PrEP	Qualitative	36 TGW	Acceptability of PrEP among TGW	Awareness, acceptability, self-efficacy for PrEP	There is low awareness and there is a need to provide information on side effects and possible interactions with female hormones and highlight the advantages of added protection in sex work and forced sexual encounters
2016	Reza-Paul S et al.	25	India	Implementation of PrEP	Mixed methods	427 FSW	Feasibility study to assess the	Acceptance, Knowledge, willingness	This feasibility study indicated strong interest in PrEP and a

Table S4. Individual study details

							acceptance of PrEP	and community interest for PrEP	desire to move forward with the demonstration project. .
2020	Reza-Paul S et al.	26	India	Implementation of PrEP	Prospective	1240 FSW	Feasibility of Delivering PrEP	Demand and adherence of PrEP	They found that the adherence rate was 90% with no HIV infections among the participants and the condom use remained high at over 90% with clients
2020	Kazemian et al.	27	India	Cost-effectiveness of PrEP	Mathematical modelling	NA	Examine the cost-effectiveness of PrEP	Cost-effectiveness analysis of PrEP	PrEP with semi-annual testing was a cost-effective HIV prevention strategy for MSM and PWID
2017	Wang Z et al.	30	China	Implementation of PrEP	Cross-sectional	183 TGW	Investigated the prevalence of acceptability of daily use of free oral PrEP	Acceptability and perception related to PrEP	Perceived behavioural control, perceived subjective norms and experiencing violence during sex work were significantly associated with daily use of free PrEP
2018	Qu D et al.	31	China	Implementation of PrEP	Prospective	331 MSM	Adherence to PrEP among MSM	Adherence rate	The main objective reasons for non-adherence were 'forgetting to take medicine', 'too busy', 'worrying about side effects', and 'too much trouble'.
2019	Han J	32	China	Implementation of PrEP	Cross-sectional online survey	4581 MSM	PrEP uptake preferences among MSM	Uptake willingness and uptake preferences for PrEP	Young and well-educated Chinese MSM reported a low willingness to uptake PrEP despite being high-risk for HIV, mainly due to worries about side effects, low perceived HIV risk, preference for condoms,

Table S4. Individual study details

									and never having received HIV testing
2018	Wang X et al.	33	China	Implementation of PrEP	Cross-sectional	487 MSM	Evaluate the extent, and reasons, for MSM's willingness to use oral PrEP	Reasons for willingness and unwillingness to use PrEP	The reasons for willing to accept PrEP were, its ability to prevent HIV infection, taking responsibility for own sexual health, and in protecting family members from potential harm
2019	Peng L et al.	34	China	Implementation of PrEP	Cross-sectional	524 MSM	Willingness to use and adhere to PrEP among MSM	Factors associated with adherence and willingness to PrEP	Conditional willingness by type of PrEP, i.e., 60% for daily oral PrEP, 79% for on-demand PrEP, and 63% for long acting injectable PrEP
2019	Wu Y et al.	35	China	Implementation of PrEP	Cross-sectional	708 MSM	To map respondents onto a motivational PrEP cascade	Awareness, intention to use and uptake of PrEP	Community education to increase accurate knowledge and provider trainings to build MSM-competent services to support shared decision-making for PrEP initiation
2019	Huang W et al.	36	China	Implementation of PrEP	Cross-sectional online survey	979 MSM	Compare the preferences for oral and long acting PrEP among MSM	PrEP acceptability and formulation preferences	Majority of MSM interested in a PrEP injection rather than oral PrEP
2019	Qu D et al.	37	China	Implementation of PrEP	Cross-sectional	1884 MSM	Determine factors influencing PrEP self-efficacy	PrEP self-efficacy	Age and anxiety score were negatively, and AIDS related knowledge was positively related to related to PrEP self-efficacy

Table S4. Individual study details

2018	Liu C et al.	38	China	Implementation of PrEP	Qualitative	32 MSM	Identify factors that might influence MSM's uptake and use of PrEP	Knowledge, beliefs and adherence to PrEP and perceived HIV risk	Perceived high HIV risk, beliefs in efficacy of PrEP, and worries of transmitting HIV to families were the major motivators and perception of low HIV risk, lack of partners' support were the major reasons for stopping the use of PrEP
2016	Ding Y et al.	40	China	Implementation of PrEP	Cross-sectional	1033 MSM	Estimate willingness and uptake of PrEP among MSM	Factors associated with willingness and uptake of PrEP	Higher willingness to use PrEP was associated with age 45 years or older, non-local residents, having many male sex partners in the past 6 months and no condom use during the last anal sex with man
2019	Poon AN et al.	39	China	Implementation of PrEP	Cross-sectional	1466 FSW	Estimate awareness and willingness to use PrEP among FSW	Factors associated with willingness to use PrEP	Willingness and awareness of PrEP is very low and interventions are needed to increase the knowledge of PrEP among the FSW population
2019	Zhang L et al.	41	China	Cost-effectiveness of PrEP	Mathematical modelling	NA	Evaluate potential population impact and cost-effectiveness of PrEP	Cost-effectiveness analysis of PrEP	Cost of daily oral PrEP regimen would need to be reduced by half to achieve cost-effectiveness
2018	Li J et al.	42	China	Cost-effectiveness of PrEP	Mathematical modelling	NA	Assess epidemiological impact and cost-	Cost-effectiveness analysis of PrEP	Compared with non-ART, the early-ART and early-ART plus partners' PrEP scenarios were associated with 81.0% and

Table S4. Individual study details

							effectiveness of PrEP		98.1% reduction in HIV transmission and they found that PrEP, test-and-treat and their combinations among MSM are effective and cost-effective
2019	Hu Q et al.	43	China	Cost-effectiveness of PrEP	Mathematical modelling	216 MSM	Efficacy and cost-effectiveness of early ART and partners' PrEP among MSM	Cost effectiveness	Integrated delivery of early ART and sexual partners' PrEP could nearly eliminate HIV transmission and reduce costs during the first 36 months of HIV infection
2019	The SeKSI Study	47	Indonesia	Implementation of PrEP	Cross-sectional Online survey	709 MSM and TGW	Behavioural study	High risk behaviour, social engagement and HIV testing	They reported high levels of condom less sex and nearly half reported experiences of discrimination due to being MSM or TGW
2017	Draper BL et al.	53	Myanmar	Implementation of PrEP	Cross-sectional	434 MSM & TGW	Willingness to use PrEP among Gay men, MSM and TGW (GMT)	PrEP awareness and willingness	MSM & TGW perceived themselves as likely to become HIV positive, who had more than one recent regular partner, no regular partners, more than five casual partners were more likely to be willing to use PrEP
2016	Oldenburg CE et al.	55	Vietnam	Implementation of PrEP	Cross-sectional online survey	548 MSM	Assessment of preferences for PrEP among MSM	Acceptability, knowledge and preferences for PrEP	25% had previously heard of PrEP and the most endorsed rectal microbicides as their preferred mode of uptake for PrEP. The major barriers in uptake cited were stigma, and side-effects.

Table S4. Individual study details

2016	Oldenburg CE et al.	56	Vietnam	Implementation of PrEP	Cross-sectional	168 TGW	Assessment of PrEP indications and readiness among TGW	PrEP preferences, readiness and indications	Most of the participants were willing to pay for PrEP, indicating a high likelihood of use, if available.
2020	Bhatia et al.	57	Vietnam	Implementation of PrEP	Cross-sectional	717 MSM	To determine the proportion of HIV negative MSM with PrEP indications in Hanoi	Percentage of MSM with PrEP indications	72.2% HIV negative MSM had more than 1 PrEP indication, with the most common being condom less anal intercourse
2017	Bourne A et al.	58	Malaysia	Implementation of PrEP	Qualitative	19 MSM	Assessment of willingness to use PrEP	HIV risk and stigma, PrEP access and information	MSM perceived PrEP as an additional layer of protection from HIV rather than seeing it as a replacement for condoms and perceived it to be more valuable to men who have a greater number of sexual partners
2017	Lim SH et al.	59	Malaysia	Implementation of PrEP	Cross-sectional online survey	990 MSM	Examined willingness to use PrEP among MSM	Awareness and willingness to use PrEP	Malay men, having ≥ 2 male anal sex partners in the previous 6 months, prior knowledge of PrEP and lack of belief in practising safer sex were associated with greater willingness to use PrEP whereas men who identified themselves as heterosexual were less willing to use PrEP
2018	Burch WJ et al.	60	Malaysia	Implementation of PrEP	Qualitative	20 MSM and 4 service providers	Understand multilevel factors related	Factors related to individual risk	Pervasive stigma against same sex relationships, importance of family in driving attitudes to same-sex relationships, lack of

Table S4. Individual study details

							to HIV risks among MSM	behaviour for HIV	sex education and knowledge of HIV/AIDS and difficulty in accessing confidential HIV testing were factors related to HIV risks
2018	Phanuphak N et al.	64	Thailand	Implementation of PrEP	Prospective	1467 MSM and 230 TGW	Feasibility of pre-exposure prophylaxis (PrEP) delivered by trained Key population (KP) community health workers	Uptake, retention and adherence to PrEP services	Key Population-led PrEP program successfully delivered PrEP to MSM and TGW. Innovative retention supports are needed, especially for TGW and those who are young or with lower education levels
2019	Seekaew P et al.	65	Thailand	Implementation of PrEP	Prospective	564 MSM and 89 TGW	Correlates of nonadherence to key population led HIV PrEP services among Thai MSM and TGW	Factors associated with low adherence	Younger age, being a TGW and whether the participant had not previously accessed services at the clinic is associated with lower adherence rates.
2017	Plotzker R et al.	66	Thailand	Implementation of PrEP	Prospective	297 MSM and TGW	Predictors of PrEP Acceptance Among Thai MSM and TG women	PrEP acceptance and HIV risk perception	HIV risk perception plays an important role in PrEP acceptance.
2020	Chemnasiri T et al.	67	Thailand	Implementation of PrEP	Qualitative	38 MSM	Estimate factors influencing PrEP adherence among Thai MSM	Facilitators and barriers of PrEP adherence	Facilitators- Use of strategies to have PrEP available when needed, simplicity in regimen. Challenges- Perceptions of no or low HIV risk, concerns about side effects and affordability of

Table S4. Individual study details

									PrEP outside of study context influencing uptake and use in the community.
2018	Ongwandee S et al.	68	Thailand	Implementation of PrEP	Prospective	1441 MSM and 435 TGW	Assess feasibility of implementing HIV program	HIV testing, ART use, Knowledge about PrEP	Peer-based recruitment was crucial to promote PrEP services
2019	Holtz TH et al.	69	Thailand	Implementation of PrEP	Randomised control trial	176 MSM and 2 TGW	Correlates of Sex-Related PrEP adherence among Thai MSM and TGW	PrEP adherence	No difference in PrEP adherence in the daily or time-driven arms but was significantly better than event driven arm and adherence to PrEP was adversely affected by uptake of substance use compared to those not using any stimulant drugs.
2018	Suraratdecha C et al.	71	Thailand	Cost-effectiveness of PrEP	Retrospective cost analysis	366 MSM and TGW	Estimation of costs associated with PrEP provision	Impact and Cost-Effectiveness analysis of PrEP	Cost-effectiveness curves demonstrated that 80% of scenarios would be cost-effective when PrEP is provided solely to higher-risk MSM