

Preference for HIV Pre-exposure Prophylaxis Access Among Men who Have Sex With Men in China: A Discrete Choice Experiment

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Background. HIV pre-exposure prophylaxis (PrEP) is highly effective but not widely used by men who have sex with men (MSM; 27%) in China.

Methods. In June 2023, an online cross-sectional survey with a discrete choice experiment (DCE) was distributed to PrEP-eligible MSM in China who were at least 18 years old. The DCE explored attributes of PrEP modality (daily pill, on-demand pill, injections, implants), clinical care model (same-day, 2-visit, telehealth prescription), medication pickup (clinic, community health center, pharmacy, MSM-focused community-based organization, home delivery), enhanced support (self-management, smartphone app, text reminder, anonymous peer support group), and cost.

Results. A total of 1013 MSM completed the survey; the average age was 31 years, and a quarter had used PrEP. The most influential attributes were cost (relative importance: 64.6%), followed by PrEP modality (27.7%), medication pickup (4.0%), enhanced support (3.5%), and clinical care model (0.2%). The most preferred ways to access PrEP were no-cost on-demand pill, medication home delivery, self-management, and telehealth. The predicted uptake of on-demand PrEP was higher than other modalities, increasing from 22% with no subsidy to 79% with full subsidy, holding the other 3 attributes constant.

Conclusions. Chinese MSM have strong preferences regarding accessing PrEP: Low cost is a critical priority, especially important because medication and clinical care are currently entirely unsubsidized in China. Preferences for on-demand PrEP and home delivery indicate methods that the health care system can utilize to best meet the needs of MSM and factors that should be incorporated into future interventions.

Keywords. China; HIV prevention; men who have sex with men; pre-exposure prophylaxis; preference.

Clinical trials and real-world studies have demonstrated the high effectiveness of HIV pre-exposure prophylaxis (PrEP) not only in reducing the risk of acquiring HIV at the individual level, but also in reducing HIV incidence at the populational level [1–4]. Due to the high effectiveness of PrEP, there has been a rapid global increase in PrEP use from 0.37 million users in 2018 to 1.6 million users in 2021 [5].

Despite the demonstrated effectiveness and large increases in PrEP uptake worldwide, the implementation of PrEP in China is still at an early stage. A large-scale systematic analysis estimated that national HIV prevalence among MSM was 5.7% in 2001–2018 [6]. Despite comprising only 2%–5% of the total population [7], MSM have accounted for >25% of new HIV diagnoses since 2014 [8]. Based on the current HIV prevalence and incidence rate, a compartmental modeling study forecasted that 50% PrEP coverage (~1.2 million) of the PrEP-eligible men who have sex with men (MSM) could prevent a total of 1.7–3.2 million new HIV infections over the next 20 years [9]. Approved by China's National Medical Products Administration in 2020 [10], PrEP is not subsidized or covered by the public health insurance system. PrEP uptake ranged from 0.7% to 1.2% among MSM in 2019 [11, 12]. The China Center for Disease Control and Prevention recently estimated that PrEP uptake increased from 14% in 2021 to 27% in 2022 among MSM recruited by community-based organizations (CBOs) in large cities using multiple cross-sectional surveys [13].

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PrEP rollout among MSM in China faces a number of challenges: low to moderate awareness and willingness to use PrEP and cultural and structural barriers to accessing PrEP. Across studies in 2012–2021 in China, awareness of PrEP among MSM was found to range from 11% to 50%, with more recent studies finding awareness at the higher end of this range [14–19]. Hypothetical willingness to use PrEP has been reported to range widely within the same time frame, from 20% to 90% [14–19]. This variation could be due to selection bias related to inclusion of different subgroups (eg, age groups, geographic locations, etc.) in studies, different measures of PrEP willingness, and different data collection time frames. Other common barriers related to low PrEP initiation include low perceived risk of HIV, concerns about the cost, efficacy, and side effects of PrEP, and sexual minority–related and HIV-related stigma [19–21]. Cultural and structural barriers, including traditional medicine beliefs regarding drug safety, scarcity of family doctors, and lack of health insurance coverage offer challenges to PrEP scale-up [20, 22]. Cultural and structural barriers may be hard to address in the short term absent substantial changes in programming or policy.

At this early stage of PrEP rollout in China, it is critical to understand preferences for different PrEP care access processes to optimize PrEP service provision. Relevant areas include regimen and modalities, costs, and health service delivery models. The World Health Organization (WHO)–recommended HIV PrEP modalities include daily oral pills [5, 23], on-demand oral pills [24], and bimonthly long-acting injectable PrEP [25, 26]. Other PrEP options, such as longer-acting injections and subdermal implants, are under investigation [27]. These regimens and modalities may offer different costs (eg, on-demand PrEP may require fewer pills and therefore lower cost) and require different medication delivery system (eg, injectable PrEP may require a health professional to perform the injection in a private setting). Currently, PrEP is mainly prescribed in China at appointed clinics/hospitals with the capacity to provide and monitor PrEP for MSM [28, 29]. These appointed hospitals are usually tier 3 hospitals or infectious disease clinical centers that employ specialists in HIV care. Clients attend the first clinic visit to get clinician counseling and laboratory tests, then the second clinic visit to get test results and to get the prescription if they are eligible for PrEP. Clients usually pick up PrEP medication from a pharmacy either within the hospital or affiliated with the clinic/hospital. This standard care approach may not be optimal for all clients due to travel times, clinic hours, and HIV PrEP–related stigma. When in-person counseling and follow-up are not feasible, real-time video communication, HIV self-test kits, and remotely collected dried blood spot specimens are recommended by the consensus statement on PrEP in China [30]. Such approaches may reduce inconvenience in travel and stigma concern. Understanding MSM clients’ preferences for these modalities, costs, and health service delivery models will inform

implementation planning to prioritize resources for the preferred features to better meet client needs in PrEP care.

Discrete choice experiments are an established quantitative method to elicit preferences by observing how people make decisions in a series of choice scenarios [31, 32]. These choice scenarios often comprise various levels of service attributes to simulate real-world decision-making processes [31–33]. DCE has previously been applied to PrEP services, with a systematic review identifying 18 PrEP preference DCE studies in 13 countries, half of which sampled from MSM populations [34]. Attributes evaluated in these studies included dosing regimen, modalities of PrEP, benefits (eg, efficacy) of PrEP, supportive services, barriers (eg, cost, side effects, and waiting times), and access (eg, dispensing location, provider type, and frequency of medicine pickup). The most important attributes commonly reported in these reviewed DCE studies were cost, effectiveness of HIV prevention, and dosing strategy [34]. However, the review also identified heterogeneity in preference across populations, as a few studies reported dispensing venue [35], incentive type [36], and monitoring frequency [37] to be the most important attributes in their sampled populations. Moreover, most DCE studies were conducted in Africa and the United States, where the numbers of PrEP initiations were relatively large, rather than countries with fewer PrEP initiations. So far, only 2 studies have been conducted in Asia, 1 in Singapore [38] and 1 in Thailand [37]. No study to date has explored PrEP access preferences among MSM in China. To explore preferences for PrEP access among MSM in China, we conducted this DCE study to estimate the strength of preferences for the attributes and attribute levels of PrEP services and to estimate the levels of PrEP uptake with various combinations of these attributes and attribute levels.

METHODS

Study Participants

This DCE study was incorporated into an existing, repeated cross-sectional survey of 500 participants in Beijing and 500 participants in Chengdu. The existing survey collected data on sexual activities and HIV prevention behaviors such as consistent condom use, HIV and sexually transmitted disease (STD) testing, and PrEP use. Study participants were recruited on a geosocial networking app from June 27 to 28, 2023. The geosocial networking (GSN) app Blued is the most widely used among MSM in China. Registered users were recruited directly on the app, with other eligibility criteria based on self-report: (1) registered app user, (2) at least 18 years of age, (3) male sex at birth, (4) male gender identity, (5) anal sex with a man in the last 6 months, (6) HIV-negative or unknown, (7) able to complete the study survey in Chinese, (8) residing in Beijing or Chengdu, and (9) eligible for PrEP according to China’s consensus statement [30].

Table 1. Attributes and Attribute Levels for PrEP Access Preference Options in the DCE

Attributes	Attribute Levels
PrEP modality	<ul style="list-style-type: none">• Daily pill• On-demand pill• Long-acting injection• Implant
Clinical care model	<ul style="list-style-type: none">• Same-day prescription• Two-visit prescription• Telehealth prescription
Medication pickup	<ul style="list-style-type: none">• Clinic/hospital pickup• Primary community health center pickup• Pharmacy pickup• MSM-focused CBO pickup• Home delivery
Enhanced support	<ul style="list-style-type: none">• Self-management (no additional support)• Smartphone application• Text reminder for medication adherence• Anonymous peer support group
Cost (out-of-pocket per month)	<ul style="list-style-type: none">• At no cost (full subsidy)• 65% subsidized (350 RMB)• 30% subsidized (700 RMB)• Full price (1000 RMB)

Abbreviations: CBO, community-based organization; DCE, discrete choice experiment; MSM, men who have sex with men; PrEP, pre-exposure prophylaxis; RMB, renminbi.

DCE Design

We included 5 attributes (PrEP modality, clinical care model, medication pickup, enhanced support services, and cost) and 3–5 levels for each attribute (Table 1). We only considered the cost of medication in this study because the cost of clinic visits, monitoring laboratory testing, and regular STD testing can vary drastically across different hospitals and regions in China. These attributes were first identified through an assessment of the literature regarding the challenges for PrEP rollout among Chinese MSM, including cost, side effects, stigma, and the structure of the health care system [14, 19, 20, 30, 39, 40]. Additionally, these studies identified several critical attributes such as dosing regimen, dispensing venue, and frequency [34, 41]. Once we established draft versions of the DCE attributes and levels, the importance of these attributes was ranked by 10 Chinese clinicians who work closely with HIV patients and by 391 PrEP-eligible Chinese MSM (Supplementary Tables 1 and 2). Further attributes and attribute levels were suggested by these clinicians and MSM. Informed by their feedback, PrEP visit follow-up frequency, which was determined to be a low-priority feature of PrEP uptake for members of the study population, was removed from the final attributes. The option of a monthly pill was removed from the final attribute level list due to the drug being removed from the clinical trial pipeline at the time the study was conducted. Further descriptions of each attribute level are presented in the Supplementary Data.

After constraining implausible combinations of attribute levels (eg, medication pickup as home delivery when the PrEP modality is implant), a total of 60 choice tasks were generated using a

d-efficient design in Ngene (ChoiceMetrics, Pty Ltd, Sydney, NSW, Australia). D-efficient designs are commonly used to maximize statistical efficiency and minimize the variability of DCE parameter estimates [42]. The 6 DCE choice task questions were provided at the end of the cross-sectional survey. To minimize the cognitive burden for participants, the 60 choice tasks were divided into 10 blocks of 6 choice tasks [42].

Study Format and Other Measures

The DCE survey was administered online in a Sojump-based cross-sectional survey. Sojump is an online survey platform that is widely used for behavioral research in China. It offers extensive survey design such as multiple question types, branching logic, question randomization, and blocking.

A description of attributes and attribute levels and an example DCE choice question were presented at the beginning of the DCE survey. After reviewing the description of the attribute levels and the example DCE choice task, participants were randomized to 1 of 10 blocks to complete 6 choice tasks. Each choice task required participants to select their preferred 1 of 3 options: taking PrEP with 1 set of attribute levels (option 1), taking PrEP with a different set of attribute levels (option 2), or neither of these 2 options (representing the choice of no PrEP). We used a simplified choice task with brief text descriptions and no images to ensure a clear view of the choice tasks on smaller screens such as smartphones, used by most participants for survey completion (Figure 1). For quality control, we recorded the total time that participants spent answering all 6 choice tasks. Two additional 5-point Likert scale (1 = “very easy” to 5 = “very hard”) questions were added to assess the difficulty of understanding and decision-making for the tasks. Each participant received a 100 renminbi (RMB; \$15 USD) gift card upon survey completion.

Other data collected in the survey included sociodemographic, behavioral, and other PrEP-relevant information. The sociodemographic variables were age, residential city, education, and income. Behavioral variables included HIV testing and condom use in the past 3 months, ever having used PrEP, and PrEP-related stigma. PrEP-related stigma was assessed by a brief HIV PrEP Stigma Scale (HPSS) with a score ranging from 1 to 5. The higher score represents the more perceived PrEP-related stigma [43]. A brief description of PrEP was provided before asking questions regarding PrEP (detailed in the Supplementary Data).

Data Analysis

Descriptive statistics were used to summarize study participants’ sociodemographic and behavioral characteristics and PrEP experience. Descriptive statistics of the choice patterns were also used to check on potential bias of the tendency to choose 1 of the options. The mixed logit model was chosen as the main model to explore PrEP access preferences,

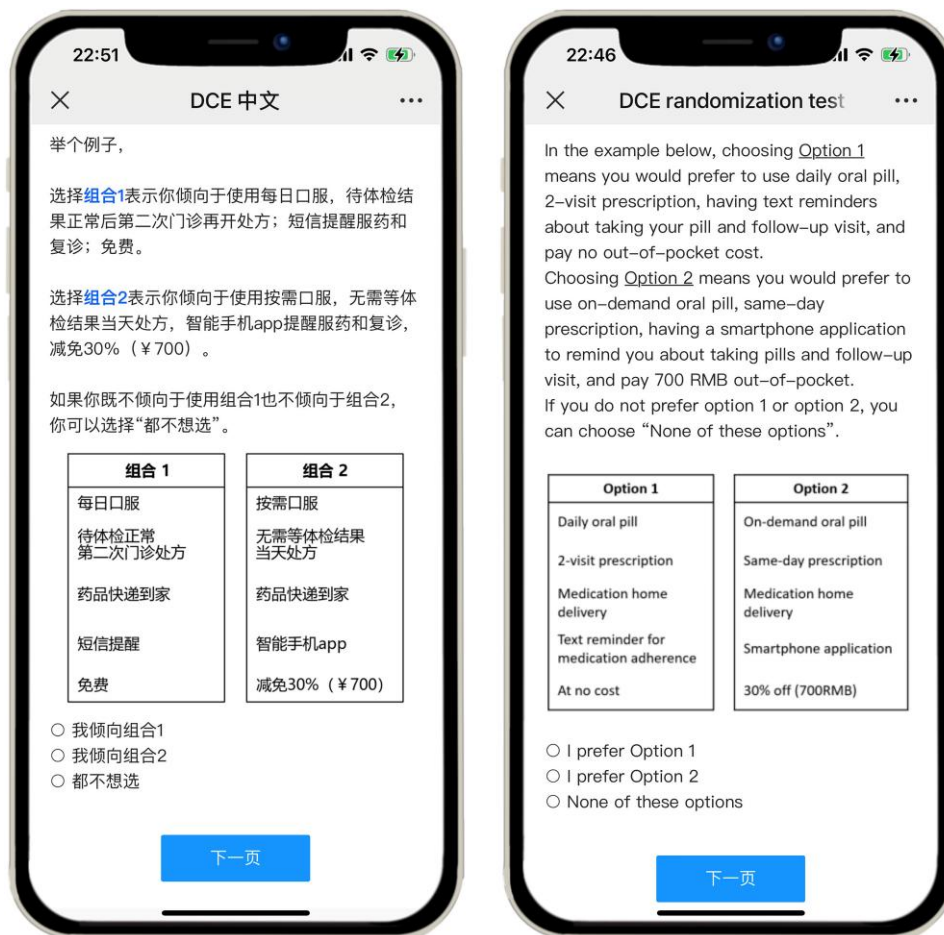


Figure 1. An example of a choice task in the DCE survey viewed from a mobile phone. Abbreviations: DCE, discrete choice experiment; RMB, renminbi.

accounting for correlations between repeated choices from the same participants. The mixed logit model also relaxes the restrictive assumption of the independence of irrelevant alternatives from the multinomial logit model [44].

All attributes were included in the model as categorical variables and effects coding was applied [45, 46]. For all models, a categorical variable controlling for the different blocks of choice tasks that participants received was tested following the recommendations of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Conjoint Analysis Statistical Analysis Good Research Practices Task Force [45]. To optimize parsimony, the variable was deleted from the model if its coefficient was not statistically significant. Statistically significant was defined as a 2-sided P value of $<.05$. The models were estimated using simulated maximum likelihood with 500 Halton draws. The heterogeneity distribution (random effects) of the parameters was set to follow a normal distribution. Log-likelihood, Akaike information criterion (AIC), consistent Akaike information criterion (CAIC), and Schwarz's Bayesian information criterion (BIC) were calculated to assess model fit. The

relative importance of each attribute was calculated using the coefficient range of each attribute divided by the sum of ranges from all attributes. Predicted uptakes were calculated under a number of scenarios with a combination of different attribute levels. For each scenario, we simulated 1000 runs using the estimated coefficients from the MXL model.

Sensitivity analyses were conducted using the main MXL with several subsets excluding respondents who (1) only chose 1 option ("straight-liners"), (2) reported that decisions were somewhat hard or hard to make, (3) reported that understanding the attributes/attribute levels or the decision-making was somewhat hard or hard, and (4) spent <15 seconds completing all 6 choice tasks ("speeders").

Data were cleaned and transformed using SAS 9.4 software (SAS Institute Inc., Cary, NC, USA). All models and postestimations were conducted with the *mixlogit* and *llogit* commands in Stata 17.0 (StataCorp, College Station, TX, USA).

Patient Consent

This study was reviewed and approved by the Emory Institutional Review Board (IRB00116910) and Blued

Institutional Review Board (IRB00116910). We obtained a waiver of written consent. All participants provided electronic informed consent conducted online through the Sojump platform before data collection.

RESULTS

The survey link was clicked 4502 times; 2374 respondents initiated the survey, 7 did not complete the eligibility assessment, 1312 respondents either failed to meet the study eligibility criteria or did not complete the survey, and 42 respondents provided duplicate responses. A total of 1013 PrEP-eligible participants completed 6078 choice tasks (6 tasks per person). The mean score for ease of understanding the attributes and attribute levels was 2.02 on a 5-point scale (1 = “very easy” to 5 = “very hard”). Five percent of participants reported that both the attributes and attribute levels were somewhat hard or very hard to understand. Eight percent of participants reported that the decisions were somewhat hard or hard to make in these choice tasks (Supplementary Table 3). The average time spent completing the 6 choice tasks in the DCE section was 61 seconds (median [IQR], 48 [30–74] seconds) (Supplementary Table 4). Seven participants spent >5 minutes completing the DCE section. The average time spent completing the survey before the DCE choice questions was 9.2 minutes (median [IQR], 8.0 [6.2–10.5] minutes).

Participant Characteristics

Participants were, on average, age 31 years (Table 2). Two-thirds of the participants lived in Beijing, and the rest were from Chengdu. Most had a college degree or above, and over two-thirds had a monthly income level above 7000 RMB, the average income level in China. A quarter of participants (25%, 249/1013) reported ever using PrEP, among whom 18% (45/249) reported using daily PrEP in the past 3 months and 70% (173/249) reported using on-demand PrEP in the past 3 months.

Choice Patterns

Among all choice tasks, option 1 and option 2 had the same likelihood of being selected (45% for option 1 and 39% for option 2). “No PrEP” (ie, “none of these options”) was selected in 16% of all choice tasks. Among all participants, a total of 5% of participants chose the “no PrEP” option of all choice tasks. A minority of participants (4%) selected option 1 across all the choice tasks, and a similar proportion (4%) selected option 2 for all the choice tasks.

PrEP Access Preferences

Overall, participants selected a PrEP option more frequently than opting out (Table 3). The most influential attribute was cost (relative importance, 64.6%), followed by PrEP modality (27.7%), medication pickup (4.0%), enhanced support (3.5%),

Table 2. Sociodemographic and Behavioral Characteristics of PrEP-Eligible MSM, China, 2023 (n = 1013)

	Total (n = 1013), No. (%)
Age, mean (SD), y	30.9 (6.7)
City	
Beijing	678 (66.9)
Chengdu	335 (33.1)
Education	
Postgraduate and above	230 (22.7)
College or university	578 (57.1)
Associate degree and/or tech school	157 (15.5)
High school and below	48 (4.7)
Monthly income	
<3000 RMB	79 (7.8)
3000–6999 RMB	225 (22.2)
7000–10 000 RMB	266 (26.3)
>10 000 RMB	449 (43.7)
HIV PrEP stigma, ^a mean (SD)	2.6 (0.6)
HIV testing uptake ^b	
No	373 (36.8)
Yes	640 (63.2)
Condomless anal sex ^b	
No	446 (44.0)
Yes	567 (56.0)
PrEP use	
Never used PrEP	764 (75.4)
Ever used PrEP	249 (24.6)

Abbreviations: MSM, men who have sex with men; PrEP, pre-exposure prophylaxis; RMB, renminbi.

^aScores range from 1 to 5, with higher scores representing greater PrEP stigma.

^bIn the last 3 months.

and clinical care model (0.2%). The most preferred kind of PrEP access was no-cost on-demand PrEP, home-delivered medication, self-management to take pills, and telehealth to get the PrEP prescription from clinicians. PrEP implant was the least preferred modality. Using text reminders was the least preferred approach to enhance medical adherence.

The standard deviations of all levels of PrEP modality, same-day care model, telehealth care model, medication pickup from MSM-focused CBOs and home delivery, smartphone application as enhanced support, and all levels of cost were significantly different from 0, suggesting preference heterogeneity for these attribute levels. The variable controlling for block effect was excluded from the final model because it was found not to be significant in the model, indicating that the survey version (the block of choice tasks) had no effect on model results (not shown in Table 3).

Predicted Uptake of PrEP

The predicted uptakes of different PrEP modalities with levels of subsidy are presented in Figure 2. The attribute levels of clinical care model, medication pickup, and enhanced support were set to follow the current standard of care: 2 visits for prescription, clinics/hospitals for medication pickup, and self-

Table 3. Mixed Logit Model of Preferences for PrEP Access Among MSM, China, 2023 (n = 1013)

Attributes and Attribute Levels	Coefficients (SE)	Standard Deviation (SE)
PrEP modality		
Daily pill	0.084 (0.085)	1.797 (0.416)***
On-demand pill	1.027 (0.117)***	0.760 (0.172)***
Long-acting injection	-0.131 (0.092)	1.433 (0.158)***
PrEP implant	-0.981 (0.124)***	0.774 (0.256)***
Clinical care model		
Same day	-0.001 (0.057)	0.630 (0.227)***
Two visits	-0.006 (0.059)	0.329 (0.205)
Telehealth	0.007 (0.058)	0.537 (0.125)***
Medication pickup		
Clinic/hospital	0.045 (0.091)	1.141 (0.883)
Primary community health center	-0.099 (0.077)	0.120 (1.123)
Pharmacy	0.014 (0.082)	0.102 (0.242)
MSM-focused CBO	-0.125 (0.099)	1.017 (0.211)***
Home delivery	0.165 (0.092)*	-0.491 (0.212)***
Enhanced support		
Self-management	0.104 (0.069)	0.575 (0.349)
Smartphone application	-0.045 (0.068)	0.518 (0.140)***
Text reminder	-0.149 (0.067)**	0.014 (0.091)
Anonymous peer support group	0.090 (0.067)	-0.250 (0.257)
Cost (out-of-pocket per month)		
No cost	2.382 (0.205)***	2.253 (0.447)***
65% subsidized (350 RMB)	0.447 (0.071)***	0.516 (0.176)***
30% subsidized (700 RMB)	-0.527 (0.085)***	1.249 (0.152)***
Full price (1000 RMB)	-2.301 (0.197)***	1.802 (0.210)***
Opt-out ^a	-3.807 (0.312)***	5.189 (0.350)***

Model fits: log-likelihood = -4442.79; AIC = 8953.57; BIC = 9219.15.

Abbreviations: AIC, Akaike information criterion; BIC, Bayesian information criterion; CBO, community-based organization; MSM, men who have sex with men; PrEP, pre-exposure prophylaxis; RMB, renminbi; SE, standard error.

^aParticipants did not want to choose either option 1 or option 2.

* $P < .10$, ** $P < .05$, *** $P < .01$.

management. Overall, the predicted uptake of all PrEP modalities largely increased when the level of subsidy increased from no subsidy to full subsidy. The predicted uptake of on-demand PrEP was higher than other modalities, increasing from 22% with no subsidy to 79% with full subsidy. The predicted uptake of daily PrEP increased from 23% with no subsidy to 69% with full subsidy. The predicted uptake of long-acting injectable PrEP increased from 14% with no subsidy to 72% with full subsidy. The predicted uptake of PrEP implant increased from 9% with no subsidy to 64% with full subsidy.

Sensitivity Analysis

Sensitivity analysis results are presented in the [Supplementary Data](#) with 4 different subsets, excluding participants who (1) only chose 1 option (“straight-liners”; $n = 122$, 12%) ([Supplementary Table 5](#)), (2) reported that decisions were somewhat hard or hard to make ($n = 79$, 8%) ([Supplementary Table 6](#)), (3) reported that understanding the attributes/

attribute levels or the decision-making was somewhat hard or hard ($n = 106$, 10%) ([Supplementary Table 7](#)), and (4) spent <15 seconds completing all 6 choice tasks (“speeders”; $n = 64$, 6%) ([Supplementary Table 8](#)). The results showed no significant difference between the model estimates and the model fits with these different subsets and with all participants.

DISCUSSION

Overall, our study shows that most MSM preferred to access PrEP compared with no PrEP, which aligns with previous findings that the awareness and willingness of PrEP use increased after its legal approval in China in 2020 [13, 47]. Varying levels of willingness to use PrEP among MSM have been reported; they are often assessed with a single hypothetical scenario and among MSM who have never used PrEP [18, 19, 47]. In contrast to previous research, our study applied a DCE to offer a more nuanced understanding of preferences with regard to PrEP access and predict potential PrEP uptake for different configurations of PrEP delivery. Additionally, we enrolled MSM who had used PrEP and those who had never used PrEP to better reflect the preferences of diverse groups of men in the real world.

In general, most study participants preferred using PrEP to not using it. Specifically, men favored on-demand PrEP, cost-free PrEP, and home delivery of medication. The preference for on-demand over a daily PrEP regimen aligns with findings from a real-world PrEP demonstration study of MSM in China [48] and studies in Malaysia and India [39, 49]. Findings from these Asian studies differed from findings in the United States and other countries, where participants preferred daily dosing over on-demand dosing and preferred extended-duration products like long-acting injections over daily pills, which could reduce the frequency of medicine pickup [39, 50, 51]. In our study, respondents’ preference for on-demand over daily or long-duration PrEP, including injectable PrEP and implants, suggests that they placed higher emphasis on levels of medication intake than medication pickup frequency. The preference for reducing the amount of doses through on-demand PrEP may be caused by concerns about drug safety and side effects [52] shaped by the traditional Chinese belief that in general “all drugs contain toxicity” [53]. Such cultural beliefs may require educational efforts by public health workers to change. Therefore, while working on reducing concerns regarding safety and side effects, clinicians and health programs should offer on-demand PrEP as an option for MSM to initiate PrEP and be flexible with dosing regimens and modalities according to their evolving needs, preferences, and risk levels.

Cost is still a major consideration that shapes decisions about PrEP uptake [12, 34, 39, 47, 49]. Participants expressed a strong aversion to paying the full price for PrEP medications. Providing subsidies or reducing costs to users for generic drugs

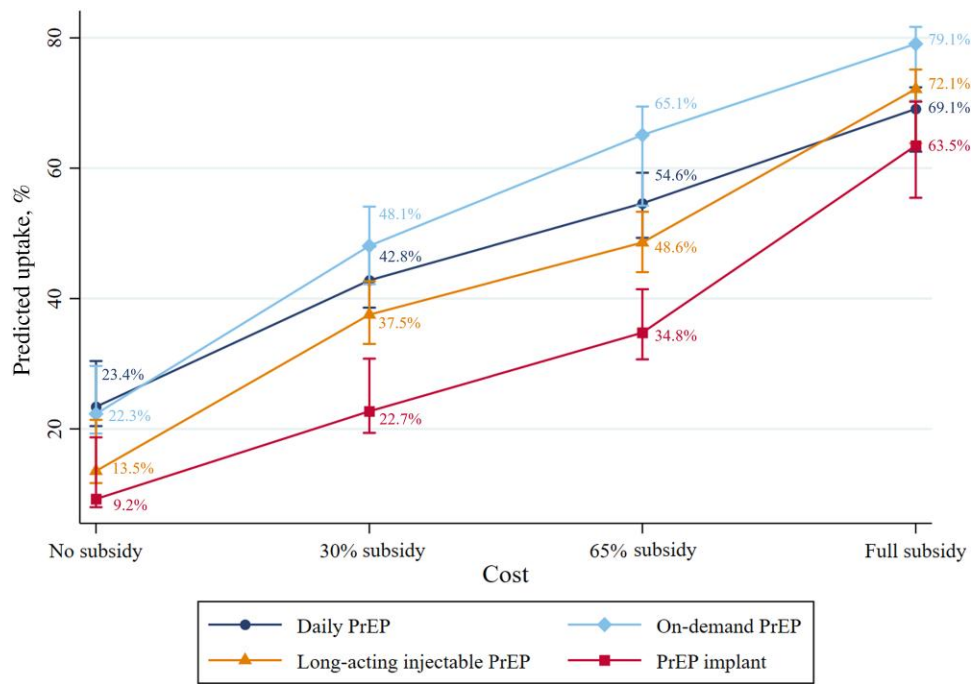


Figure 2. Predicted uptake of different PrEP modalities with levels of subsidy among MSM, China. Holding clinical care model, medication pickup, and enhanced support as the standard-of-care scenario: 2-visit for prescription, clinics/hospitals for medication pickup, and self-management. Abbreviations: MSM, men who have sex with men; PrEP, pre-exposure prophylaxis.

might greatly improve PrEP uptake. We estimated that a 30%–65% subsidy to reduce out-of-pocket costs could increase the current PrEP uptake >2-fold from 11%–13% to 30%–76%. One previous study conducted among Chinese MSM in 2018–2019 found that willingness to use PrEP was as high as 85% if PrEP was assumed to be effective in HIV prevention and was offered at no cost [17]. Another study conducted in 2020 reported that only 27% of Chinese MSM in Chengdu would use PrEP if they could purchase medication at the generic drug market price (>US\$85 per month) [54]. To our knowledge, although no subsidy has been provided for PrEP outside of research studies, a lower-cost generic drug is available in China, which is about half the cost of the brand-name drug [55]. This could largely benefit the whole MSM community, whatever their extent of price sensitivity.

Besides PrEP modality and cost, our study participants also preferred home delivery of medication. In China, home delivery, as an innovative approach to delivering medication, is facilitated by several large e-commerce companies that have expanded their services to online pharmacies. These companies often establish a same-city delivery system so that patients can receive medicine and other health care products within a few hours at home, which greatly improves accessibility and convenience. As such online platforms proliferate, it is important to ensure that providers properly prescribe PrEP or verify PrEP prescriptions [56, 57]. Health care facilities should try to reduce barriers to PrEP access by partnering with online pharmacies,

which can offer services to reduce the burden of having to pick up medications at designated clinics and hospitals. Meanwhile, better regulations for providing medication prescriptions including telemedicine PrEP and standardizing regular STD screening and other laboratory tests within the HIV PrEP care continuum are needed when embracing these new technologies.

There are a few limitations to this study. First, we measured only stated preferences relating to hypothetical scenarios. Hypothetical willingness is infamously challenging to translate into actual behaviors [58, 59]. Although the DCE design can give important insights into health choices [33], future studies are needed to explore the actual choice of these attributes from PrEP user data. Such data will optimally inform implementation strategies for PrEP rollout. Second, our data are subject to selection biases. Our study participants were recruited from a GSN app and from 2 metropolitan cities. The GSN app provides tools to meet sexual partners and offers online PrEP counseling and medication home delivery services. GSN users may be more familiar with PrEP and medication home delivery services than others not using this social networking app. Participants residing in these 2 metropolitan cities may have a higher level of education and income compared with the general population of China. Therefore, they might have better knowledge of PrEP and fewer concerns regarding cost compared with other areas of China. Third, in this study, the cost component only addressed medication costs because

clinic visits, laboratory testing, and regular sexually transmitted disease testing costs can vary across China. Future studies should consider exploring the total cost of PrEP care and willingness to pay with costs included based on a systematic assessment of service costs in China. Preference for ongoing clinic visits for safety labs and STD screening was not assessed in this DCE study. Future studies could explore clients' preferences with regard to more holistic PrEP care access. Finally, cognitive fatigue should be considered in this study because the DCE choice tasks were incorporated in an existing survey. The limited average time for that survey (9 minutes) and the results of sensitivity analyses minimize such concerns.

CONCLUSIONS

MSM in China have strong and specific preferences regarding PrEP. Cost of PrEP is a critical factor in promoting uptake; PrEP medications and clinical visits are currently entirely unsubsidized in China. Preferences for on-demand PrEP and access through home delivery indicate opportunities for the health care system to meet the needs of MSM; these approaches should be incorporated into future interventions in addition to the appropriate standard of care for clients to access PrEP care.

Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

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