

## Original Article



# Willingness to Pay for Antiretroviral Drugs Covered by Medical Insurance among People Living with HIV in 18 Chinese Cities\*

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## Abstract

**Objective** Antiretroviral drugs covered by medical insurance have been gradually used by people living with human immunodeficiency virus (PLWH) in recent years in China. This study aimed to analyze their willingness to pay (WTP) for antiretroviral drugs.

**Methods** A mixed-methods study design involving a cross-sectional survey and in-depth interviews was conducted. A cross-sectional survey was performed to collect data on the general characteristics, economic status, antiretroviral therapy (ART) status, and WTP of PLWH in 18 Chinese cities from August 2022 to February 2023. Multivariate logistic regression was used to analyze the factors associated with WTP. Representatives of PLWH were interviewed *via* in-depth interviews, and the data were thematically analyzed.

**Results** Among the 941 PLWH, 271 (28.80%) were willing to pay for antiretroviral drugs covered by medical insurance. For basic medical insurance for urban and rural residents, PLWH with the following characteristics were more willing to pay: an educational level of senior high school or technical secondary school, having an undergraduate degree or higher, frequently working away from their hometowns, and homosexual transmission. Off-farm workers and recipients of government medical aid were more unwilling to pay. For basic medical insurance for urban employees, PLWH with the following characteristics were more willing to pay: frequently working away from their hometowns; homosexual transmission; personal annual income  $\geq 100,000$  CNY; and adverse events of antiretroviral drugs. The main reasons for PLWH's WTP for antiretroviral drugs covered by medical insurance were that the drugs had fewer adverse events and were easier to administer. The main reasons for PLWH's unwillingness to pay were financial difficulties and privacy concerns.

**Conclusion** Nearly one-third of PLWH are willing to pay for antiretroviral drugs covered by medical insurance. In the future, PLWH with a high WTP can be guided to use these drugs.

**Key words:** PLWH; Antiretroviral drugs covered by medical insurance; Willingness to pay

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## INTRODUCTION

With the development and improvement of antiretroviral drugs, antiretroviral therapy (ART) has become increasingly important for the prevention and control of acquired immune deficiency syndrome (AIDS), transforming AIDS from an incurable disease to a chronic disease<sup>[1]</sup>. Effective ART not only prolongs the life span of people living with human immunodeficiency virus (PLWH) and reduces mortality but also prevents human immunodeficiency virus (HIV) transmission and plays an important role in reducing new HIV infections<sup>[2-4]</sup>. Countries worldwide, including China, are implementing ART strategy to improve the coverage and viral suppression percentage of ART. Joint United Nations Programme on HIV/AIDS (UNAIDS) has set targets of 95% of confirmed people receiving ART and 95% of people receiving ART with viral suppression by 2030<sup>[5]</sup>. In China, by the end of 2022, the coverage of ART among PLWH was 92.8%; however, 7.2% are still vulnerable, and ART coverage needs to be further improved<sup>[6]</sup>. The viral suppression (viral load < 50 copies/mL) percentage among PLWH receiving ART is 92.0%; however, some PLWH receiving ART are still at a risk of treatment failure and low-level HIV viraemia<sup>[7-9]</sup>.

Antiretroviral drug security is the basis for improving the coverage and the viral suppression percentage of ART. In keeping with the prevention and control of AIDS entering into a phase of high-quality development, the comprehensive reform of the Chinese medical security system was initiated in 2020<sup>[10,11]</sup>. In China, there currently exists three secure ways of acquiring antiretroviral drugs: free antiretroviral drugs (PLWH obtain free antiretroviral drugs through the *National Free ART Policy*), antiretroviral drugs covered by medical insurance (PLWH obtain antiretroviral drugs that are included in *National Basic Medical Insurance Drug Catalog* which requires PLWH to pay a portion of the cost out-of-pocket), and self-funded antiretroviral drugs (PLWH obtain antiretroviral drugs in the market at full price)<sup>[12]</sup>. In recent years, the types of antiretroviral drugs covered by medical insurance has increased, and by 2023, the numbers of types have reached 12<sup>[13]</sup>. Most of these drugs are newly marketed single-tablet regimens, with the advantages of greater effectiveness, better adherence, fewer adverse events, and ease of use<sup>[14,15]</sup>. PLWH who obtain these drugs through the national basic medical insurance will only need to

pay a portion of the cost out-of-pocket (about 300 Chinese Yuan [CNY] a month), while the rest of the cost will be covered by the *National Medical Insurance Fund*. In China, the advantages of antiretroviral drugs covered by medical insurance and free antiretroviral drugs complement each other, adapting to the needs of different PLWH groups<sup>[12]</sup>.

According to the results of relevant surveys, only approximately 20% of PLWH in China use antiretroviral drugs covered by medical insurance, and its utilization rate is even lower in some remote places with poor AIDS-related medical security policies. Compared to free antiretroviral drugs, antiretroviral drugs covered by medical insurance require PLWH to pay a portion of the cost out-of-pocket; therefore, the cost has become one of the main barriers to their use by PLWH.

Since antiretroviral drugs covered by medical insurance have only been gradually used by a small portion of Chinese PLWH in recent years, there have been studies on the feasibility of including ART in medical insurance<sup>[16]</sup> and policies related to antiretroviral drugs covered by medical insurance<sup>[17,18]</sup>. However, Chinese researchers have not conducted studies on the willingness to pay (WTP) for antiretroviral drugs covered by medical insurance. Therefore, in this study, PLWH were selected from 18 Chinese cities in six provinces to analyze PLWH's willingness to pay (WTP) for antiretroviral drugs covered by medical insurance. In doing so, the study hopes to provide reference for further improving the coverage and viral suppression percentage of ART in China.

## METHODS

### Study Participants

In this study, multistage sampling was used to select the participants. The sampling method was as follows.

Considering the differences in the level of regional economic development and the *Reform Plan for the Division of Fiscal Authority and Expenditure Responsibility between the Central and Local Governments in the Field of Medical and Health Care*<sup>[19]</sup>, which stipulated the proportion of the central government's share of basic public health service expenditures, Sichuan and Chongqing (80% shared by the central government), Hunan and Liaoning (60% and 50% shared by the central government, respectively), and Jiangsu and

Guangdong (30% shared by the central government) were selected as the surveyed provinces.

In each province, three cities with good medical security policies for ART and a large number of people receiving ART were selected as the study sites. Eighteen cities were selected as study sites: Chengdu, Leshan, and Mianyang in Sichuan Province; Shapingba, Yubei, and Nan'an districts in Chongqing municipality; Changsha, Hengyang, and Chenzhou in Hunan Province; Shenyang, Tieling, and Yingkou in Liaoning Province; Nanjing, Nantong, and Changzhou in Jiangsu Province; and Guangzhou, Huizhou, and Meizhou in Guangdong Province.

A major hospital designated for ART was selected from each city for investigation. Regarding PLWH selection, we used the ART ID as the number of the individual in the aggregate, and then randomly selected a number as the first participant, and the other participants were selected according to the rule of equidistant sampling. If the participants were not available, we moved to the next participant. In this study, the inclusion criteria were as follows: (1) age  $\geq 18$  years old, (2) at least 1 year of ART, (3) never used antiretroviral drugs covered by medical insurance, and (4) provided a signed informed consent and complete the study.

The sample size was computed *via* the formula 
$$N = \frac{Z_{1-\alpha/2}^2 \times p q}{d^2},$$
 where  $\alpha = 0.05$  and  $Z_{1-\alpha/2} = 1.96$ . The estimated acceptable margin of error for proportion was  $d = 0.1p$ . Previous information suggested that the proportion of PLWH's WTP for antiretroviral drugs covered by medical insurance was approximately 30%, and calculations showed that the minimum sample size was approximately 933. This study was approved by the Ethics Committee of the National Center for AIDS/STD Control and Prevention and the Chinese Center for Disease Control and Prevention (X220607702). All the experiments were performed in accordance with the Declaration of Helsinki. Signed electronic informed consent forms were obtained from all participants involved in the study.

### Study Methods

A mixed-methods study design involving a cross-sectional survey and in-depth interviews was conducted.

This study conducted a cross-sectional survey between August 2022 and February 2023. Wenjuanxing ([www.wjx.cn](http://www.wjx.cn)), an online Chinese survey tool, was used to administer the survey. Once participants met the inclusion criteria, they were

contacted by trained investigators to conduct the survey. During the questionnaire design, several discussions were held with experts from the Centers for Disease Control and Prevention, hospitals, and the medical security administration. The questionnaire included participants' general characteristics (gender, age, ethnicity, education, marital status, occupation, type of basic medical insurance, year of confirmation of HIV infection, whether frequently worked away from their hometown, route of transmission, etc.), economic status (average annual income of family members, personal annual income, whether or not a recipient of government medical aid, etc.), ART status (ART hospital level, adverse events of antiretroviral drugs, privacy concerns regarding their HIV status, etc.), and WTP for antiretroviral drugs covered by medical insurance.

To gain an in-depth understanding of PLWH's WTP for antiretroviral drugs covered by medical insurance and the main factors impacting WTP, this study selected at least one representative PLWH from the cross-sectional survey in each province for one-on-one in-depth interviews; the sample size of the interviews was determined in accordance with the principle of information saturation. After contacting the interviewees, they were interviewed on-site or online through an application called *Tencent Conference*. The interview process was recorded after obtaining permission from the interviewees. Each participant was interviewed for approximately 40–60 minutes.

### Definitions

**Free antiretroviral drugs:** PLWH obtain free antiretroviral drugs through the *National Free ART Policy*. These drugs are available completely free of charge.

**Antiretroviral drugs covered by medical insurance:** PLWH obtain antiretroviral drugs that are included in *National Basic Medical Insurance Drug Catalog* through basic medical insurance. PLWH who obtain these drugs will only have to pay a portion of the cost out-of-pocket (approximately 300 CNY per month), while the remaining cost will be covered by the *National Medical Insurance Fund*.

**WTP for antiretroviral drugs covered by medical insurance:** PLWH are regarded as having WTP if they are willing to use and pay for antiretroviral drugs covered by medical insurance out-of-pocket (approximately 300 CNY per month).

**A recipient of the government medical aid:** Those who receive medical assistance from the

government because they are unable to pay for medical care because of the family's financial insecurity or serious illness.

**Basic medical insurance:** In China, basic medical insurance mainly includes basic medical insurance for urban and rural residents, and basic medical insurance for urban employees. State organs, enterprises, public institutions, social organizations, individual industrial and commercial households with employees, and other employment units and their employees are covered by basic medical insurance for urban employees. People who are not covered by the basic medical insurance for urban employees or those who are not covered by other medical security in accordance with the regulations shall be covered by the basic medical insurance for urban and rural residents.

### Statistical Analysis

After data were extracted from Wenjuanxing, Microsoft Excel 2021 was used for data sorting and verification, and SAS (version 9.4; SAS Institute Inc., Cary, NC, USA) was used for statistical analysis. Qualitative data are presented as frequencies and percentages. Quantitative data are presented as the median and interquartile range (IQR). PLWH were stratified according to the type of basic medical insurance, and the factors associated with the WTP for PLWH with basic medical insurance for urban and rural residents or urban employees were analyzed using multivariable logistic regression. Collinearity analysis was performed, and variables were included using stepwise selection. All *P*-values were based on two-tailed tests, and *P* < 0.05 was considered to be statistically significant. Data from the in-depth interviews were thematically analyzed.

## RESULTS

### General Characteristics

Among the 941 PLWH in this study, 83.00% (781/941) were male. Of these, 48.88% (460/941) were 18–39 years old, and the median (IQR) age was 41 (33–53) years. Further, 21.57% (203/941) were senior high school or technical secondary school students, and 31.24% (294/941) were undergraduates or above. A total of 37.62% (354/941) of the participants were married. A total of 17.00% (160/941) frequently worked away from their hometowns. Homosexual HIV transmission was observed in 51.54% (485/941) of participants. Moreover, 49.10% (462/941) had a personal annual

income at the level of ≤ 49,999 CNY, and the median (IQR) personal annual income was at the level of 40,000 (20,000–60,000) CNY (Table 1).

### ART Status

Among the 941 PLWH included in this study, 47.18% (444/941) received treatment at municipal hospitals and 19.13% (180/941) at provincial hospitals. Furthermore, 23.91% (225/941) experienced adverse events of antiretroviral drugs, and 90.22% (849/941) were concerned about privacy regarding their HIV status (Table 1).

### Factors Associated with WTP for Antiretroviral Drugs Covered by Medical Insurance among PLWH

Among the 941 PLWH included in this study, 271 (28.80%) were willing to pay for antiretroviral drugs covered by medical insurance. For basic medical insurance for urban and rural residents, PLWH with the following characteristics were more willing to pay: having an education level of senior high school or technical secondary school (*aOR* = 7.19; 95% *CI*: 2.01–25.72), having an undergraduate degree or above (*aOR* = 7.03; 95% *CI*: 1.85–26.66); frequently worked away from their hometown (*aOR* = 6.23; 95% *CI*: 3.06–12.71); and homosexual transmission (*aOR* = 3.05; 95% *CI*: 1.61–5.78). Furthermore, PLWH with the following characteristics were more unwilling to pay for antiretroviral drugs covered by medical insurance: off-farm workers (*aOR* = 0.34; 95% *CI*: 0.14–0.83) and recipients of government medical aid (*aOR* = 0.27; 95% *CI*: 0.08–0.94) (Table 2).

For basic medical insurance for urban employees, PLWH with the following characteristics were more willing to pay: frequently worked away from their hometowns (*aOR* = 3.22; 95% *CI*: 1.83–5.68); homosexual transmission (*aOR* = 2.20; 95% *CI*: 1.26–3.84); personal annual income at the level of ≥ 100,000 CNY (*aOR* = 3.08; 95% *CI*: 1.66–5.74); and adverse events of antiretroviral drugs (*aOR* = 1.71; 95% *CI*: 1.03–2.85) (Table 2).

### In-depth Interviews with WTP for Antiretroviral Drugs Covered by Medical Insurance among PLWH

According to the results of in-depth interviews with nine PLWH, the main reasons for PLWH's WTP for antiretroviral drugs covered by medical insurance were that the drugs had fewer adverse events and were easier to take. The main reasons for PLWH's unwillingness to pay were financial difficulties and privacy concerns regarding their HIV status (Table 3).

**Table 1.** General characteristics of the participants

Variables	Number (N)	Percentage (%)
Total	941	100.00
Gender		
Male	781	83.00
Female	160	17.00
Age, years		
Median (IQR)	41 (33-53)	
18–	460	48.88
40–	365	38.79
≥ 60	116	12.33
Ethnicity		
Han	900	95.64
Others	41	4.36
Education		
Elementary school or below	140	14.88
Junior high school	304	32.31
Senior high school or technical secondary school	203	21.57
Undergraduate or above	294	31.24
Marital status		
Divorced or widowed	166	17.64
Unmarried	421	44.74
Married	354	37.62
Occupation		
Unemployed/Retired	231	24.55
Off-farm workers	241	25.61
Private/Foreign enterprise employees	298	31.67
Government agency/Public institution/State-owned enterprise employees	90	9.56
Others	81	8.61
Type of basic medical insurance		
Basic medical insurance for urban and rural residents	435	46.2
Basic medical insurance for urban employees	383	40.7
Others	123	13.1
Year of confirmation of HIV infection		
2020–2022	201	21.36
2017–2019	323	34.32
2014–2016	245	26.04
2011–2013	111	11.80
–2010	61	6.48
Whether frequently worked away from hometown		
No	781	83.00
Yes	160	17.00

Continued

Variables	Number (N)	Percentage (%)
Route of transmission		
Heterosexual transmission	396	42.08
Homosexual transmission	485	51.54
Others	60	6.38
Average annual income of family members, CNY		
Median (IQR)	25,000 (12,500–45,833)	
≤ 49,999	709	75.35
50,000–	169	17.96
≥ 100,000	63	6.69
Personal annual income, CNY		
Median (IQR)	40,000 (20,000–60,000)	
≤ 49,999	462	49.10
50,000–	311	33.05
≥ 100,000	168	17.85
A recipient of government medical aid		
No	836	88.84
Yes	105	11.16
Main sources of income		
Own income	745	79.17
Assistance from others	131	13.92
Others	65	6.91
Level of ART hospital		
County hospitals or below	317	33.69
Municipal hospitals	444	47.18
Provincial hospitals	180	19.13
Adverse events of antiretroviral drugs		
No	716	76.09
Yes	225	23.91
Concerned about privacy		
No	92	9.78
Yes	849	90.22
Willingness to pay for antiretroviral drugs covered by medical insurance		
No	670	71.20
Yes	271	28.80

**Note.** IQR, interquartile range; HIV, human immunodeficiency virus; CNY, Chinese Yuan; ART, antiretroviral therapy.

## DISCUSSION

Among the 941 PLWH included in this study, 271 (28.80%) were willing to pay for antiretroviral drugs covered by medical insurance. There were slight

differences in the factors influencing WTP for PLWH with different basic medical insurance types. Antiretroviral drugs covered by medical insurance have the advantage of good treatment effects, good patient adherence, fewer adverse events, and ease

**Table 2.** Factors associated with WTP for antiretroviral drugs covered by medical insurance among PLWH

Variables	Basic medical insurance for urban and rural residents		Basic medical insurance for urban employees	
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Gender				
Male	1.00		1.00	
Female	0.56 (0.31–1.03)		0.38 (0.15–0.94)*	
Age, years				
18–39	1.00		1.00	
40–59	0.39 (0.23–0.66)***		0.50 (0.32–0.79)**	
≥ 60	0.21 (0.08–0.55)**		0.39 (0.18–0.84)*	
Ethnicity				
Others	1.00		1.00	
Han	0.38 (0.15–1.01)		1.25 (0.37–4.24)	
Education				
Elementary school or below	1.00	1.00	1.00	
Junior high school	2.65 (0.88–8.01)	2.01 (0.57–7.17)	1.81 (0.88–4.01)	
Senior high school or technical secondary school	10.41 (3.50–30.98)***	7.19 (2.01–25.72)**	0.52 (0.24–1.11)	
Undergraduate or above	15.05 (4.95–45.79)***	7.03 (1.85–26.66)**	1.12 (0.59–2.13)	
Marital status				
Divorced or widowed	1.00		1.00	
Unmarried	4.18 (1.94–9.01)***		4.07 (2.00–8.27)***	
Married	1.29 (0.58–2.89)		2.38 (1.13–5.05)*	
Occupation				
Unemployed/Retired	1.00	1.00	1.00	
Off-farm workers	0.60 (0.30–1.22)	0.34 (0.14–0.83)*	0.69 (0.33–1.45)	
Private/Foreign enterprise employees	1.41 (0.74–2.67)	0.54 (0.24–1.25)	1.29 (0.73–2.28)	
Government agency/Public institution/State-owned enterprise employees	4.87 (1.89–12.57)**	2.32 (0.73–7.43)	1.91 (0.96–3.79)	
Others	1.95 (0.82–4.60)	0.64 (0.23–1.79)	0.62 (0.22–1.74)	
Year of confirmation of HIV infection				
2020–2022	1.00		1.00	
2017–2019	0.93 (0.50–1.72)		0.94 (0.50–1.76)	
2014–2016	0.90 (0.45–1.78)		0.87 (0.46–1.62)	
2011–2013	0.69 (0.28–1.67)		1.05 (0.49–2.25)	
–2010	0.66 (0.21–2.10)		0.29 (0.10–0.87)*	
Whether frequently worked away from hometown				
No	1.00	1.00	1.00	1.00
Yes	5.68 (3.24–9.98)***	6.23 (3.06–12.71)***	3.64 (2.14–6.18)***	3.22 (1.83–5.68)***
Route of transmission				
Heterosexual transmission	1.00	1.00	1.00	1.00
Homosexual transmission	4.74 (2.80–8.03)***	3.05 (1.61–5.78)***	2.91 (1.80–4.69)***	2.20 (1.26–3.84)**
Others	1.30 (0.71–2.29)	0.65 (0.32–1.28)	1.07 (0.36–3.17)	1.05 (0.33–3.33)

Continued

Variables	Basic medical insurance for urban and rural residents		Basic medical insurance for urban employees	
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Average annual income of family members, CNY				
≤ 49,999	1.00		1.00	
50,000–99,999	4.65 (2.30–9.41)***		2.06 (1.29–3.29)**	
≥ 100,000	4.26 (1.53–11.88)**		2.71 (1.37–5.36)**	
A recipient of government medical aid				
No	1.00	1.00	1.00	
Yes	0.33 (0.12–0.94)*	0.27 (0.08–0.94)*	0.68 (0.31–1.46)	
Personal annual income, CNY				
≤ 49,999	1.00		1.00	1.00
50,000–99,999	3.80 (2.21–6.54)***		1.79 (1.04–3.06)*	1.50 (0.84–2.70)
≥ 100,000	3.75 (1.80–7.82)***		3.78 (2.12–6.73)***	3.08 (1.66–5.74)***
Main sources of income				
Own income	1.00		1.00	
Assistance from others	0.80 (0.44–1.46)		0.25 (0.06–1.12)	
Others	1.32 (0.57–3.08)		0.46 (0.17–1.30)	
Level of ART hospital				
County hospitals or below	1.00		1.00	
Municipal hospitals	0.35 (0.20–0.60)***		0.88 (0.54–1.42)	
Provincial hospitals	0.74 (0.37–1.47)		1.52 (0.90–2.58)	
Adverse events of antiretroviral drugs				
No	1.00		1.00	1.00
Yes	2.87 (1.69–4.87)***		1.66 (1.05–2.64)*	1.71 (1.03–2.85)*
Concerned about privacy				
No	1.00		1.00	
Yes	0.65 (0.34–1.26)		1.61 (0.69–3.75)	

**Note.** \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ ; WTP, willingness to pay; PLWH, people living with human immunodeficiency virus; HIV, human immunodeficiency virus; CNY, Chinese Yuan; ART, antiretroviral therapy.

of use<sup>[14,15]</sup>. This provides an opportunity for PLWH who have stopped ART because of adverse drug events or cumbersome drug medication to re-enroll in ART<sup>[20,21]</sup>. This study will help improve ART coverage, reduce the percentage of treatment failure and low-level HIV viraemia, and improve the viral suppression percentage of ART<sup>[22]</sup>.

For PLWH with basic medical insurance for urban and rural residents or basic medical insurance for urban employees, those who frequently worked away from their hometowns were more willing to pay. In China, ART is a territorial management system with designated hospitals<sup>[23]</sup>. Patients who choose to take free antiretroviral drugs after being

diagnosed as HIV-positive will be required to obtain drugs regularly at hospitals designated for ART. For PLWH who frequently work away from their hometowns, there are many inconveniences in obtaining free antiretroviral drugs, but antiretroviral drugs covered by medical insurance can be obtained more easily and can also be reimbursed through remote reimbursement<sup>[24]</sup>. Therefore, mobile PLWH are more willing to pay because of the convenience of drug accessibility. Those infected with HIV through same-sex sexual activities were also more willing to pay. Among them, there is a higher proportion of young people and young adults<sup>[25]</sup>. These people are more open to new things, have



wider access to knowledge, and know more about antiretroviral drugs covered by medical insurance<sup>[26]</sup>, and so are more willing to pay.

For PLWH with basic medical insurance for urban and rural residents, those whose educational level was senior high school or technical secondary school or had an undergraduate degree or above were more willing to pay. This may be because PLWH with higher education have more knowledge about antiretroviral drugs covered by medical insurance, a better understanding of the advantages of antiretroviral drugs covered by medical insurance, and are more willing to use it<sup>[27]</sup>. In addition, PLWH with higher education have a better economic status and can afford to spend more, and so they were more willing to pay for antiretroviral drugs covered by medical insurance. Off-farm workers were more unwilling to pay. This may be because off-farm workers have a low level of education, lack knowledge about antiretroviral drugs covered by medical insurance, and relatively poor economic

status<sup>[28]</sup>. Therefore, these individuals were more willing to use free antiretroviral drugs than those covered by medical insurance. Those who received government medical aid were more unwilling to pay. In China, recipients of government medical aid mainly include people on subsistence allowances, people in extreme financial difficulty, family members on the edge of subsistence allowances, and rural people under monitoring, who are prone to returning to poverty<sup>[29]</sup>. The economic level of these people is just enough to maintain the living expenses of the family, and antiretroviral drugs covered by medical insurance that require them to pay approximately 300 CNY at their own expense every month are difficult for them to bear.

For PLWH with basic medical insurance for urban employees, those whose personal annual income was  $\geq 100,000$  CNY were more willing to pay. Free antiretroviral drugs are provided free of charge by the country, whereas antiretroviral drugs covered by medical insurance cost approximately 300 CNY per month. PLWH with decent incomes are more willing

**Table 3.** In-depth interview results regarding WTP for antiretroviral drugs covered by medical insurance among PLWH

Whether willing to pay for antiretroviral drugs covered by medical insurance	Main reason	Representative quotations
Yes	Fewer adverse events	I didn't sleep well when I started taking the free antiretroviral drugs. Next year, I will buy antiretroviral drugs covered by medical insurance, so that my body will suffer fewer adverse events. (SC2022120701) If there are adverse events from taking free antiretroviral drugs, I am willing to pay for antiretroviral drugs covered by medical insurance. (JS2022081801) One advantage of antiretroviral drugs covered by medical insurance is that they have less side effects on the liver and kidneys, and fewer adverse events such as dizziness, nightmares, and diarrhea. (GD2022120701)
	Easier to take	Antiretroviral drugs covered by medical insurance are easier to take, and are taken once a day and only one pill at a time. Free antiretroviral drugs are troublesome to take, and have to be taken twice a day and three pills at a time. (HN2022120701)
No	Financial difficulties	I earn just over 1,000 CNY a month and I would only consider using antiretroviral drugs covered by medical insurance when the out-of-pocket is about 100 CNY a month. (HN2022092802) I am unemployed right now and facing financial difficulties. If I can get a stable job in the future, I will turn to antiretroviral drugs covered by medical insurance. (SC2022120702) I'm taking free antiretroviral drugs right now. Many PLWH like me suffer from adverse events such as depression, nightmares, and hyperlipidemia. However, we still insist on taking free antiretroviral drugs, because of our own financial difficulties. If the price of antiretroviral drugs covered by medical insurance fell further, more people might be willing to pay for it. (LN2022092201) I'm especially concerned about whether it is possible that the medical insurance administrations reveal my private data once they get the information related to my condition. In addition, I am also worried that the medical insurance administrations will let my workplace to know about my details. So, I am unwilling to pay for antiretroviral drugs covered by medical insurance. (CQ2022121701)
	Privacy concerns	I work in a state-owned enterprise and have a decent income. However, I am unwilling to pay for antiretroviral drugs covered by medical insurance for fear of privacy disclosure. (JS2022081802)

**Note.** WTP, willingness to pay; PLWH, people living with human immunodeficiency virus; CNY, Chinese Yuan; SC, Sichuan Province; JS, Jiangsu Province; GD, Guangdong Province; HN, Hunan Province; LN, Liaoning Province; CQ, Chongqing Municipality.

to pay after comparing the costs and advantages of antiretroviral drugs covered by medical insurance, such as better treatment effects, higher adherence, fewer adverse events, and ease of use<sup>[14,15]</sup>. For PLWH with low incomes, paying about 300 CNY per month is also a significant economic burden<sup>[30]</sup> and they were more unwilling to pay. Compared to free antiretroviral drugs, antiretroviral drugs covered by medical insurance are newly marketed single-tablet regimens that have fewer adverse effects on PLWH's nervous and digestive systems<sup>[31,32]</sup>; therefore, PLWH who have experienced adverse events were more willing to pay.

According to the results of the in-depth interviews, the main reasons for PLWH's WTP for antiretroviral drugs covered by medical insurance were that they had fewer adverse events and were easier to take. Most free antiretroviral drugs have been on the market for a long time and cause more adverse events than antiretroviral drugs covered by medical insurance<sup>[31,32]</sup>. Therefore, PLWH are willing to pay for antiretroviral drugs covered by medical insurance to reduce the adverse events of poor sleep and impairment of liver and kidney function. Free antiretroviral drugs have complex regimens requiring multiple daily doses. However, the antiretroviral drugs covered by medical insurance are easier to administer and require only a single dose per day. The main reason for PLWH's WTP for antiretroviral drugs covered by medical insurance is that they are easier to take.

The main reasons for PLWH's unwillingness to pay for antiretroviral drugs covered by medical insurance were financial difficulties and privacy concerns regarding their HIV status. For some PLWH, even though they experienced adverse events such as nightmares and hyperlipidemia when taking free antiretroviral drugs, they were still unwilling to pay for antiretroviral drugs covered by medical insurance due to financial difficulties. If the price of antiretroviral drugs covered by medical insurance decreases further, patients may be willing to pay. However, whether the price can be further reduced needs to be decided through a multi-department consultation. Since its discovery, AIDS has been accompanied by discrimination and inequality, and has become a highly sensitive issue<sup>[33]</sup>. Medical insurance policies involve procedures such as application, document review, approval, and publicity, which entail a risk of privacy disclosure<sup>[24]</sup>. Therefore, some PLWH, especially those with stable and decent jobs, were unwilling to pay for antiretroviral drugs covered by medical insurance for

fear of privacy disclosure.

There are some limitations to this study. First, many provinces and cities were involved in this study and it was challenging to keep the sampling consistent; therefore, there were sampling errors. Second, this study was a cross-sectional survey, which cannot provide an exact causal relationship. Longitudinal studies are needed to further prove this causal relationship.

## CONCLUSION

Nearly one-third of PLWH investigated by this study are willing to pay for the antiretroviral drugs covered by medical insurance. There are slight differences in the factors associated with WTP for PLWH with different basic medical insurance types. In the future, PLWH with a high WTP can be guided to use antiretroviral drugs covered by medical insurance in a targeted manner after considering the factors associated with their WTP. Meanwhile, related policies and privacy protection systems should be continuously improved.

## AUTHOR CONTRIBUTIONS

Fan Lyu, Guang Zhang, and Peng Xu conceived this study. Jingkun Hu conducted the research, analyzed the data, and drafted the manuscript. Houlin Tang, Jie Xu, Decai Zhao, Yang Hao, and Xinlun Wang helped interpret the results and made revisions. Wenting Kang and Shuyu Wang participated in data collection and analysis, and critically read the manuscript. All authors contributed to manuscript preparation and read and approved the final manuscript.

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## CONFLICT OF INTEREST

The authors declare no conflicts of the interest related to this study.

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