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High pre-exposure prophylaxis awareness and willingness to pay for pre-exposure prophylaxis among young adults in Western Kenya: results from a population-based survey

Emily R Begnel¹, Jaclyn Escudero¹, Melissa Mugambi¹, Kenneth Mugwanya¹, John Kinuthia^{1,2}, Kristin Beima-Sofie¹, Julia C Dettinger¹, Jared M Baeten^{1,3,4}, Grace John-Stewart^{1,3,4,5}, Jillian Pintye¹

¹Department of Global Health, University of Washington, Seattle, WA, USA

²Department of Obstetrics/Gynecology, Kenyatta National Hospital, Nairobi, Kenya

³Department of Epidemiology, University of Washington, Seattle, WA, USA

⁴Department of Medicine, University of Washington, Seattle, WA, USA

⁵Department of Pediatrics, University of Washington, Seattle, WA, USA

Abstract

We conducted a population-level short message service (SMS)-based survey among individuals aged 18–34 years in six HIV high-burden counties in Western Kenya to assess pre-exposure prophylaxis (PrEP) awareness, acceptability of nonfacility PrEP delivery, and willingness to pay for PrEP. In January 2019, anonymous data were collected using mSurvey Inc., Nairobi, Kenya, which sends SMS messages via mobile provider networks to a ‘general audience’ pool of subscribers 18 years. Subscribers’ demographic information was matched to Kenyan census data by age, gender, and county. Of the 3825 individuals who received the survey, 2617 (68%) opened the survey and 2498/2617 (95%) completed all questions. Overall, 84% had ever heard of PrEP, of whom 59% demonstrated understanding of PrEP; understanding was greater among men than women (64% versus 55%, $p < 0.001$). Among participants who understood PrEP ($n = 1249$), 38% reported pharmacies (informal or formal) as the preferred venue to obtain PrEP. Over half (61%) were willing to pay for PrEP and 78% reported that the maximum amount they were willing to pay for a one-month supply was <5 USD. High awareness of PrEP in high HIV prevalence settings in Kenya suggests effective public health messaging. Willingness to pay and preference for pharmacy access suggest that non-facility PrEP delivery may be useful.

Keywords

Africa; HIV (human immunodeficiency virus); prevention

Corresponding author: Emily R Begnel, Department of Global Health, University of Washington, 325 Ninth Ave., Box 359909, Seattle, WA 98104, USA. erb29@uw.edu.

Declaration of conflicting interests

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Introduction

Tenofovir-based oral pre-exposure prophylaxis (PrEP) for HIV prevention is scaling up in sub-Saharan Africa (SSA), with 15 African countries having obtained or applied for regulatory approval of PrEP as of April 2019.^{1,2} Since 2017, Kenyan national guidelines have recommended PrEP for individuals at substantial risk of HIV infection,³ including serodiscordant couples, sex workers, and young women; these groups are the primary target audience of ongoing PrEP implementation activities.⁴⁻⁶ Kenya's national public sector rollout integrates PrEP services into routine care at healthcare facilities and includes community sensitization.⁷ Approximately 44,000 Kenyans were currently using PrEP as of July 2019, surpassing the 2019 PEPFAR target of 31,047 individuals on PrEP.⁸ However, uptake remains low in Kenya among certain target populations, such as young women in regions with high HIV prevalence.⁹ Qualitative studies from Kenyan sex workers found that despite availability of PrEP, few knew about it and even fewer used it.¹⁰ Community-based models could be important for targeting hard-to-reach populations who do not habitually access health facilities. To date, no evaluation of the general population's PrEP awareness and preferences has been conducted in Kenya.

To address this gap, we conducted a population-based survey of PrEP awareness, acceptability of non-facility PrEP delivery, and willingness to pay for PrEP within six high HIV burden counties in Western Kenya.

Methods

In January 2019, we conducted a short message service (SMS)-based survey among individuals 18–34 years old from six high HIV burden counties in Western Kenya: Homa Bay, Kisii, Kisumu, Migori, Nyamira, and Siaya counties (adult HIV prevalence 4–21%).¹¹ The survey was conducted using the mSurvey platform (mSurvey Inc., Nairobi, Kenya), which is designed for short, onetime polls administered to a pool of general audience participants and previously has been used for research in Kenya.^{12,13} Pool members are recruited in-person by mSurvey and individuals are eligible if they are 18 years old, speak English, and have a Safaricom mobile phone line. At the time of recruitment, information on age, gender, and county of residence is collected. Distribution of these characteristics within the pool is matched to Kenyan census data to ensure representation of the general population. All data collected via mSurvey are anonymized and cannot be linked to any identifiable information.

A study-specific automated SMS system was developed by mSurvey for delivery, receipt, and recording of SMS surveys, and the database was hosted on cloud-based technology. SMS messages were sent directly through the mobile provider's network. Subscribers were invited to participate in our survey via a standardized generic welcome message that did not contain any information about poll contents. Once potential respondents opened the survey, participants had 72 h to respond. There was no cost associated with sending or receiving SMS messages for the survey and upon completion participants received 0.20 USD (mSurvey's standard reimbursement for polls in Kenya).

To measure PrEP awareness, participants were asked a yes/no question, ‘*Have you ever heard of pre-exposure prophylaxis (PrEP, also known as Truvada) for HIV prevention*’. If a participant replied ‘*No*’, they were subsequently asked, ‘*Have you heard of a pill that can be taken daily to prevent someone from acquiring HIV?*’. If a participant responded ‘*No*’ to both items, they were categorized as not having previously heard of PrEP. If a participant responded ‘*Yes*’ to either item, they were asked an open-ended question, ‘*Who do you think should take PrEP?*’. Responses were categorized as (1) PrEP-aware: correctly identifying a type of HIV-uninfected individual or group who should take PrEP; (2) misunderstood PrEP: conflating PrEP for HIV treatment or post-exposure prophylaxis (PEP); and (3) unknown PrEP awareness: unable to categorize as PrEP-aware or misunderstood PrEP (e.g. unintelligible response or item left blank). We operationally defined having PrEP awareness as previously having heard of PrEP and correctly identifying an HIV-uninfected individual or group who should take PrEP. All other information about experiences with PrEP, perceptions of PrEP, and willingness to pay for PrEP were captured through a short set of yes/no and multiple-choice questions and only analyzed among those who had PrEP awareness.

We used Chi square tests to compare demographic characteristics between respondents with and without PrEP awareness. Responses that were uninterpretable or from participants who conflated PrEP for HIV treatment or PEP were excluded from PrEP awareness comparisons. Analyses were performed with Stata 14.0 (Stata Corporation, College Station, TX). All procedures were approved by the Human Subjects Division of the University of Washington and the Kenyatta National Hospital Ethical Review Committee.

Results

Of the 3825 subscribers who received the survey, 2617 (68%) opened the survey and 2498/2617 (95%) completed all questions; the overall response rate was 65%. Participants who completed the survey (n = 2498) were from Kisii (38%), Nyamira (22%), Kisumu (17%), Siaya (10%), Migori (7%), and Home Bay (6%) counties. Overall, 60% of respondents were aged 18–24 years, 35% were 25–29 years, and 5% were 30–34 years; 32% were female and 68% male.

In total, 2102/2498 (84%) of participants reported previously hearing of PrEP. Of these individuals, 378/2102 (18%) conflated PrEP for HIV treatment or PEP and 475/2102 (23%) had unknown PrEP awareness due to uninterpretable responses. Among respondents with interpretable responses (n = 1627), PrEP awareness was greater among current PrEP users than non-users (85% versus 76%, $p = 0.016$). Among participants who conflated PrEP for HIV treatment or PEP (n = 378), 72% mistook PrEP for PEP and 28% mistook PrEP for ART. Overall, 1249/2102 (59%) correctly identified at least one type of HIV-uninfected individual or population who should take PrEP, and were considered PrEP-aware, and were included in the comparison analyses. Men were more frequently aware of PrEP than women (64% versus 55%, $p < 0.001$; Table 1). PrEP awareness also differed by age ($p < 0.001$; Table 1) with a greater proportion of individuals ages 18–24 (61%) and 25–29 (63%) reporting awareness than individuals 30–34 (56%).

Among respondents with PrEP awareness (n = 1249), one-third (32%) personally knew someone taking PrEP and 13% reported currently taking PrEP themselves (Figure 1). Nearly two-thirds (64%) of respondents with PrEP awareness believed that PrEP would cause people to have condomless sex. When asked whether someone would be most likely to obtain PrEP at a clinic, pharmacy, kiosk (e.g. small roadside booth where convenience goods are sold), or other (unspecified), over half (55%) chose one of the non-facility locations. A majority (61%) of participants reported willingness to pay for PrEP; willingness to pay was greater among men than women (64% versus 53%, $p < 0.001$). Most (78%) participants reported that the maximum amount they were willing to pay for a one-month supply of PrEP was less than 500 Kenyan shillings (approximately 5 USD) (Table 1).

Discussion

In this large, population-based survey, we found wide PrEP awareness and general willingness to pay for PrEP (59 and 60%, respectively) among young adults residing in Kenyan counties with high HIV burden. To our knowledge, these are the first data of PrEP awareness and willingness to pay for PrEP among a general population of young people within an HIV high-prevalence setting. About one-third of survey respondents who were aware of PrEP knew someone taking PrEP and one-fifth reported currently taking PrEP themselves. Our findings suggest that recently implemented PrEP delivery programs have achieved substantial PrEP access within the overall population in Western Kenya. However, a considerable proportion of respondents mistook PrEP for PEP or ART, suggesting that misconceptions about PrEP persist in regions with high HIV burden and further education is needed to dispel misinformation. Our results also found that PrEP delivery points based outside of facilities, including pharmacies, are acceptable in this population and should be considered when planning client-centered PrEP service provision.

In our study, 84% of participants reported previously having heard of PrEP and 59% demonstrated accurate PrEP knowledge. Since 2017, Kenya has had strong national-level support for PrEP, including widespread campaigns for PrEP sensitization in geographic regions with high HIV burden.⁷ This likely contributed to the high frequency of PrEP awareness we found compared to older investigations in Kenya and studies from other African countries with slower PrEP scale-up. A national-level survey from 2016, a year before the national program launch, found that only 6% of HIV-infected Kenyan women in serodiscordant couples had heard of PrEP.¹⁴ A 2018 survey of university students in Nigeria, a country where PrEP roll-out has been slow,⁸ found that only 19% of participants (77% were <24 years) were aware of PrEP and only 2% personally used PrEP.¹⁵ Our findings suggest that PrEP messaging efforts are reaching individuals in most-affected areas of Kenya and strategies used by the Kenya Ministry of Health⁷ may be useful in other countries.

Although the majority of respondents in our study reported having heard of PrEP, we also found that many conflated PrEP with HIV treatment. This has implications for PrEP demand as stigma and negative reactions associated with confusing PrEP pills for HIV treatment have been reported as barriers to PrEP among Kenyan adolescent women.¹⁶ We also found that frequency of PrEP awareness was lower among women. As PrEP roll-out continues to expand, it is increasingly important to improve the quality of PrEP messaging to ensure

correct information is understood by the general public and to facilitate PrEP use among young women. Disconnecting PrEP messaging from antiretrovirals used for HIV treatment and focusing on health promotion and female empowerment instead of HIV risk could improve understanding of PrEP and subsequently, demand.²

Our results suggest that there is a demand for PrEP availability outside of health facilities and a willingness to pay for PrEP. Community-based PrEP delivery programs are rare in SSA, despite frequently being acknowledged as a potential way to expand HIV prevention access.¹⁷ Currently, PrEP can only be obtained from a prescribing clinician in Kenya,¹⁸ most frequently within a health facility, and there is no widespread PrEP availability in community pharmacies. Community-based delivery strategies that acknowledge the benefit of PrEP for all at-risk groups – not only those frequently targeted by PrEP programs, such as discordant couples, MSM, or sex workers – have been shown to be acceptable¹⁹ and could increase PrEP uptake.¹⁸ Current work to de-medicalize PrEP, through expanding self-testing for HIV²⁰ and minimizing or eliminating laboratory tests that are recommended, but not required, for PrEP initiation could facilitate expansion of PrEP delivery into non-clinical settings like community pharmacies.²¹

Our survey has limitations. Our SMS-based approach allowed us to obtain high-level indicators about PrEP awareness and willingness to pay for PrEP, but restricted our ability to probe responses. Future qualitative studies should explore our findings and whether these reported beliefs have implications for PrEP uptake. The mSurvey general audience pool is designed to generate a representative selection of potential participants based on Kenyan census data, but it is possible that the English language requirement biased our results toward individuals with higher socioeconomic status, thus limiting the representativeness of our sample. We had more male than female participants, which could bias our data toward male perspectives. However, most PrEP surveys to date have been conducted within hospitals/clinics, which are infrequently accessed by the general population of men.²²⁻²⁴ Our large representation of males may produce more generalizable results for men than samples derived from research or clinical settings. Our response rate was comparable to those of previous mSurvey polls (based on internal mSurvey performance data), suggesting that the content of our questionnaire did not cause unexpected attrition, and the anonymity provided by the survey platform could reduce response bias.

In conclusion, our study demonstrates that PrEP awareness and willingness to pay for PrEP are high among young people in counties of Kenya where HIV burden is high. Additionally, our findings suggest that PrEP delivery in non-healthcare settings, even at-cost, may be a viable strategy to increase PrEP access and should be explored.

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References

1. AVAC. Regulatory status of TDF/FTC for PrEP, <https://www.avac.org/infographic/regulatory-status-tdfttc-prep> (2019, accessed 26 April 2019).
2. Ahmed N, Pike C and Bekker L-G. Scaling up pre-exposure prophylaxis in sub-Saharan Africa. *Curr Opin Infect Dis* 2019; 32: 24–30. [PubMed: 30461452]
3. National AIDS & STI Control Programme (NASCOP), Ministry of Health. Framework for the implementation of pre-exposure prophylaxis of HIV in Kenya. Nairobi: NASCOP, 2017.
4. Cowan FM, Delany-Moretlwe S, Sanders EJ, et al. PrEP implementation research in Africa: what is new? *J Int AIDS Soc* 2016; 19: 21101. [PubMed: 27760680]
5. Pintye J, Kinuthia J, Roberts DA, et al. Integration of PrEP services into routine antenatal and postnatal care. *J Acquir Immune Defic Syndr* 2018; 79: 1. [PubMed: 29847475]
6. Mugwanya KK, Irungu E, Bukusi E, et al. Scale up of PrEP integrated in public health HIV care clinics: a pro-tocol for a stepped-wedge cluster-randomized rollout in Kenya. *Implement Sci* 2018; 13: 1–11. [PubMed: 29301543]
7. Masyuko S, Mukui I, Njathi O, et al. Pre-exposure prophylaxis rollout in a national public sector program: the Kenyan case study. *Sex Health* 2018; 15: 578–586. [PubMed: 30408432]
8. AVAC. PrEP Watch – Kenya, <https://www.prepwatch.org/country/kenya/> (2019, accessed 19 April 2019).
9. Oluoch LM, Mugo NR, Roxby AC, et al. Low uptake of preexposure prophylaxis among Kenyan adolescent girls at risk of HIV. In: CROI, Seattle, Washington, 2019.
10. Restar AJ, Tocco JU, Mantell JE, et al. Perspectives on HIV pre- and post-exposure prophylaxes (PrEP and PEP) among female and male sex workers in Mombasa, Kenya: implications for integrating biomedical prevention into sexual health services. *AIDS Educ Prev* 2017; 29: 141–153. [PubMed: 28467163]
11. Kenya Ministry of Health, NASCOP, Council NAC. Kenya HIV estimates report 2018. Nairobi: National Aids Control Council, 2018, pp.1–28.
12. Njuguna N, Ngure K, Mugo N, et al. The effect of human immunodeficiency virus prevention and reproductive health text messages on human immunodeficiency virus testing among young women in Rural Kenya: a pilot study. *Sex Transm Dis* 2016; 43: 353–359. [PubMed: 27200519]
13. Pintye J, Drake AL, Begnel E, et al. Acceptability and outcomes of distributing HIV self-tests for male partner testing in Kenyan maternal and child health and family planning clinics. *AIDS* 2019; 33: 1369–1378. [PubMed: 30932954]
14. Pintye J, Oluoch P, Langat A, et al. Low awareness of pre-exposure prophylaxis (PrEP) for protection against HIV transmission among HIV-infected women in HIV-serodiscordant couples in Kenya: Results from a nationwide survey. In: The 22nd international AIDS conference, 2018.
15. Ajayi AI, Ismail KO, Adeniyi OV, et al. Awareness and use of pre-exposure and postexposure prophylaxes among Nigerian university students: findings from a cross-sectional survey. *Medicine* 2018; 97: e12226. [PubMed: 30200145]
16. Pintye J, Beima-Sofie KM, Makabong'O PA, et al. HIV-uninfected Kenyan adolescent and young women share perspectives on using pre-exposure prophylaxis during pregnancy. *AIDS Patient Care STDs* 2018; 32: 538–544. [PubMed: 30036072]
17. Lillie TA, Baer J, Adams D, et al. Think global, act local: the experience of Global Fund and PEPFAR joint cascade assessments to harmonize and strengthen key population HIV programmes in eight countries. *J Int AIDS Soc* 2018; 21: e25125. [PubMed: 30033537]

18. Ministry of Health, National AIDS & STI Control Program (NASCOP). Guidelines on use of antiretroviral drugs for treating and preventing HIV infection in Kenya. 2018 ed. Nairobi: NASCOP, 2018.
19. Eakle R, Bourne A, Mbogua J, et al. Exploring acceptability of oral PrEP prior to implementation among female sex workers in South Africa. *J Int AIDS Soc* 2018; 21: e25081.
20. Ngure K, Heffron R, Mugo N, et al. Feasibility and acceptability of HIV self-testing among pre-exposure prophylaxis users in Kenya. *J Int AIDS Soc* 2017; 20: 21234. [PubMed: 28362073]
21. Pintye J, Abuna F, Kinuthia J, et al. Point-of-care creatinine testing within a programmatic PrEP delivery setting. In: CROI, Seattle, Washington, 2019, <http://www.croiconference.org/sessions/point-care-creatinine-testing-within-programmatic-prep-delivery-setting> (accessed 29 April 2019).
22. Camlin CS, Ssemmondo E, Chamie G, et al. Men “missing” from population-based HIV testing: insights from qualitative research. *AIDS Care* 2016; 28: 67–73. [PubMed: 27421053]
23. Ackers ML, Hightower A, Obor D, et al. Health care utilization and access to human immunodeficiency virus (HIV) testing and care and treatment services in a rural area with high HIV prevalence, Nyanza Province, Kenya, 2007. *Am J Trop Med Hyg* 2014; 90: 224–233. [PubMed: 24323517]
24. Evens E, Lanham M, Hart C, et al. Identifying and addressing barriers to uptake of voluntary medical male circumcision in Nyanza, Kenya among men 18–35: a qualitative study. *PLoS One* 2014; 9: e98221. [PubMed: 24901226]

Figure 1. PrEP acceptability, beliefs, and attitudes among individuals who were PrEP-aware, by gender. KSH: Kenyan Shillings; PrEP: pre-exposure prophylaxis.
* p-value statistically significant (<0.05)

Table 1.

PrEP awareness by demographic characteristics (N = 2498).

County	n (%)	Reported previously hearing of PrEP ^d				p-value ^f
		Yes (n = 2102)			PrEP-aware (n = 1249) ^d	
		Overall (N = 2498)	Unknown PrEP awareness (n = 475) ^b	Misunderstood PrEP (n = 378) ^c		
Homa Bay	152 (6.1)	31 (6.5)	28 (7.4)	69 (5.5)	24 (6.1)	0.592
Kisumu	427 (17.1)	80 (16.8)	58 (15.3)	225 (18.0)	64 (16.2)	
Siaya	247 (9.9)	40 (8.4)	25 (6.6)	141 (11.3)	41 (10.4)	
Kisii	959 (38.4)	168 (35.4)	163 (43.1)	462 (37.0)	166 (41.9)	
Migori	176 (7.1)	38 (8.0)	27 (7.1)	87 (7.0)	24 (6.1)	
Nyamira	537 (21.5)	118 (24.8)	77 (20.4)	265 (21.2)	77 (19.4)	
Age (years)						
18–24	1503 (60.2)	299 (63.0)	198 (52.4)	735 (58.9)	271 (68.4)	0.001
25–29	874 (35.0)	154 (32.4)	156 (41.3)	459 (36.8)	105 (26.5)	
30–34	121 (4.8)	22 (4.6)	24 (6.4)	55 (4.4)	20 (5.1)	
Gender						
Female	776 (31.1)	120 (25.3)	140 (37.0)	363 (29.1)	153 (38.6)	0.001
Male	1722 (68.9)	355 (74.7)	238 (63.0)	886 (70.9)	243 (61.4)	

PrEP: pre-exposure prophylaxis.

^a Responded ‘Yes’ to ‘Have you ever heard of pre-exposure prophylaxis (PrEP, also known as Truvada) for HIV prevention?’ or ‘Have you heard of a pill that can be taken daily to prevent someone from acquiring HIV?’.

^b Unknown PrEP awareness: defined as not being able to categorize as PrEP-aware or misunderstood PrEP (e.g. unintelligible response when asked, ‘Who do you think should take PrEP’ or item left blank).

^c Misunderstood PrEP defined as conflating PrEP for HIV treatment or post-exposure prophylaxis (PEP) when asked, ‘Who do you think should take PrEP?’.

^d PrEP-aware defined as correctly identifying an HIV-uninfected individual or group who should take PrEP when asked, ‘Who do you think should take PrEP?’.

^e Responded ‘No’ to ‘Have you ever heard of pre-exposure prophylaxis (PrEP, also known as Truvada) for HIV prevention?’ and ‘Have you heard of a pill that can be taken daily to prevent someone from acquiring HIV?’.

^f Chi square tests compare PrEP-aware participants and those who did not previously hear of PrEP.