

# Willingness to pay (WTP) for HIV and AIDS services in Africa: A systematic review

John Bekiita Byabagambi (✉ [j.byabagambi@lancaster.ac.uk](mailto:j.byabagambi@lancaster.ac.uk))

Lancaster University <https://orcid.org/0000-0002-1456-3387>

Mark Limmer

Lancashire Teaching Hospitals NHS Foundation Trust

Bruce Hollingsworth

Lancaster University Library Services Ltd LULS: Lancaster University

---

## Research Article

**Keywords:** Willingness to pay, HIV, AIDS

**Posted Date:** November 14th, 2022

**DOI:** <https://doi.org/10.21203/rs.3.rs-2057408/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

**Version of Record:** A version of this preprint was published at Journal of Global Health Reports on August 29th, 2023. See the published version at <https://doi.org/10.29392/001c.85122>.

# Abstract

**Background:** While Africa is the continent most affected by HIV and AIDS, its response to HIV and AIDS remains largely donor supported. However, in the face of declining donor support, alternative ways to sustainably support HIV and AIDS responses in Africa are paramount. This systematic review explores the willingness to pay (WTP) for HIV services in Africa as a potentially more sustainable HIV and AIDS service cost recovery approach.

**Methods:** A comprehensive systematic search for literature was conducted in electronic databases and websites of HIV and AIDS organisations for studies that reported on the willingness to pay for HIV services in Africa. Preference studies that did not use the WTP approach and that were conducted outside Africa were excluded. Information on the HIV service, the methods used in the studies and factors that influence WTP were extracted. A descriptive thematic analysis was undertaken. The findings are summarised in tables and graphs.

**Results:** A total of 5,139 records were returned and screened for eligibility from the initial search. After screening and removal of duplicates, twenty-two articles from 10 countries with 19,611 study participants were included in the final review. There is an uneven distribution of WTP studies across different types of HIV services and across countries. There is evidence of a willingness to pay for HIV services, with the proportion of people reported in individual studies that are willing to pay, ranging from 34.3% to 97.1%. However, in the majority of studies (71.4%, 15/21), the amount people are willing to pay cannot cover the cost of the full service in an open market. Factors associated with WTP include socioeconomic status, beliefs, and knowledge about HIV services.

**Conclusion:** The current systematic review presents evidence of cost recovery from HIV programs. The main finding is that other resources, beyond out-of-pocket payments, are needed to meet the full cost of any service. This has implications for the provision of (nondonor-funded) services on a sustainable level in the long term.

**Systematic review registration:** PROSPERO, registration number CRD42021275215

## Background

Globally, HIV remains a significant public health problem. The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimates that by the end of 2020, 37.6 million people were living with HIV globally. Cumulatively, it is estimated that 77.5 million and 34.7 million people have been infected with HIV and died of AIDS, respectively, since the start of the epidemic [1]. Whereas the number of people dying of AIDS-related illnesses fell by 39%, from 1.2 million in 2010 to 690,000 deaths in 2020, new infections continue to occur at a high rate. In 2020 alone, 1.5 million new infections occurred [1]. The COVID-19 pandemic has impacted the HIV epidemic [2]. A UNAIDS report indicates that the risk of dying from COVID-19 is double among people living with HIV compared to the general population [3], and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFTAM) reports a 41% reduction in HIV testing, which is an

entry point for HIV and AIDS care, between April and September 2020 compared to the same period in 2019 [4]. Furthermore, the UNAIDS notes that the gains made in HIV prevention are likely to be eroded by the COVID-19 pandemic [2]. The burden of HIV and AIDS has a considerable opportunity cost, most especially in low-income countries. In 2020 alone, US\$ 26.2 billion was required to combat HIV and AIDS globally, but only US\$ 18.6 billion was available [1]. The cost of HIV-related care is estimated to reach US\$ 40 billion annually by 2030 [5].

Africa carries a disproportionate burden; it is the continent most impacted by HIV and AIDS, accounting for two-thirds of the global HIV cases. At the end of 2018, it was estimated that 25.7 million people were living with HIV, and 1.1 million new infections were registered in Africa. Within Africa, eastern and southern Africa are the most affected regions, with 20.6 million people (55% of the cases) living with HIV [1]. To achieve the 2016 United Nations resolution of ending HIV and AIDS as a public health problem by 2030, UNAIDS estimates that investments of up to US\$29 billion are required for low- and middle-income countries (LMICs) by 2025 [1]. Expenditure on HIV-related activities accounts for 20% of the total health budget in Sub-Saharan Africa [6].

Donations from high-income countries that are least affected by HIV remain a significant source of funding for HIV and AIDS activities in LMICs [6]. Although there has been an increase in domestic funding that currently accounts for 57% of the resources [1], overall, the total resource envelope continues to decline. Funding from bilateral governments remained the same between 2008 and 2019 despite a 25% increase in people living with HIV and AIDS in LMICs. Funding from donors such as the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) has been instrumental in reducing HIV-related mortality in low- and middle-income countries [7].

Atun and Chang [8] estimate that nine Sub-Saharan countries will require US\$261 billion between 2015 and 2050 to avail all people living with HIV of antiretroviral therapy (ART), a need that is too substantial to be met through the current funding streams. For instance, Uganda estimates that it will require US\$8.2 billion between 2021 and 2030 to prevent 130,000 new HIV infections and 51,000 AIDS-related deaths [9]. This has significant resource implications for other public sectors and calls for other options to provide sustainable support for HIV and AIDS interventions in the most affected countries. Out-of-pocket payments are one of the options.

## Methods

### Aim

This systematic review aims to gain insight into the willingness to pay (WTP) for HIV services as an alternative approach for sustaining the provision of HIV prevention, care, and treatment services in the most affected countries. The primary objective of the review is to determine the extent of the WTP for HIV services. The secondary objectives include determining the methods used to investigate the WTP for HIV services, the type of HIV services that have been investigated using the WTP and the factors that

influence the WTP for HIV services in Africa. In this review, HIV services are operationally defined as World Health Organisation (WHO)-approved services for the diagnosis, prevention, treatment and support for HIV and AIDS.

## **Eligibility criteria**

To be included in the review, studies had to meet the following inclusion criteria: 1) used the WTP method, 2) were about HIV and AIDS services, 3) were conducted in Africa, and 4) were published in English. The exclusion criteria included 1) studies that used preference elicitation methods other than WTP, 2) studies that were not about an HIV service, and 3) studies about tuberculosis among people living with HIV. The review was restricted to Africa for two reasons. First, Africa is the most affected continent [10], and it is highly dependent on HIV donor resources [11]. Second, socioeconomic status is documented as influencing WTP; thus, the inclusion of studies from other continents, such as Europe and North America, has the potential to skew the findings, a limitation noted in other systematic reviews [12].

## **Information sources and search strategy**

An electronic search was conducted in PubMed, EMBASE, Web of Science, and CINAHL using search terms presented in Additional file 1. A manual search for additional articles and grey literature was conducted on the International AIDS Society, Avert, and World Health Organisation websites. References of relevant published articles were also searched for additional articles. The databases were searched from inception until 31 December 2021. Alerts for new articles were put on the electronic database prior to the completion of the final data analysis. One additional article that met the eligibility criteria was identified in April 2022 and was included in the final review. The review protocol was registered with PROSPERO under number CRD42021275215.

## **Data abstraction and synthesis**

Data extraction was performed sequentially by two independent people. A thematic descriptive analysis was used to synthesise findings because of the heterogeneity of the retrieved articles. With a standardised data abstraction template, data about the authors, country of the study, theory used to inform the study, HIV thematic area (diagnosis, prevention, treatment), the objective of the study, population, sample size, survey method, WTP elicitation method, type of statistical analysis conducted, factors associated with the WTP, and data on the sufficiency of the amount to pay for full service were extracted. The methodological quality of the included articles was assessed using the JBI critical appraisal tools [13, 14]. The findings are presented using tables and graphs.

## **Results**

### **Study selection**

A total of 5,139 records were retrieved, with 5,108 articles identified from databases and 31 documents retrieved from other sources that included references to other articles and websites of HIV and AIDS

organisations. The number of records was reduced to 105 articles after screening for the key terms in subject headings, titles, and abstracts. Of the 105 records available for review, 83 were excluded for the following reasons: 38 articles were not about willingness to pay studies and used other preference elicitation methods, such as willingness to accept; 32 were duplicates; and eight were about willingness to participate. Other reasons for dropping articles were study protocol [15], not about an HIV service [16], abstract with inadequate information [17], digest article for one of those already included [18], and viewpoint [19]. Twenty-two articles (22) were available for data extraction. Figure 1 shows the flow diagram summarising the selection process of articles.

## **Study characteristics**

The studies' characteristics are presented in Table 1. The articles were published between 2002 and 2021, with the majority (13; 59.1%) published between 2016 and 2020. The studies were conducted in ten African countries, including Nigeria, which had eight; Kenya, which had six; Tanzania and Zimbabwe, which each had three; and one article each from Zambia, Uganda, Cote d'Ivoire, South Africa, Cameroon, and Ghana, as shown in Fig. 2. Two studies were conducted in multiple countries.

Table 1  
Study characteristics

Study characteristic	Frequency (%)	Articles
<b>Total number of articles reviewed</b>	22	[30] [32] [24] [38] [35] [25] [22] [21] [33] [29] [39] [27] [26] [40] [41] [23] [37] [36] [20] [34] [31] [28]
<b>Publication year</b>	N = 22	
2000–2005	2 (9.1)	[30] [32]
2006–2010	0 (0)	
2011–2015	4 (18.2)	[24] [38] [35] [25]
2016–2020	13 (59.1)	[22] [21] [33] [29] [39] [27] [26] [40] [41] [23] [37] [36] [28]
2021–2022	3 (13.6)	[20] [34] [31]
<b>Country of study</b> ( <i>some studies were multicountry</i> )	N = 10	
Cameron	1	[30]
Cote d' Ivoire	1	[26]
Ghana	1	[35]
Kenya	6	[21] [32] [39] [27] [23] [28]
Nigeria	8	[34] [21] [24] [38] [29] [37] [36] [31]
South Africa	1	[21]
Tanzania	3	[33] [20] [26]
Uganda	1	[41]
Zambia	1	[21]
Zimbabwe	3	[21] [25] [40]
<b>Theory underpinning study</b>		
Stated	1(4.5)	[22]
Not stated	21 (95.5)	
<b>Study population</b>	N = 22	
Beneficiary population	19 (86.4)	[30] [24] [38] [35] [25] [22] [21] [33] [29] [27] [26] [40] [23] [37] [36] [20] [34] [31] [28]
General population	2 (9.1)	[39] [41]

<b>Study characteristic</b>	<b>Frequency (%)</b>	<b>Articles</b>
Other	1 (4.5)	[32]
<b>Sample size</b>	N = 19611	
< 100	2 (9.1)	[30] [20]
101–500	12 (54.5)	[24] [38] [29] [39] [35] [41] [23] [36] [37] [34] [31] [28]
501–1000	5 (22.7)	[22] [26] [40] [25] [32]
> 1001	3 (13.6)	[21] [27] [33]
<b>Survey method</b>	N = 22	
Interviewer administered questionnaire	17 (77.3)	[22] [33] [29] [39] [40] [41] [23] [37] [36] [20] [34] [24] [38] [35] [30] [32] [31]
Interviewer-administered electronic questionnaire	3 (13.6)	[26] [21] [25]
Self-administered questionnaire	2 (9.1)	[27] [28]
<b>WTP Elicitation method</b>	N = 21	
Bidding game	6 (28.6)	[24] [21] [29] [30] [31] [28]
Payment card	4 (19.0)	[22] [32] [33] [34]
Multiple price list	1 (4.8)	[20]
Open-ended question	1 (4.8)	[35]
Bidding game with open minimum and maximum	1 (4.8)	[36]
Structured haggling	1 (4.8)	[37]
Not stated	7 (33.3)	[38] [25] [39] [26] [27] [40] [23]
Not applicable (qualitative)	1 (5)	[41]
<b>Statistical analysis</b>	N = 21	
Regression	16 (76.2)	[22] [33] [29] [39] [40] [23] [37] [36] [20] [24] [35] [26] [21] [25] [31] [28]
Odds ratio	1 (4.8)	[38]
Chi square and t test	1 (4.8)	[34]
Not stated	3 (14.3)	[27] [32] [30]
Not applicable (qualitative)	1	[41]

Study characteristic	Frequency (%)	Articles
<b>Percentage willing to pay</b>	N = 21	
0–25	0 (0)	
26–50	4 (19.0)	[24] [29] [23] [21]
51–75	8 (38.1)	[22] [30] [33] [27] [26] [40] [34] [28]
75–100	8 (38.1)	[32] [38] [39] [20] [35] [36] [37] [31]
Not stated	2 (9.5)	[25]
<b>Amount sufficient to pay for full service at market value</b>	N = 21	
No	15 (71.4)	[24] [22] [32] [33] [29] [25] [39] [20] [26] [40] [55] [23] [37] [31] [28]
Yes	1(4.8)	[21]
Not stated	5(23.8)	[30] [38] [27] [36] [34]

The total sample size of the included studies was 19,611, ranging from 26 participants [20] to 6,566 participants for a multicountry study [21]. The majority (19; 86.4%) of the studies were conducted amongst users of the service under study, such as people living with HIV (PLHIV) who are on antiretroviral therapy (ART) and condom users. Two studies [22, 23] were conducted amongst people drawn from the general population. One study [24] was conducted among university students. Among the retrieved articles, only one [22] mentions the theory underpinning the study.

Willingness to pay for HIV studies in Africa mainly uses face-to-face interviews to collect data from participants. Most studies (17; 77.3%) used interviewer-administered face-to-face interviews to collect data, while three studies [21, 25, 26] (13.6%) used interviewer-administered electronic questionnaires to collect data. Only two studies used self-administered questionnaires [27, 28].

Seven (33.3%) articles did not explicitly state how WTP figures were elicited. Among the fourteen articles that mentioned the elicitation method, 42.9% (6/14) used the bidding game [21, 24, 28–31], 28.6% (4/14) used the payment card [22, 32–34], and one study each addressed multiple price lists [20], open-ended questions [35], bidding games with minimum and maximum [36], and structured haggling [37].

At 73.7% (14/19), the findings indicate that statistical analysis to determine factors that influence WTP was mainly done using regression analysis among the qualitative studies that explicitly state the kind of data analysis used. Odds ratios [38] and chi-square tests [34] were used in one study each.

## **The scope of HIV services investigated using the willingness to pay approach in Africa**



Table 2 presents the themes and types of HIV services that have been investigated using the WTP approach in Africa. Among the retrieved articles, 27.2% (6/22) covered the theme of HIV diagnosis [20, 22, 24, 26, 32, 39], 36.4% (8/22) the theme of HIV prevention [21, 23, 25, 27, 34–36, 38], and another 36.4% (8/22) the theme of HIV care and treatment [28–31, 33, 37, 40, 41]. On the theme of HIV diagnosis, the articles are evenly distributed between WTP for HIV counselling and testing (HCT) and WTP for HIV test kits. There is an uneven distribution across the types of services under the themes of HIV prevention and HIV treatment. Under HIV prevention, 37.5% (3/8) of the articles are about the Prevention of Mother to Child Transmission of HIV (PMTCT) [34–36], 25% (2/8) are about WTP for condoms [21, 25], and one article each for voluntary medical male circumcision [23], PrEP [27] and cervical cancer screening [38]. Seven articles (87.5%) on the theme of treatment were about ART, while one was about general HIV care services.

Table 2  
Scope of HIV services

Country	HIV theme			Article
	Diagnosis (n = 6)	Prevention (n = 8)	Treatment (n = 6)	
	Type of HIV services			
Nigeria	HCT			[24]
Nigeria	HCT			[22]
Kenya, Nigeria, South Africa, Zambia, and Zimbabwe		Condoms		[21]
Cameron			ART	[30]
Kenya	HCT			[32]
Nigeria		Cervical cancer screening		[38]
Tanzania			ART	[33]
Nigeria			ART	[29]
Zimbabwe		Condoms		[25]
Kenya	HIV test kits			[39]
Kenya		PrEP		[27]
Tanzania	HIV test kits			[20]
Cote d'Ivoire and Tanzania	HIV test kits			[26]
Zimbabwe			ART	[40]
Ghana		PMTCT		[35]
Uganda			After hour ART clinic	[41]
Kenya		VMMC		[23]
Nigeria		PMTCT		[36]
Nigeria			ART	[37]
Nigeria		PMTCT		[34]
Kenya			HIV care	[28]

## Willingness to pay for HIV services

All twenty-two articles that were reviewed found that people were willing to contribute to the payment of HIV services but to varying levels. From the twenty-one quantitative studies that reported on the percentage of people who are willing to pay, the proportion of people willing to pay for various HIV services ranged from 34.3% for payment of ART in Nigeria [29] to 97.1% for payment of PMTCT services, also in Nigeria [36]. Only two studies [23, 29] found that less than 50% of people were willing to pay for services. On average, more people were willing to pay for HIV diagnosis (77.5%) compared to HIV prevention (69.4%) and HIV treatment (66.4%), as shown in Fig. 3. Studies on the theme of HIV prevention reported the highest proportion of people willing to pay [36]; however, they also have the widest range (from 39.6–97.1%) of the proportion of people willing to pay compared to other HIV services. The majority (15/21, 71.4%) of the studies indicate that the amount people are willing to pay is less than the actual cost of the full service in a real market. Only one study, [21], reports willingness-to-pay amounts higher than the market value. Five articles (23.8%) did not state if the amount was below, equivalent, or more than the actual market value.

## **Factors that affect the willingness to pay for HIV services in Africa**

Figure 4 shows the themes influencing the WTP for HIV services in Africa. Socioeconomic status was the most common theme cited as influencing WTP. Factors under the category of socioeconomic status include income, ability to pay, employment education, salary, and male gender. The second most common theme, with a frequency of eight mentions, was knowledge and people's beliefs about products under consideration. The cost of the item or service, perceived benefits and influence of peers were other themes cited as influencing factors of the willingness to pay. Detailed information on the factors that influence willingness to pay for HIV services in Africa is shown in Table 3.

Table 3  
Factors that influence the willingness to pay for HIV services in Africa

Objective	Factor significantly associated with WTP (+) enhances WTP, (-) decrease WTP	P value	Articles
WTP for HCT	(+) Male	0.05	[24]
	(+) Higher Education level	0.03	
	(+) Knowledge of VCT	0.02	
WTP for HCT	(+) Income	0.001	[22]
	(+) Knowledge of someone living with HIV	0.006	
	(+) Knowledge of someone who died of AIDS	0.026	
	(+) Worry about HIV infection	0.001	
	(+) Fear of HIV related stigma	0.005	
WTP for condoms	(+) Satisfied service user		[21]
	(+) perceived brand value		
	(-) Ability to pay		
WTP for ART	(+) Male		[30]
	(+) Income		
	(-) High cost		
	(-) Stigma about HIV		
	(-) Disbelief in efficacy of antiretroviral therapy		
WTP for voluntary HCT	-		[32]
WTP for cervical cancer screening among HIV-positive women	(+) Knowledge about risk of cervical cancer		[38]
WTP for community ART delivery	(+) Education level	0.048	[33]
	(-) Failure to disclose HIV status	0.049	

Objective	Factor significantly associated with WTP (+) enhances WTP, (-) decrease WTP	P value	Articles
WTP for ART	(+) Employment (+) Higher Income (+) Socioeconomic status (+) Knowledge on ART adherence (-) Older age (-) Higher transport costs		[29]
WTP for condoms	(+) Satisfaction/loyalty (+) Knowledge about the product (+) Market barriers	< 0.001 0.007 < 0.001	[25]
WTP for HIV self-tests	(+) Self-reported higher chance of acquiring HIV		[39]
WTP for PrEP	(+) Male	0.001	[27]
WTP to restock HIV self-test kits	(-) High sale price		[20]
WTP for HIV self-test kits	(+) Higher level of education (+) Higher level of socioeconomic status (+) Having health insurance (+) Earning own income (+) Service managed by faith-based organisation (+) Women with knowledge of HIV self-testing		[26]
WTP for HIV treatment	(+) Being employed (+) Disclosure of HIV status to a friend (+) Satisfaction with service provider (+) Attending 3 months scheduled reviews (-) Reduction in income (-) Practising no religion	0000 0.02 0.04 0.02 0.05 0.01	[40]
WTP for PMTCT	(+) income		[35]

Objective	Factor significantly associated with WTP (+) enhances WTP, (-) decrease WTP	P value	Articles
WTP to attend an after-hours copay clinic	Themes  (+) Benefits for after-hours clinic (choice, convenience, privacy)  (-) Disadvantages of after-hours clinic (fee might become mandatory for all, creates suspicion to pay for clinical services that have been free, those who do not pay might receive poor quality services, need for equity)  (+) Recommending service to a friend		[41]
WTP for VMMC	(+) Knowledge about VMMC role in reducing HIV transmission	0.03	[23]
WTP for PMTCT	(+) Education  (+) Residence near specialised pharmacy  (+) Trimester of pregnancy  (+) Time spent to reach health facility	0.046  0.03  0.02  0.02	[36]
WTP for HIV treatment and monitoring tests	(-) Low social economic status  (+) Salaried employment	< 0.001  0.022	[37]
WTP for PMTCT	-		[34]
WTP for HIV care	(+) Education  (+) Income  (+) Private medical insurance  (+) Previously paid for services	0.01  0.00  0.003  0.021	[28]

## Qualitative findings

Of the twenty-two articles that were reviewed, only one used a qualitative methods design [41]. Using semistructured key informant interviews and focus group discussions, Twimukye, King [41] explored the attitudes and perceptions of HIV patients and their willingness to pay using a fee-based after-hours HIV clinic in Uganda. The key informants were people with high HIV stigma, high net worth individuals, busy individuals and staff working at the clinic. The focus group discussions were composed of randomly selected individuals attending the clinic on a given day. The study found the willingness to copay, with some respondents willing to pay as high as Uganda Shillings 40,000 (approximately US\$ 11) per visit. The themes associated with WTP include the perceived benefits of attending a special clinic, such as the privacy and short waiting time, convenience for those in formal employment, and the fact that it gives people another choice. The themes associated with a negative attitude towards payment that were

mentioned in the article include the perceived fear that fees might become mandatory for all HIV patients, including those attending the general clinic, poor quality services for those unable to pay and the belief that HIV services should be offered free. The other reason cited for the unwillingness to pay is that the clinic is not a one-stop centre for additional services, such as being a prostate cancer clinic.

## Quality assessment of the studies

Using only five items from JBI tools that were applicable to the retrieved studies, the articles were assessed for methodological quality. No study had an item marked as “No.” Nine (40.9%) studies that had all items marked as “yes” and 10 (45.5%) studies that had four “yes” and one “unclear” domains were classified as being of high quality. Three studies (13.6%) had two “yes” and three “unclear” and were classified as medium quality. Both high and medium quality studies were included in the final review. The details are presented in Additional file 2.

## Discussion

The current systematic review investigates the willingness to pay for HIV services in Africa. To the best of our knowledge, this is the first review on this topic. The review covers the methods used in WTP studies for HIV services in Africa and the factors associated with the willingness to pay. Twenty-two articles that met all the inclusion criteria and none of the exclusion criteria were included in the final review. The main reason for dropping some of the preference studies is that they focus on the trade-off for specific HIV services using the discrete choice and willingness to accept elicitation methods but not to assess the willingness to pay for the services.

The review includes articles that were not in three recent reviews [12, 42, 43]. The majority (72.7%) of the articles were relatively new and were published between 2016 and 2022. This coincides with the period when donor funding for HIV started to stagnate or fall and, hence, may relate to the interest in exploring alternative sources of funding [11]. All three thematic areas of HIV diagnosis, prevention and treatment were investigated using the WTP approach. Although HIV prevention had the highest number of articles amongst those included in the review, within the HIV prevention scope, there are few HIV prevention services covered by WTP studies. For instance, voluntary medical male circumcision and preexposure prophylaxis for HIV each had just one article. HIV prevention remains the hallmark for long-term control of HIV and AIDS [44], and thus, it is important that alternative measures for sustaining HIV prevention interventions in Africa be explored.

We find incomplete reporting on the methods used in WTP studies. The theories underpinning the studies and the methods used to elicit willingness to pay are two notable items that are not consistently reported in the reviewed articles. There is limited mention of the theoretical approaches to the studies on willingness to pay for HIV services in Africa. Only one study about WTP for HIV services in Nigeria explicitly states the theory underpinning the research [22], while another [40] states the conceptual framework but not the theory. Research should ideally be guided by an appropriate theory [45]. Adekunjo, Rasiah [22] used the neoclassical economic theory that assumes people to be rational and, thus, make

decisions that maximise their utility [46, 47]. The neoclassical economic theory is critiqued for assuming humans are always rational; in contrast, individuals sometimes make decisions that are not in their best interests [48]. Rice [48] recommends integrating behavioural economic tools in health economics to address the shortcomings of the neoclassical theory. The available evidence indicates incomplete documentation on the method for eliciting WTP. Only fourteen out of the twenty-one quantitative studies (70%) fully mention the elicitation method for obtaining the WTP. The bidding game is the most common method used among the retrieved articles, which is similar to what other studies have found [12].

The majority (86.4%) of the included studies are conducted amongst users of the service under study. This is similar to what was found in a systematic review on WTP for HIV prevention technologies [43]. Although Foreit and Foreit [49] recommend that WTP studies for clinical services should be conducted among people attending clinics, conducting WTP studies amongst people already using the service and who already find utility in the service may lead to systematic bias [50].

Among the retrieved articles, only one uses a qualitative method, which is perhaps not surprising because WTP is largely a quantitative method. From the lone qualitative article, there is evidence of WTP for an after-hours HIV clinic. The themes in favour of WTP include perceived benefits such as privacy, less waiting time, and the convenience of attending an after-hour clinic. The themes reported from participants who were not WTP include perceived threats such as fear that payment might become mandatory, including the general clinic, poor quality services for those in the general clinic who are unable to pay for the after-hours clinic, and the belief that HIV services should be free. The qualitative findings highlight the importance of exploring other factors beyond the ability to pay that influence willingness to pay. The key informants who were high net worth individuals and, thus, more likely to be able to pay are concerned not only about the quality of care in the after-hours clinic but also in the general clinic where those who are unable to pay seek care. The qualitative findings are similar to what Steigenberger, Flatscher-Thoeni [12] found that perceived benefits and fears/threats are among the factors that influence WTP for health services.

Almost all the studies (90.9%) used interview-administered questionnaires to collect data, with only two studies reporting the use of self-administered questionnaires [27, 28]. Interactive data collection formats that allow clarification of questions and probing for higher amounts are generally recommended for WTP [51, 52].

The review finds evidence of willingness to pay for HIV services even though the amount is not sufficient to pay for the full service at market value. The proportion of people willing to pay ranged from 34.3–97.1%. A greater proportion are more willing to pay for HIV diagnosis compared to prevention and treatment. This may be attributed to the fact that HIV diagnosis costs much less compared to HIV prevention and treatment service, and thus, many more people are able to afford it. Several factors are significantly associated with the willingness to pay for HIV services. Among the factors, income (including ability to pay, employment, and socioeconomic status) was the most frequently mentioned, followed by knowledge and beliefs about the HIV service or product. Other factors include level of



education, being male and the influence of other people. These factors are similar to what has been previously reported [12, 53, 54].

The review has several strengths compared to other recent reviews. We attempted to address the limitation of excluding qualitative articles from preference elicitation studies, as acknowledged in the systematic review by Beckham, Crossnohere [35]. Our search for evidence included grey literature sources that were omitted by other reviews [42, 43]. All the studies included were classified as medium to high quality. However, our review is not without limitations. Willingness to pay is largely a quantitative approach. Although we tried to include qualitative articles, there is a possibility that our search criteria may not have been sensitive enough, and thus, we may have missed some articles that used qualitative methods. We restricted our search to only articles in English, which also may have excluded important articles in other languages. One of the limitations of contingent valuation studies is the assumption that stated preference equates to actual payment, which may not be the case, and this systematic review is no exception; thus, the findings should be interpreted with some caution.

## **Conclusion**

This systematic review has provided evidence of willingness to pay for HIV services in Africa. The amount people are willing to pay is insufficient to cover the full cost of services, which is an important potential consideration when determining how to fund a sustainable HIV service in the future. Several factors, including socioeconomic status, knowledge, and beliefs about HIV services, influence the willingness to pay for HIV services in Africa. These findings are important in the development of policies for sustaining HIV services in a world where donor funding is declining.

## **Declarations**

### **Ethics approval and consent to participate**

Not Applicable

### **Consent for publication**

Not Applicable

### **Availability of data and materials**

All data generated or analysed during this study are included in this published article and its supplementary information files.

### **Competing interests**

The authors declare that they have no competing interests.

## Funding

No funding was received.

## Authors' contributions

BBJ conceived and planned the review. BBJ, LM and HB contributed to the design. BBJ wrote the first draft of the manuscript, while LM and HB reviewed and edited the manuscript. All authors read and approved the final manuscript.

## Acknowledgements

Not applicable

## References

1. The Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS. Fact sheet—global AIDS update 2019. UNAIDS. 2019. 2021.
2. UNAIDS. Preventing HIV infections at the time of a new pandemic: A synthesis report on programme disruptions and adaptations during the COVID-19 pandemic in 2020. Joint United Nations Programme on HIV/AIDS; 2021.
3. UNAIDS. CONFRONTING INEQUALITIES: Lessons for pandemic responses from 40 years of AIDS. UNAIDS; 2021.
4. Global Fund to Fight AIDS Tuberculosis and Malaria (GFTAM). THE IMPACT OF COVID-19 ON HIV, TB AND MALARIA SERVICES AND SYSTEMS FOR HEALTH. A SNAPSHOT FROM 502 HEALTH FACILITIES ACROSS AFRICA AND ASIA. The Global Fund; 2021.
5. Ismail SD, Pankrac J, Ndashimye E, Prodger JL, Abrahams M-R, Mann JF, et al. Addressing an HIV cure in LMIC. *Retrovirology*. 2021;18(1):1–19.
6. Amico P, Aran C, Avila C. HIV spending as a share of total health expenditure: an analysis of regional variation in a multi-country study. *PLoS ONE*. 2010;5(9):e12997.
7. Kates J, Nandakumar A, Gaumer G, Hariharan D, Crown W, Wexler A. Assessing PEPFAR's Impact: Analysis of Mortality in PEPFAR Countries KFF: KFF; 2021 [cited 2021 28/09/2021]. Available from: <https://www.kff.org/global-health-policy/issue-brief/assessing-pepfars-impact-analysis-of-mortality-in-pepfar-countries/view/footnotes/>.
8. Atun R, Chang AY, Ogbuoji O, Silva S, Resch S, Hontelez J, et al. Long-term financing needs for HIV control in sub-Saharan Africa in 2015–2050: a modelling study. *BMJ open*. 2016;6(3):e009656.
9. Kamurungi E. AIDS body seeks Shs29 trillion to avert 130,000 new infections [News paper]. *Daily Monitor*; 2021 [Available from: <https://www.monitor.co.ug/uganda/news/national/aids-body-seeks-shs29-trillion-to-avert-130-000-new-infections-3555468>].

10. Roth GA, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*. 2018;392(10159):1736–88.
11. Kates J, Wexler A, Lief E. Donor government funding for HIV in low-and middle-income countries in 2020. Menlo Park: Kaiser Family Foundation and UNAIDS; 2021.
12. Steigenberger C, Flatscher-Thoeni M, Siebert U, Leiter AM. Determinants of willingness to pay for health services: a systematic review of contingent valuation studies. *The European Journal of Health Economics*. 2022:1–28.
13. Joanna Briggs Institute. JBI critical appraisal *Checklist for analytical cross sectional studies*. 2017 [Available from: <https://jbi.global/critical-appraisal-tools>].
14. Joanna Briggs Institute. *JBI critical appraisal checklist for qualitative research*. 2017 [Available from: <https://jbi.global/critical-appraisal-tools>].
15. Subramanian S, Kaganova Y, Zhang Y, Hoover S, Nyambe N, Pinder L, et al. Patient preferences and willingness to pay for cervical cancer prevention in Zambia: Protocol for a multi-cohort discrete choice experiment. *JMIR Res protocols*. 2018;7(7):e10429.
16. Chiwaula LS, Chirwa GC, Caltado F, Kapito-Tembo A, Hosseinipour MC, van Lettow M, et al. The value of informal care in the context of option B + in Malawi: a contingent valuation approach. *BMC Health Serv Res*. 2016;16(1):1–7.
17. Ndhlovu TM. Willingness to pay for health care and antiretroviral drugs, determinants of HIV testing and of adherence to antiretroviral therapy Evidence from Rural Southern Region of Malawi. University of Dar es Salaam; 2008.
18. London S. Knowledge Is Key to Willingness to Pay for Voluntary Medical Male Circumcision. *Int Perspect Sex Reproductive Health*. 2016;42(1):56.
19. Binswanger HP. Willingness to pay for AIDS treatment: myths and realities. *The Lancet*. 2003;362(9390):1152–3.
20. Chiu C, Hunter LA, McCoy SI, Mfaume R, Njau P, Liu JX. Sales and pricing decisions for HIV self-test kits among local drug shops in Tanzania: a prospective cohort study. *BMC Health Serv Res*. 2021;21(1):1–11.
21. Evans W, Kadirov K, Thior I, Ganesan R, Ulasevich A, Deperthes B. Willingness to pay for condoms among men in sub-saharan Africa. *Int J Environ Res Public Health*. 2019;16(1):34.
22. Adekunjo FO, Rasiyah R, Dahlui M, Ng CW. Assessing the willingness to pay for HIV counselling and testing service: a contingent valuation study in Lagos State, Nigeria. *Afr J AIDS Res*. 2020;19(4):287–95.
23. Wandei S, Nangami M, Egesa O. Ability and willingness to pay for voluntary medical male circumcision: a cross-sectional survey in Kisumu County, Kenya. *AIDS Care*. 2016;28(4):471–4.
24. Uzochukwu B, Uguru N, Ezeoke U, Onwujekwe O, Sibeudu T. Voluntary counseling and testing (VCT) for HIV/AIDS: a study of the knowledge, awareness and willingness to pay for VCT among students

- in tertiary institutions in Enugu State Nigeria. *Health Policy*. 2011;99(3):277–84.
25. Evans WD, Taruberekera N, Longfield K, Snider J. Brand equity and willingness to pay for condoms in Zimbabwe. *Reproductive health*. 2011;8(1):1–8.
  26. Ashburn K, Antelman G, N'Goran MK, Jahanpour O, Yemaneberhan A, N'Guessan Kouakou B, et al. Willingness to use HIV self-test kits and willingness to pay among urban antenatal clients in Cote d'Ivoire and Tanzania: a cross-sectional study. *Tropical Med Int Health*. 2020;25(9):1155–65.
  27. Begnel ER, Escudero J, Mugambi M, Mugwanya K, Kinuthia J, Beima-Sofie K, et al. 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. *Int J STD AIDS*. 2020;31(5):454–9.
  28. Otiso LD. *Assessing the acceptability and willingness to pay for HIV services among patients at LVCT health clinics*: Strathmore University; 2016.
  29. Mbachu C, Okoli C, Onwujekwe O, Enabulele F. Willingness to pay for antiretroviral drugs among HIV and AIDS clients in south-east Nigeria. *Health Expect*. 2018;21(1):270–8.
  30. Muko KN, Ngwa VC, Chigang L, Ngwa IG, Meiburg A, Shu EN. Willingness to pay for treatment with highly active antiretroviral (HAART) drugs: a rural case study in Cameroon. *Sahara-J: J Social Aspects HIV/AIDS*. 2004;1(2):107–13.
  31. Durosinmi-Etti O, Fried B, Dubé K, Sylvia S, Greene S, Ikpeazu A, et al. Sustainability of funding for HIV treatment services: a cross-sectional survey of patients' willingness to pay for treatment services in Nigeria. *Glob Health Sci Pract*. 2022;10(2).
  32. Forsythe S, Arthur G, Ngatia G, Mutemi R, Odhiambo J, Gilks C. Assessing the cost and willingness to pay for voluntary HIV counselling and testing in Kenya. *Health Policy Plann*. 2002;17(2):187–95.
  33. Geldsetzer P, Sauer A, Francis JM, Mboggo E, Lwezaula S, Sando D, et al. Willingness to pay for community delivery of antiretroviral treatment in urban Tanzania: a cross-sectional survey. *Health Policy Plann*. 2020;35(10):1300–8.
  34. Isah A, Adibe MO, Ukwe CV, Okonta MJ, Ubaka CM, Aluh DO, et al. Cost-benefit analysis of prevention of mother-to-child transmission of HIV services: a contingent valuation study of patients' preferences from clinical pharmacists' perspective. *J Pharm Health Serv Res*. 2021;12(1):18–23.
  35. Ayifah E, Ayifah RNY. Socio-Economic Burden of HIV/AIDS: Investigating Pregnant Women's Willingness-to-Pay to Prevent Mother-to-Child Transmission in Ghana. *Malaysian J Public Health Med*. 2012;12(Supplement 1):13-.
  36. Isah A, Adibe MO, Anosike C, Aluh DO, Onyekwelu PO, Okonta MJ, et al. Willingness-to-accept and willingness-to-pay ratios of prevention of mother-to-child transmission services in a Nigerian hospital: a cross-sectional contingent valuation study. *Value in health regional issues*. 2019;19:112–21.
  37. Nwobi EA, Ossai EN, Aniwada EC, Ezeoke UE. Willingness to pay for highly active antiretroviral (HAART) drugs and HIV treatment monitoring tests among People Living with HIV/AIDS in Enugu State, Nigeria. *Australasian Med J (Online)*. 2017;10(7):558.

38. Dim CC, Onyedum CC, Dim NR, Chukwuka JC. Cervical cancer screening among HIV-positive women in Nigeria: an assessment of use and willingness to pay in the absence of donor support. *J Int Association Providers AIDS Care (JIAPAC)*. 2015;14(3):241–4.
39. Thirumurthy H, Masters SH, Agot K. Willingness to pay for HIV self-tests among women in Kenya: implications for subsidy and pricing policies. *Journal of acquired immune deficiency syndromes (1999)*. 2018;78(2):e8.
40. Chirundu S, Tapesana P, Magande TM. Willingness to pay for HIV Treatment-A Case of Clients Seeking Care at Rimuka TB and HIV Site Kadoma Zimbabwe. *Texila International Journal of Public Health*. 2017;5(1).
41. Twimukye A, King R, Schlech W, Zawedde FM, Kakaire T, Parkes-Ratanshi R. Exploring attitudes and perceptions of patients and staff towards an after-hours co-pay clinic supplementing free HIV services in Kampala, Uganda. *BMC Health Serv Res*. 2017;17(1):1–10.
42. Humphrey JM, Naanyu V, MacDonald KR, Wools-Kaloustian K, Zimet GD. Stated-preference research in HIV: a scoping review. *PLoS ONE*. 2019;14(10):e0224566.
43. Beckham SW, Crossnohere NL, Gross M, Bridges JF. Eliciting preferences for HIV prevention technologies: a systematic review. *The Patient-Patient-Centered Outcomes Research*. 2021;14(2):151–74.
44. Goosby E, Dybul M, Fauci AA, Fu J, Walsh T, Needle R, et al. The United States President's Emergency Plan for AIDS Relief: a story of partnerships and smart investments to turn the tide of the global AIDS pandemic. *JAIDS J Acquir Immune Defic Syndr*. 2012;60:51-S6.
45. Osanloo A, Grant C. Understanding, selecting, and integrating a theoretical framework in dissertation research: Creating the blueprint for your “house”. *Administrative issues journal: connecting education, practice, and research*. 2016;4(2):7.
46. Culyer AJ. The normative economics of health care finance and provision. *Oxf Rev Econ Policy*. 1989;5(1):34–58.
47. Ostermann J, Brown DS, Mühlbacher A, Njau B, Thielman N. Would you test for 5000 Shillings? HIV risk and willingness to accept HIV testing in Tanzania. *Health Econ Rev*. 2015;5(1):1–11.
48. Rice T. The behavioral economics of health and health care. *Annu Rev Public Health*. 2013;34:431–47.
49. Foreit KG, Foreit JR. Willingness to pay surveys for setting prices for reproductive health products and services a user's manual. 2004.
50. Malone H, Nicholl H, Tracey C. Awareness and minimisation of systematic bias in research. *Br J Nurs*. 2014;23(5):279–82.
51. Portney PR. The contingent valuation debate: why economists should care. *J Economic Perspect*. 1994;8(4):3–17.
52. Phillips KA, Homan RK, Luft HS, Hiatt PH, Olson KR, Kearney TE, et al. Willingness to pay for poison control centers. *J Health Econ*. 1997;16(3):343–57.

53. Noor Aizuddin A, Sulong S, Aljunid SM, editors. Factors influencing willingness to pay for healthcare. BMC Public Health; 2012: Springer.
54. Ogundeji YK, Akomolafe B, Ohiri K, Butawa NN. Factors influencing willingness and ability to pay for social health insurance in Nigeria. PLoS ONE. 2019;14(8):e0220558.
55. Ayifah E. Determinants of the willingness-to-pay for HIV/AIDS prevention: the case of mother-to-child transmission in selected hospitals in Ghana. Retrovirology. 2010;7(1):1-.

## Figures

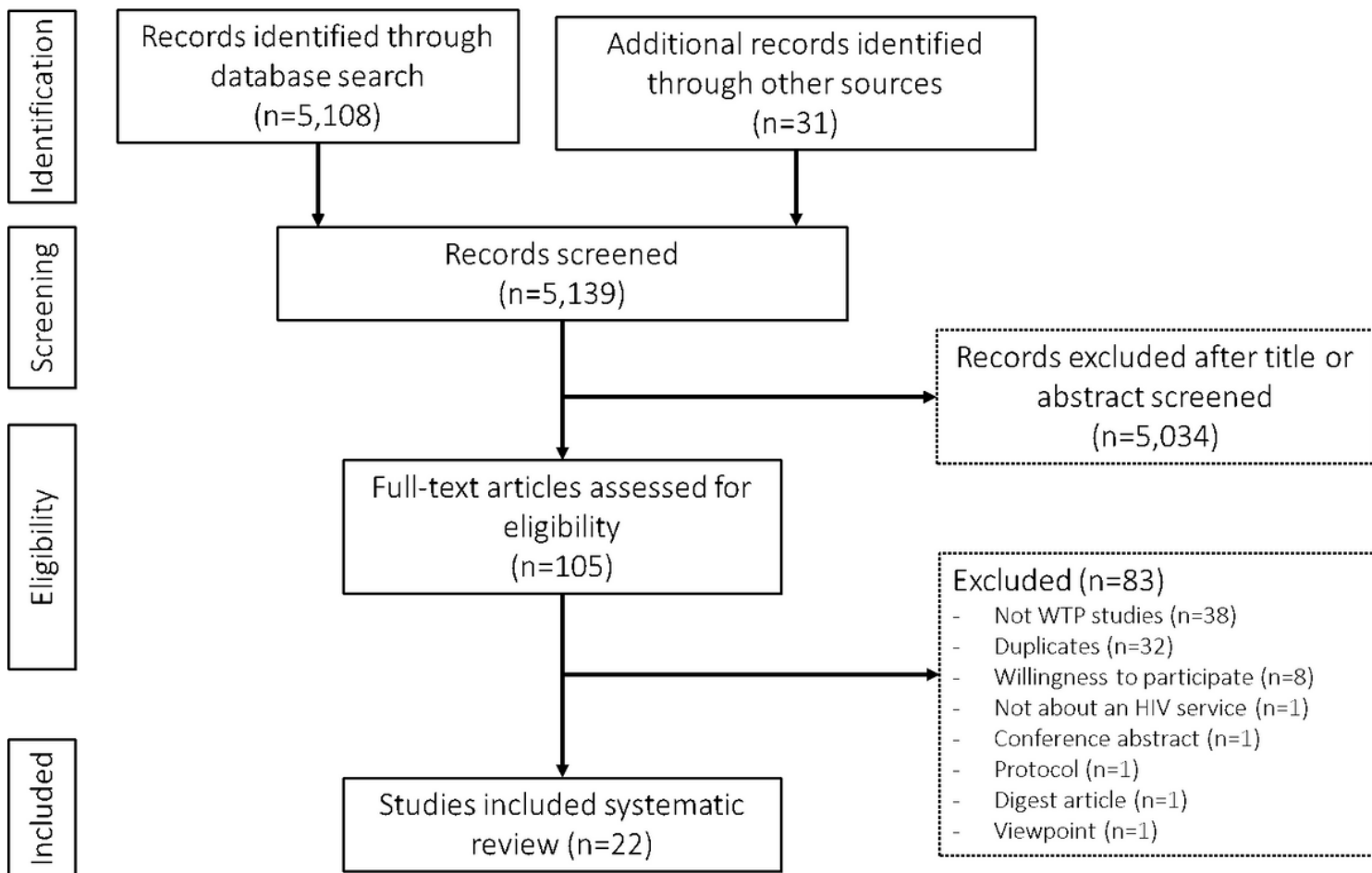
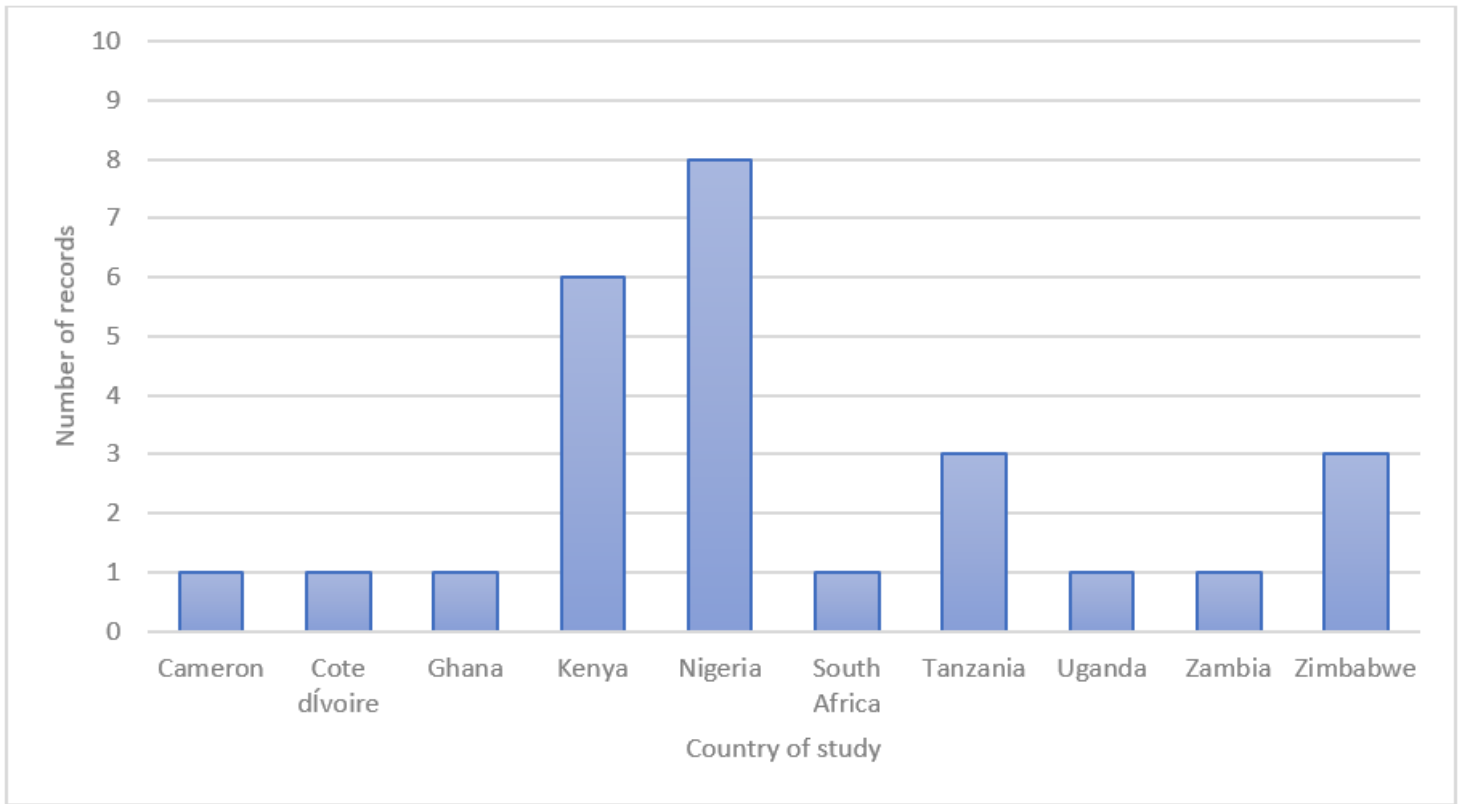


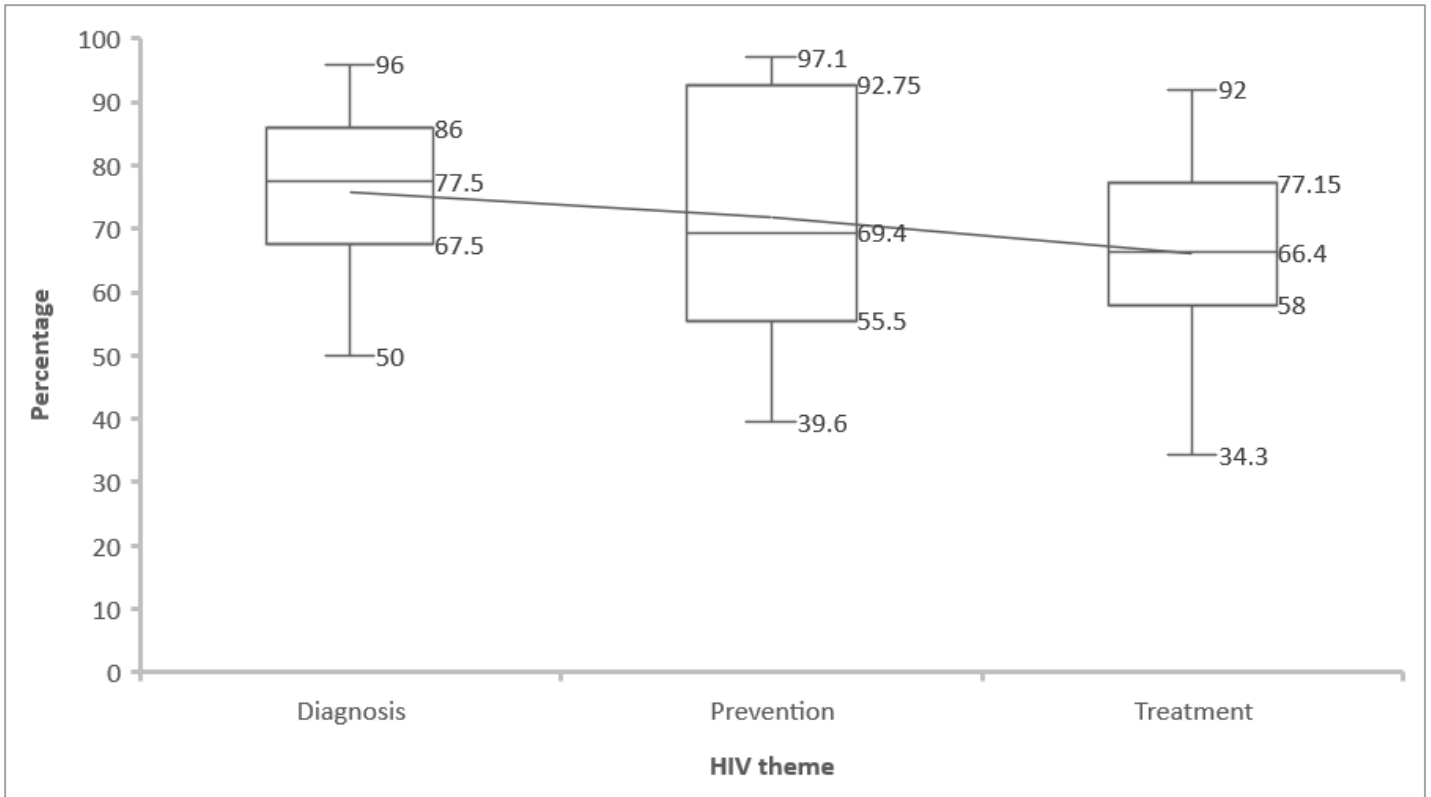
Figure 1

Flow diagram of study selection



**Figure 2**

**Frequency of willingness to pay records per country extracted from the literature for the period 2000–2021**



**Figure 3**

The percentage of people willing to pay for HIV services by theme



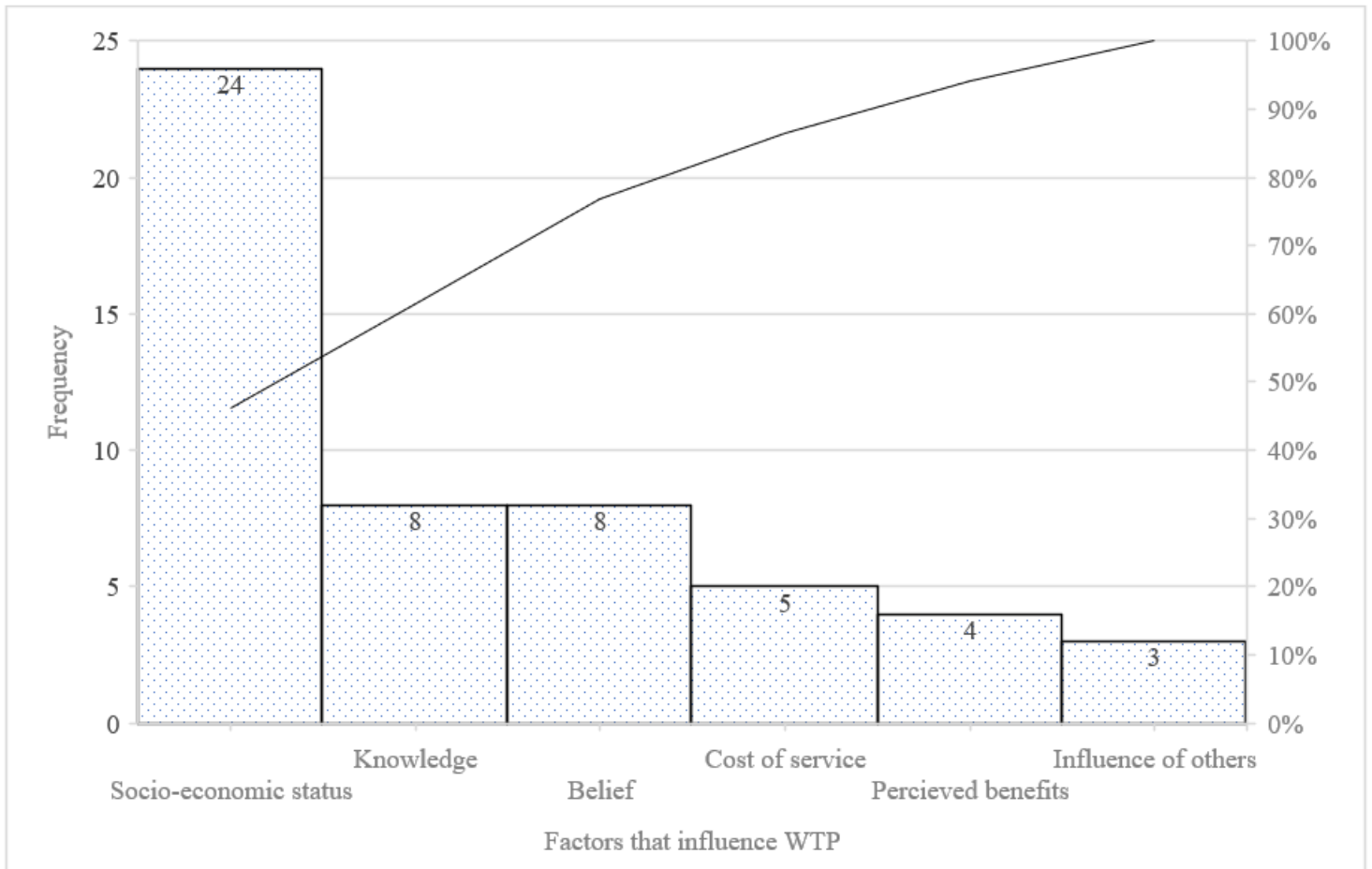


Figure 4

Factors that influence the willingness to pay for HIV services

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Additionalfile1Searchterms.docx](#)
- [Additionalfile2QualityAssessment.docx](#)
- [Additionalfile3CompletedPRISMA2020checklist.docx](#)