

TESTS UNDER THE MICROSCOPE

Community monitoring on the availability of viral load and drug resistance testing in the Republic of Kyrgyzstan and the Republic of Belarus in 2023.



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Disclaimer

The main purpose of this document is to support the efforts of governmental authorities in Eastern Europe and Central Asia in the fight against the HIV epidemic.

The authors of this report are not responsible for the use and interpretation of the data, conclusions and recommendations presented herein by third parties.

The conclusions and recommendations in this report reflect the views of the authors, which may not necessarily reflect the views of other stakeholders.

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List of acronyms

AIDS	Acquired Immunodeficiency Syndrome
ART/ARVT	Antiretroviral therapy
ARV	Antiretroviral
AHD	Advanced HIV Disease
CI	Confidence interval
DR	Drug resistance
DRV	Darunavir
DRV/r	Darunavir/ritonavir
DTG	Dolutegravir
EECA	Eastern Europe and Central Asia
EFV	Efavirenz
HIV	Human Immunodeficiency Virus
INI	Integrase inhibitor
ITPC	International Treatment Preparedness Coalition
LPV/r	Lopinavir/ritonavir
NNRTI	Non-nucleoside reverse transcriptase inhibitor
NPV	Nevirapine
NRTI	Nucleoside reverse transcriptase inhibitor
PI	Protease inhibitor
PLHIV	People living with HIV
RF	Russian Federation
RMC	Regular medical check-up
RTV	Ritonavir
VED	List of Vital and Essential Drugs
VL	Viral load
WHO	World Health Organization

Objectives and aims

The **goal** of this survey was to assess the availability of viral load (VL) and drug resistance (DR) testing in Belarus and Kyrgyzstan, identify barriers limiting access to testing and test results, assess the level of patients' knowledge about their tests, understanding of the idea and necessity of testing, and how to monitor the effectiveness of ARV therapy.

Aims:

To achieve the above objectives, the survey focused on the following assessment areas:

1. Regulatory framework for the procurement and use of HIV drug resistance tests;
2. Mechanism of procurement of HIV drug resistance tests;
3. The level of awareness among PLHIV about the effectiveness of ARVT and diagnostics of effectiveness, as well as to assess the availability of viral load and drug resistance testing;
4. Implementation of national recommendations on viral load and drug resistance testing.

Methodology

There is a brief version of methodology, detailed methodology is attached as Appendix 1.

The surveys were conducted in two countries, Kyrgyzstan, and Belarus, with the methodological support of ITPC EECA and ITPC Global.

Data collection methods

1. Desk review of the regulatory framework and procurement of DR tests in partner countries;
2. Survey (interviews) of people living with HIV (300 people per country) using a structured questionnaire; due to the specifics of the work in each country, the questionnaires could slightly differ from each other in some wording. Original questionnaire is available in [Russian](#) and [English](#).
3. In-depth interviews with healthcare professionals working with PLHIV (3 staff in each city: 1 doctor, 1 administrative staff member and 1 laboratory staff member). A guide for conducting interviews with medical staff is available in [Russian](#).

Enrollment criteria

- People living with HIV;
- Age: 18 years and older;
- Surveyed cities in Belarus: Minsk, Svetlogorsk, Pinsk;
- Surveyed cities in Kyrgyzstan: Bishkek, Chui region and Jalal-Abad region.

Sample size in countries

In Belarus, a total of **301** interviews were conducted in three regions:

Table 1. Number of respondents from the total number of PLHIV by cities, Belarus

	Total PLHIV	Respondents	Percentage of all PLHIV in the region
Minsk	5000	150	3%
Svetlogorsk	2500	99	4%
Pinsk	800	52	6%

In Kyrgyzstan, a total of **302** interviews were conducted in three regions:

Table 2. Number of respondents from the total number of PLHIV by cities, Kyrgyzstan

	Total PLHIV	Respondents	Percentage of all PLHIV in the region
Bishkek	2892	99	3%
Chui region*	3121	102	3%
Jalal-Abad	1315	101	8%

*Excluding Bishkek

Data confidentiality and uniqueness

The participation in the survey was on a voluntary basis. All participants gave their informed consent, which they could withdraw at any time. No personal data of the respondents were entered into the questionnaire.

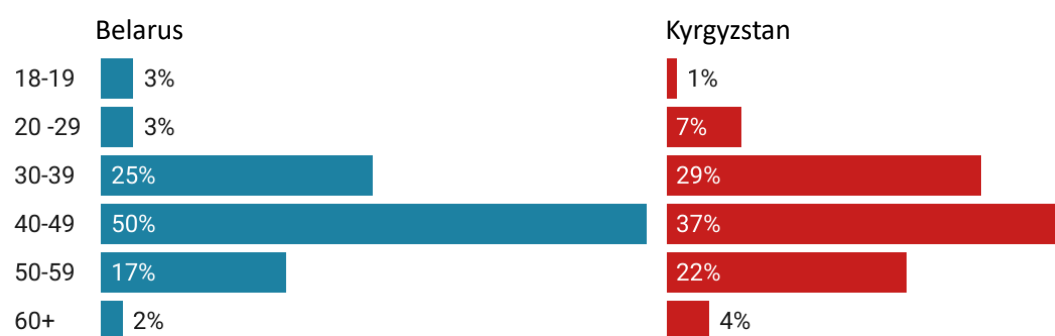
Statistical processing of the obtained results was conducted on a personal computer with the help of SPSS 26.0 and Excel software using standard statistical methods of information processing.

Profile of respondents

In Belarus, a total number of respondents is 301, in Kyrgyzstan is 302.

The average age of respondents in both countries is 42–43 years. The age distribution of participants between the countries is similar, i.e., over two thirds of participants in both Kyrgyzstan and Belarus are in the group of 30–49 years old.

How old are you?



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Figure 1. Age of respondents by country

The gender distribution also roughly coincides and is 50/50: in Belarus, 56% of men and 44% of women; in Kyrgyzstan, 51% of men and 49% of women.

Gender of respondents



Figure 2. Gender of respondents by country

The average period of living with diagnosed HIV infection is 6 years in Kyrgyzstan and 8 years in Belarus, i.e., there are more “experienced” respondents in Belarus.



Figure 3. Years living with HIV (since diagnosis) by country

Almost all respondents are now receiving ARV therapy (97% in Belarus, 99% in Kyrgyzstan). The average duration of therapy taking is 6–7 years in both countries.

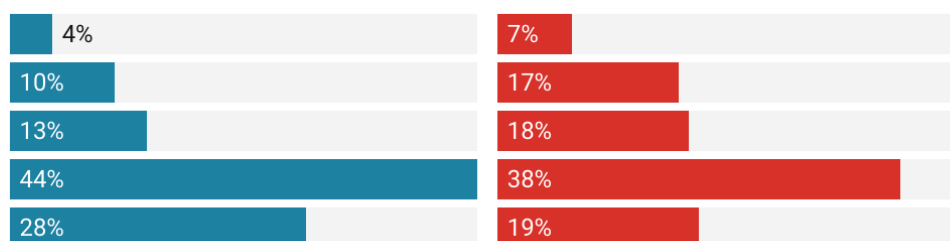


Figure 4. Years on ARV therapy by country

Summary

1. According to the survey results, Belarus and Kyrgyzstan have high coverage of VL testing. About 95% of all PLHIV in both countries (94% in Belarus, 96% in Kyrgyzstan) were tested at least once in 12 months. In both cases, this is in line with national protocols. This conclusion is also confirmed by a survey addressed to medical specialists.
2. Respondents in both countries demonstrated a relatively high level of knowledge about VL testing, i.e., more than two thirds of respondents understand that a VL test should be done to check whether ARV therapy is working (79% in Kyrgyzstan and 71% in Belarus). At the same time, the majority of respondents in both countries understand the results of VL tests (68% for Kyrgyzstan and 75% in Belarus).
3. In both countries the majority of respondents know (received) the results of their last VL test (89% in Belarus and 81% in Kyrgyzstan).
4. In Jalal-Abad (Kyrgyzstan), it is statistically significantly less common to receive and know their VL test results, and for a doctor to comment on their VL results, less frequently than in the other two survey regions (Bishkek and Chui region). In general, in Jalal-Abad, statistically fewer respondents know that there is drug-resistant HIV (5% vs 16% in other two regions). This region is distinguished by the fact that patients demonstrate lower awareness of testing and interpretation of results. In Belarus there is no statistically significant difference in answers between the cities where the survey was conducted: in all three cities patients' awareness of testing and interpretation of results, as well as access to HIV tests were the same.
5. One DR test is registered in Belarus (locally produced in Belarus). According to the monitoring of the regulatory framework and government procurement, about 1,000 DR tests are conducted annually, which covers the need, according to the requirements specified in clinical protocols.
6. The indications for HIV DR testing in Belarus in the national clinical protocol have been expanded in accordance with the EACS recommendations (European AIDS Clinical Society). Thus, in Belarus DR testing is strongly recommended when switching to a third-line regimen after virological treatment failure on both DTG and DRV/r regimens, while the protocol also provides for pre-treatment testing of newly diagnosed HIV-positive pregnant women; perinatally infected children; in case of infection against the background of receiving PrEP; and in case of probable infection from PLHIV with absence of viral suppression against the background of ART.
7. Belarus has started a large-scale transition to DTG regimens: by the end of 2023, 40% of regimens contained DTG, which may lead to a decrease in the number of indications for DR testing in the coming years.
8. There are no problems with access to DR tests in Belarus. Taking into account the protocols and rules of test prescribing, as well as the mass transition to DTG, the need for DR tests corresponds to the supply of tests, there are probably no problems with access to tests. When taking the test, PLHIV receive information about the results, which is commented by the doctor.
9. Among the barriers to access to HIV DR testing in Belarus may be unequal awareness and experience of prescribing tests by infectious disease doctors in few regions of the country, as well as technical problems, i.e., conducting HIV DR tests by the only existing laboratory in the country.
10. There are no DR tests registered in Kyrgyzstan, and no separate funding for procurement of tests is provided. The tests are provided within the framework of a research and humanitarian project with an international partner (Russia). On average, 200–300 tests are provided free of charge per year.
11. In 2022, DR tests were not delivered to the country by the partner due to logistical problems, therefore no DR testing was conducted in Kyrgyzstan in 2022. In addition, there is no national funding for maintenance of DR testing equipment (sequencer). In case the equipment is not

working, biological samples are sent to Russia, which puts an additional burden on the budget in the form of logistics costs and on the timeframe for obtaining results.

12. In Kyrgyzstan, there is no clearly described procedure for prescribing and conducting DR tests. Recommendations and indications for testing are described in several documents, but testing is not specified as a mandatory examination, and it is recommended to test “if necessary”. Thus, the test can be prescribed both when taking therapy and in case of virological failure. According to the survey data in Kyrgyzstan, out of 70 people who started receiving therapy in the last 2 years, no one received a DR test.
13. In Kyrgyzstan, in the absence of testing in 2022, there were no reports of test failures from PLHIV themselves, which emphasizes that patients are not sufficiently informed about DR diagnosis.
14. In Kyrgyzstan, more than 95% of regimens include DTG, which may also suggest a reduced interest in DR testing among the decision makers, as well as a reduced number of indications for DR testing.
15. In both countries, awareness and understanding of the DR test among PLHIV are very low. If about a quarter of respondents have heard something about the test (28% in Belarus and 21% in Kyrgyzstan), the number of those who know and understand what the test is for is much smaller (14% in Kyrgyzstan and 9% in Belarus). At the same time, more than a half of respondents in Belarus (54%) realize that therapy may stop working in principle, while in Kyrgyzstan it is 20% of respondents. Overall, this points to the need for additional patient education in both countries as well as the low awareness of patients about DR.

Background

Kyrgyzstan

The estimated number of PLHIV in the country for 2022 was about 10,000. Of this number, 83% were diagnosed, 69% of those diagnosed were on ART, and 90% of PLHIV on treatment had viral suppression. HIV prevalence was 170 per 100,000 population as of December 31, 2022. The provision of antiretroviral drugs for PLHIV in the Republic of Kyrgyzstan was started in 2005.

Until 2016, there was virtually no research on DR in Kyrgyzstan, with a lack of laboratory capacity for routine monitoring of DR.

In 2017, with the support of the Russian Federal State Agency for Health and Consumer Rights (Rospotrebnadzor), a study on resistance was conducted in several regions of the country, showing that in the Chui-Bishkek region DR to the applied regimens was 16.5%, and in the Osh region it was 45%. The resistance was primarily to NNRTIs and NRTIs.

Another [study](#) conducted around the same time showed very low adherence to therapy (22%).

Sequencing equipment (1 unit) was provided to the Republican AIDS Center of Kyrgyzstan for research and humanitarian purposes under an international agreement between the Ministry of Healthcare of Kyrgyzstan and Rospotrebnadzor of the Russian Federation, and DR tests are supplied free of charge annually until 2024 inclusive (400 tests in 2021 and 150 tests in 2022). The sequencer is located in Bishkek in the laboratory of the Republican Center for the Control of Hemocontact Viral Hepatitis and HIV, so resistance testing is conducted only in one center (all biological samples from other regions are sent to Bishkek), which imposes additional financial costs and time for conducting tests. In addition, the state budget does not provide funds for both maintenance of DR testing equipment and procurement of tests. In case of malfunctioning equipment, biological samples for determining DR are sent to Russia, which further increases the money and time spent for obtaining results. In the case of malfunctioning

equipment, as described above, samples may be sent to Russia and it may take up to 3 months to obtain results.

The annual supply of tests from Russia can also be done with interruptions. For example, in 2022, the tests were not delivered until the end of the year, which limited access to testing for patients during 2022.

In addition to technical problems, there is also no clearly described procedure for prescribing and conducting DR tests in Kyrgyzstan. Both the [Clinical Recommendations on HIV Treatment](#) and the [Guidelines on HIV Laboratory Diagnostics](#) (at the start of treatment or in case of ineffective treatment) mention the possibility of testing and the conditions of prescription, but testing is not specified as a mandatory test, and it is recommended to test “if necessary”. Thus, although resistance testing is formally referred to in the legal documents, such reference does not create conditions for its mandatory performance.

According to official documents, the test can be prescribed both at the time of initiation of therapy and in case of virological failure, but, as described above, there is no clear order of prescription, which makes it unclear how mandatory the test is.

At the end of 2022, more than 90% of PLHIV on ART were taking regimens with dolutegravir, which has a high resistance profile. There is likely to be a lack of high interest in expanding DR testing capacity because of this.

Parameter	Cost of the test
Average cost of HIV DR test (excluding indirect costs)	Free of charge, under agreement with Russia (for research and humanitarian purposes)

Parameter	Pcs.
Number of HIV DR tests procured by the government (annually)	0
Number of HIV DR tests provided free of charge under an agreement with a foreign partner (Russia)	200–300

Belarus

As of 1 January 2023, 24,328 HIV-positive people were registered for HIV care. The prevalence rate for the registered cases was 0.26% (262.8 per 100,000 population). The estimated prevalence of HIV infection since 2020 is 28,000 people. ART coverage was 90.4% (19,953 people). The number of PLHIV with undetectable VL on ART is 17,145 people, or 61.2% of the estimated number of PLHIV or 80.7% of those receiving ART.

In 2022, there was a broad transition to DTG-based first-line regimens (12.8% of regimens), almost two-thirds of PLHIV (63.4%)¹ continued to receive first-line regimens with EFV, and one in five (21.3%) received regimens with PI (LPV/r, much less frequently with DRV+RTV). Almost two thirds of PLHIV (63.4%) received regimens with NNRTI class drugs, i.e., EFV and NVP. The prevalence of resistance to ART in Belarus is high (13.9%), primarily to NNRTI class drugs, i.e., EFV and NVP, (11.4%). The high prevalence of resistance to

¹ N.V. Goloborodko, I.E. Statkevich, S.S. Losev, A.A. Atamanchuk, O.A. Fedchenko. Access to HIV and Hepatitis C treatment in Belarus 2022-2023: analytical report. Positive Movement Public Association: Minsk, 2023. – 100 p.

NNRTIs is an important argument for maintaining access resistance to DTG-based first-line regimens and requires the continuation of further country studies of HIV resistance to ARVs.

Prescription of DR testing is described in the clinical guidelines, where resistance testing is strongly required when switching to a third-line regimen after virological failure of treatment on both DTG and DRV/r (which belong to INI and PI/b classes with the highest resistance threshold), in children under 3 years of age after being on either DTG or DRV/r (or ATV/b or LPV/r). The protocol also provides for expanded testing criteria: prior to treatment of newly diagnosed HIV-positive pregnant women, perinatally HIV-infected children, in case of infection on PrEP and in case of probable infection from PLHIV with absence of viral suppression on ART. When choosing a regimen, preference is given to ARVs with a high genetic barrier to resistance (INI or PI classes), resistance to which is not widespread in Belarus (unlike NNRTI class ARVs).

There are no publicly available data on who actually received HIV DR tests and for what indications. It is likely that most tests were performed due to the development of ineffectiveness of second- and subsequent-line treatment regimens. HIV DR testing prior to treatment initiation is likely to be more limited: thus, over the three years of Belarus' participation in the regional (for EECA countries) REZEDA study (2017–2019), data received from less than two hundred patients were analyzed in total.

Given the relatively recent mass transition to DTG-containing first-line ART regimens (by the end of 2023, 40% of regimens contained DTG, and the transition process is ongoing), as well as the high genetic barrier to DTG, the use of guideline-based transition to second- and third-line regimens (which is regulated by the Clinical Guidelines 2022) may lead to a decrease in the number of HIV resistance test indications in the coming years.

At the time of drafting this report, one HIV resistance test system (Bel HIV-1-resistance-genotype), locally produced, is registered in Belarus. The tests are procured at the expense of the state budget, about 1,000 tests are procured annually, according to the plan. According to the protocols for prescribing DR tests, this volume probably covers the need (approximately 4%, i.e., every 25th PLHIV register for HIV care has a theoretical possibility of having an HIV DR test during the year).

According to the study, infectious disease doctors in regions of the country may have uneven awareness and experience in prescribing HIV DR tests.

HIV DR tests in Belarus are performed by a single laboratory (the Laboratory of Diagnostics of HIV and Related Infections of the Republican Scientific and Practical Center of Epidemiology and Microbiology, which has the functions of a reference laboratory), which has no formally defined obligations to perform HIV DR tests at the request of a clinician.

Parameter	Cost of the test in 2023 (plan)
Average cost of HIV DR test (excluding indirect costs)	50.08\$

Parameter	Pcs.
Number of HIV DR tests procured by the government (annually)	1056

Detailed findings

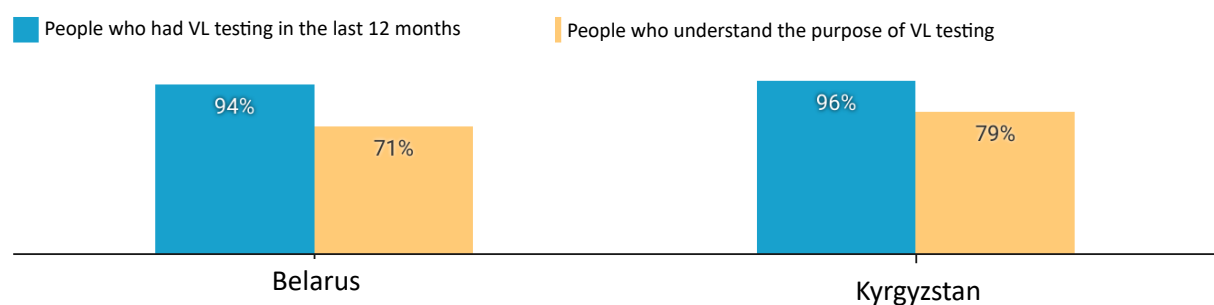
VL test: availability

The coverage of VL testing is quite high in both countries. Thus, in the last 12 months, almost all PLHIV (96% in Kyrgyzstan and 94% in Belarus) had this test. In both cases, it is in line with national recommendations (protocols).

Parameter	Belarus	Kyrgyzstan
PLHIV tested for VL in the last 12 months	94% (95% CI: 92–97%)	96% (95% CI: 94–99%)
Base	301	302

Both countries are characterized by the absence of difficulties in passing the VL test, no more than 6% of respondents reported difficulties, mostly related to blood collection due to poor vein quality of the respondents.

Access to VL testing and understanding the purpose of this testing



**WHAT TEST SHOULD BE TAKEN TO CHECK THAT ARV THERAPY IS WORKING? (answer: The VL test).*

Figure 5. People tested for VL (of all respondents) and people understanding why a VL test should be performed (of all PLHIV). For Belarus the total number of respondents for questions: 301 and 261, For Kyrgyzstan: 302 and 247.

In-depth interviews with medical staff in both countries confirmed high testing coverage and a well-established process for testing.

VL test: understanding the purpose

Most PLHIV in both Belarus and Kyrgyzstan understand that the VL test is to check how ARV therapy works. At the same time, more respondents in Kyrgyzstan understand the purpose of the test (rationale for the test) than in Belarus (statistically significant differences). However, it is important to note that not everyone understands it, and about a quarter of respondents need additional education.

Parameter	Belarus	Kyrgyzstan
PLHIV who know and understand the meaning of VL testing (see how well treatment is working)*	71% (95% CI: 66–76%)	79% (95% CI: 75–84%)
Base	261	247

**WHAT TEST SHOULD BE TAKEN TO CHECK THAT ARV THERAPY IS WORKING? (answer: The VL test).*

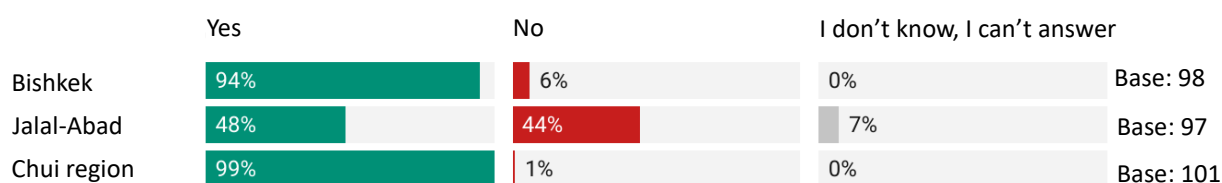
VL test: knowing the VL results

Parameter	Belarus	Kyrgyzstan
PLHIV who know the results of their last VL testing	89% (95% CI: 86–93%)	80% (95% CI: 76–85%)
Base	289	296

In both countries, most PLHIV of those tested for VL know the result of their test. Almost 90% in Belarus and 80% in Kyrgyzstan. That is, there is practically no problem with PLHIV not knowing their results in both countries. The main reason for people not knowing their test results in Belarus (11% of those who do not know) is not remembering their results (74% of those who do not know). In Kyrgyzstan (20% of those who do not know), 40% do not remember, 55% did not receive the results. At the same time, for Kyrgyzstan such a situation, when people did not receive their testing results, is characteristic mainly for one region, namely Jalal-Abad. While in Belarus there are practically no statistically significant differences in respondents' answers between cities, in Kyrgyzstan the situation is different. People in Jalal-Abad are statistically significantly less likely to receive and know their VL test results.

Did you receive the results of your last VL testing?

Kyrgyzstan



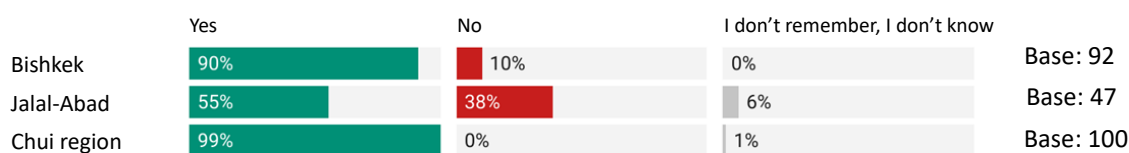
People in Jalal-Abad are statistically significantly less likely to receive and know their VL test results than in Bishkek and Chui region.

Figure 6. Responses to the question about whether respondents received the results of the last VL testing, by city, Kyrgyzstan

Also, in Jalal-Abad, doctors are less likely to comment on VL results than in Bishkek and Chui region.

Did the doctor or any other medical specialist explain the results of your last VL testing?*

* Those who received the results were asked this question



In Jalal-Abad doctors are statistically significantly less often comment VL test results than in Bishkek and Chui region

Figure 7. Responses to the question, whether the medical specialist commented on the results of the VL test to the respondent, by city, Kyrgyzstan

At the same time, if the doctor explained the result, the vast majority of respondents understood the doctor's comments (92% in Belarus and 99% in Kyrgyzstan).

The way of obtaining VL test results differs in the countries. Most often respondents in Belarus learn their results from a doctor (92%). In Kyrgyzstan, the picture is different: 41% of respondents learn the results from a doctor, 27% are told by an NGO employee and another 26% receive their results via a text message.

How did you receive your VL test results?

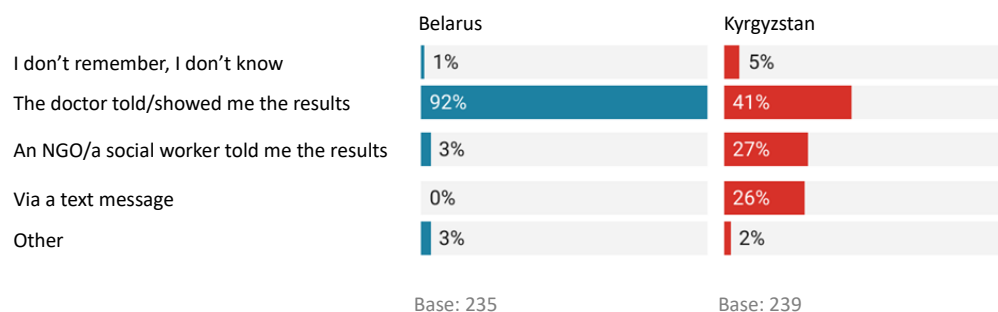


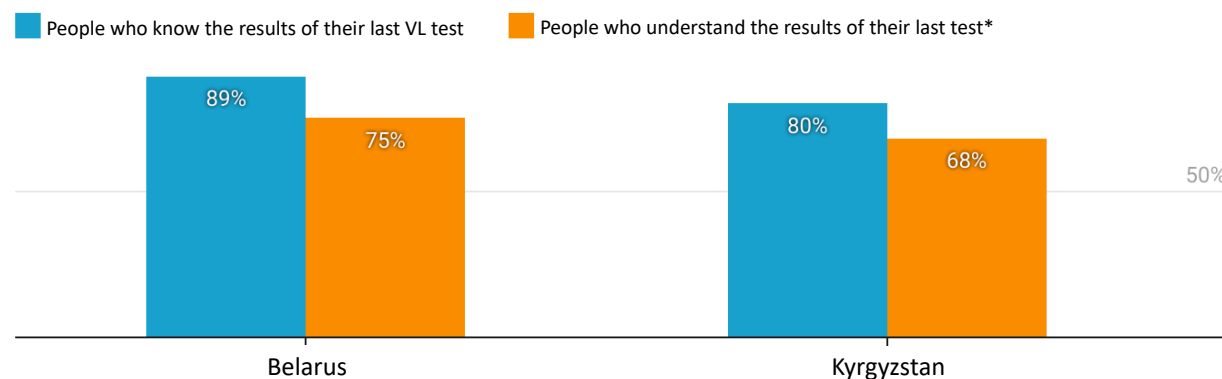
Figure 8. Way of receiving VL test results, by country

VL test: understanding the meaning (purpose)

Parameter	Kyrgyzstan	Belarus
PLHIV who understand their last VL test results (PLHIV were asked to explain how exactly they understand them)*	68% (95% CI: 62–74%)	75% (95% CI: 70–80%)
Base	238	258

*Please, explain (briefly): what do your VL test results mean? Those who understand the test results are asked this question. Using this response, answers are coded and number of those who really understand is calculated.

Of those who responded that they understood the result of their last VL test only about a quarter actually do not. In both countries understanding level is about the same (68% and 75%).



*Open-type question: PLEASE, EXPLAIN WHAT YOUR LAST VL TEST RESULTS MEAN FROM THE POINT OF VIEW OF HEALTH (BRIEFLY). Those who understand their test results were asked this question. The answers were coded and analyzed.

Figure 9. Percentage of people who know their VL test results out of all those who took the test, and the percentage of people who understand their results out of all those who know and understand their results, by country

Of those who correctly understood their results, respondents in both countries described the undetectable load as having little virus in the blood, being healthy, “n=n”. Of those who incorrectly understood their results, the common answers are «don’t understand».

DR tests: understanding the meaning (purpose)

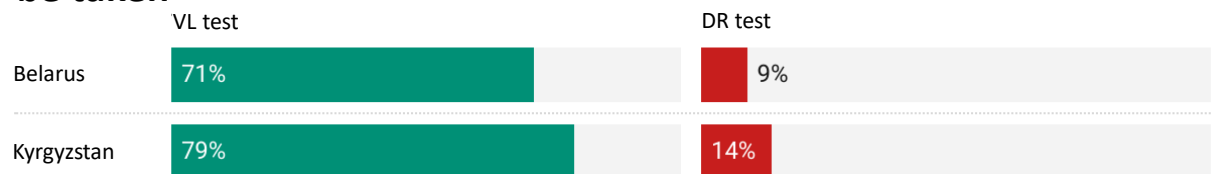
In both countries, knowledge about the DR test and understanding of the meaning of the test (rationale for the test) among PLHIV is very low, with no statistically significant differences between the countries.

Parameter	Kyrgyzstan	Belarus
PLHIV who know about HIV DR testing and understand its results*	14% (95% CI: 10–18%)	9% (95% CI: 6–13%)
Base	302	301

*WHAT TEST SHOULD BE TAKEN TO CHECK THAT ARV THERAPY ISN’T WORKING? (answer: The ARV therapy resistance test).

While about a quarter of respondents have heard something about the test (28% in Belarus and 21% in Kyrgyzstan), much fewer people know and understand what this test is for, i.e., 14% in Kyrgyzstan (95% CI: 10–18%) and 9% (95% CI: 6–13%) in Belarus. In comparison with the VL test, the difference is enormous: while almost all respondents know and understand the idea of the VL test, only a few respondents know and understand the purpose of the DR test.

People who know about the DR test and understand why it should be taken

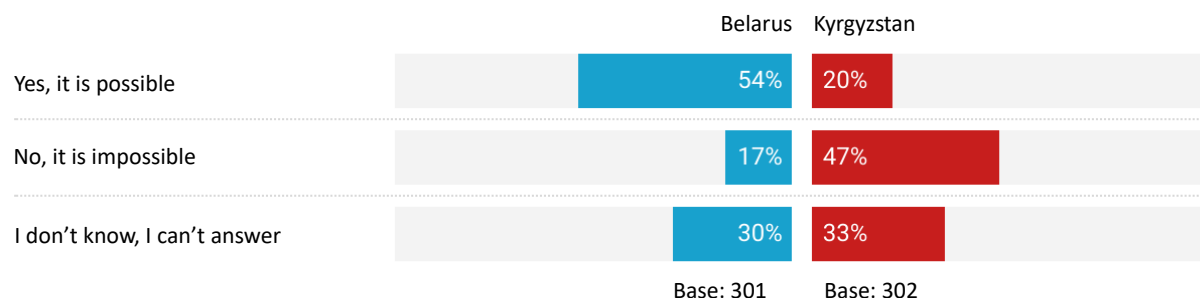


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Figure 10. Percentage of respondents who know and understand why they need to have a VL and DR test (of all respondents)

At the same time, many more respondents in Belarus realize that ARV therapy may stop working (54%) than in Kyrgyzstan (20%), although awareness is very low in both countries. The main reasons why therapy may stop working, “irregular use” or “interruption of therapy”, and “body adaptation” are mentioned in both countries. That is, among those who realize that ART might stop working, they correctly understand the reasons for this.

Do you think it is possible that ARV therapy that is taken for HIV treatment can stop working?



In Belarus, significantly more respondents realize that ARV therapy might stop working than in Kyrgyzstan. At the same time, awareness in both countries is low. ^B

Figure 11. Respondents' answers to the question about the possibility of situation when ARV therapy stops working (percentage of all respondents)

All respondents were also asked whether “it is possible to be infected immediately with HIV” that will be immune to therapy. This also reflects the low awareness of PLHIV about this situation (only 22% in Belarus and 12% in Kyrgyzstan said that it is possible to be infected with such HIV virus). At the same time, there is also a statistical difference in the answers between the countries (in Belarus more respondents are aware of it than in Kyrgyzstan).

Do you think it is possible to be infected with a drug-resistant HIV virus, i.e., one that is immune to certain ARV drugs?

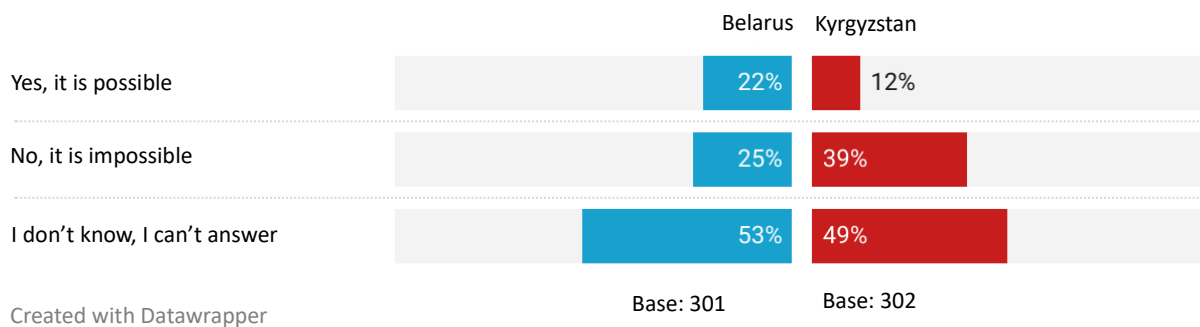


Figure 12. Respondents' answers to the question about the possibility of being infected with drug-resistant HIV (percentage of all respondents)

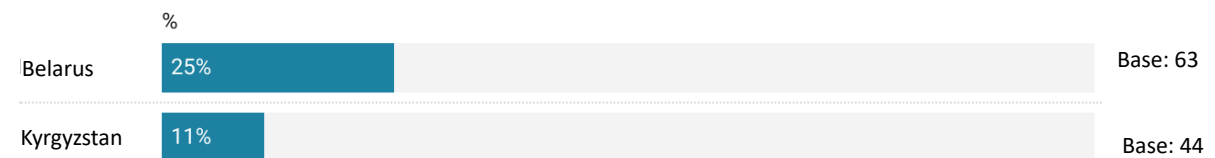
DR tests: availability

Parameter	Kyrgyzstan	Belarus
% of PLHIV tested for HIV DR out of those who experienced virologic failure*	11% (95% CI: 0–26%)	25% (95% CI: 15–37%)
Base:	44	63

* of those who had a regimen change due to a VL test + those who had a DR test for other reasons. This does not mean that protocols say that the test should have been done. Each country has its own rules for prescribing a DR test (described below in the relevant country sections). *The absolute values are very small, and therefore a large variation in confidence intervals is recorded.*

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Confidence interval (CI). Belarus: 25% (95% CI: 15–37%). Kyrgyzstan: 11% (95% CI: 0–26%)
 The absolute values are very small, and therefore a large variation in confidence intervals is recorded.

Figure 13. Percentage of respondents tested for resistance of those who had a regimen change due to a VL test + those who had a DR test for other reasons. That does not mean that the testing should have been done according to protocols. Each country has its own rules for prescribing a DR test.

Belarus: out of all PLHIV who participated in the survey, 5% had a DR test. Having an DR test when changing regimens based on VL test results is 25% of all “eligible” respondents (95% CI: 15–37%). A resistance test is required when switching to a third-line regimen after virologic treatment failure on both DTG and DRV/r regimens (belonging to INI and PI/b classes with the highest resistance threshold) and switching to DTG regimens has only begun relatively recently. Therefore, it is likely that the need for resistance tests is consistent with the supply (the answers of medical specialists confirmed this assumption). According to in-depth interviews with doctors, the percentage of those who are tested and change their regimens based on the test is small (e.g., 2.5% of all those on DTG in Minsk), but this is consistent with the recommendation to test the transition to second-line regimens, and partially to third-line regimens.

Kyrgyzstan: out of all PLHIV who participated in the survey, 2% had a resistance test. Having an ARV resistance test when changing regimens based on VL test results is 11% of all “eligible” respondents (95% CI: 0–26%).

As described above, current protocols and recommendations in Kyrgyzstan do not provide a precise, clear, and mandatory algorithm for DR testing. In in-depth interviews, medical specialists spoke about the need for testing when therapy is ineffective due to lack of patient adherence.

According to official data, no tests were performed in 2022 due to disruptions in the supply of tests, although about 600 PLHIV were taken on ART. According to the survey, about 70 PLHIV from the respondents were taken on therapy in the last 2 years, and none of them received a resistance test. In addition, 39 respondents stated that their therapy was switched because of a VL test, but only 4 of them had a resistance test. However, there were no reports of test interruptions from PLHIV themselves, further emphasizing that patients are not well informed about DR diagnosis. According to the in-depth interview, one of the doctors indicated the reason for conducting was ART ineffectiveness (increased or unsuppressed VL). However, when assessing the situation with DR testing in Kyrgyzstan, it is important to consider that more than 95% of regimens include DTG.

DR testing: clarity of results

According to the survey results, the number of people who actually had DR testing is very small, especially in Kyrgyzstan, which limits the interpretation and assessment of a number of parameters (clarity of results, doctors’ explanations, receiving the results) in percentages.

Thus, in Belarus, 13 out of 16 people received their results, of whom the results were explained to 11. Judging by the answers in Belarus, if a person was prescribed a resistance test, he/she is likely to know the reasons why it was prescribed, he/she will receive the results and doctors' comments, i.e., there will be no difficulties with the test.

In Kyrgyzstan, 3 out of 5 received both the results and doctors' explanations, i.e., the majority did not have any difficulties.

Recommendations

1. **Belarus and Kyrgyzstan:** the responsible agencies in the countries, in collaboration with NGOs, are recommended to conduct a comprehensive national assessment of patients' awareness of their test results and provide training for staff to inform patients about laboratory diagnostic results. Special attention is recommended for the Jalal-Abad region (Kyrgyzstan) due to low awareness of VL in the region and limited access to their results.
2. **Belarus and Kyrgyzstan:** local NGOs are recommended to conduct awareness-raising activities for the patient community to increase knowledge about the importance of ART effectiveness and DR to certain drugs, causes of resistance, and resistance diagnosis.
3. **Belarus and Kyrgyzstan:** donors are recommended to provide support for regular community-led monitoring of DR situation in countries.
4. **Belarus and Kyrgyzstan:** responsible agencies are recommended to ensure regular publication of open data on DR in the countries: to which drugs, to whom the tests were conducted, including for assessment of compliance with equal and uniform access to testing in individual regions.
5. **Kyrgyzstan: The Ministry of Healthcare of the Republic of Kyrgyzstan** is recommended to revise the current clinical guidelines in order to develop a transparent and unambiguous procedure for prescribing DR tests;
6. **Kyrgyzstan:** as the current model for the provision of resistance tests is not sustainable, the Ministry of Healthcare of the Republic of Kyrgyzstan and other stakeholders need to undertake a detailed assessment of the resources required for a continuous supply of resistance tests in the country, utilizing national or international funding.
7. **WHO and relevant government agencies** should work to improve guidelines for the use of resistance tests and monitor their implementation to ensure the consistent and effective use. Particular attention should be paid to the low coverage of DR testing in the EECA region, acknowledging the unique challenges posed by the age of the epidemic. The critical issue of Advanced HIV Disease (AHD) must be prioritized. Specific actions could include:
 - i. Addressing the lack of attention people, who are living with HIV for many years and may face advanced disease progression.
 - ii. Strengthening diagnostic and treatment protocols for AHD, including early identification and management of opportunistic infections and co-morbidities common among long-term survivors.
 - iii. Ensuring access to tailored care and support for aging populations with HIV, which includes addressing both medical and psychosocial needs.

Appendix 1. Detailed methodology

The surveys were conducted in two countries, Kyrgyzstan, and Belarus, with the methodological support of ITPC EECA and ITPC Global.

Data collection methods

4. Desk review of the regulatory framework and procurement of drug resistance tests in partner countries;
5. Survey (interviews) of people living with HIV (300 people per country) using a structured questionnaire; due to the specifics of the work in each country, the questionnaires could slightly differ from each other in some wording. Original questionnaire is available in [Russian](#) and [English](#).
6. In-depth interviews with healthcare professionals working with PLHIV (3 staff in each city: 1 doctor, 1 administrative staff member and 1 laboratory staff member). A guide for conducting interviews with medical staff is available in [Russian](#).

People living with HIV were rewarded for participating in the survey:

- In Kyrgyzstan: food gift package worth \$3.4;
- In Belarus: grocery store chain gift certificates worth \$6.

Recruitment in Belarus. Questionnaires were conducted in healthcare facilities in three cities where people living with HIV undergo their medical check-ups, as well as in low-threshold points of the NGO-partner. Interviewers approached a visitor who came to a doctor or NGO to receive services and offered to answer questions. The participation was on a voluntary basis.

Recruitment in Kyrgyzstan. The list of respondents was formed by doctors based on enrollment criteria and additional recommendations for enrollment from the NGO partner (listed below). After the list of respondents was generated, interviewers called potential respondents and made arrangements for participation in the survey. The participation was on a voluntary basis.

Questionnaires in both countries were administered using tablets that the interviewers had with them, which excluded the subsequent manual entering the questionnaire data into the database: the data were immediately entered into a shared database when the questionnaire was filled out.

Questionnaires for the countries were programmed using [Anketolog](#) survey generation service.

Enrollment criteria

- People living with HIV;
- Age: 18 years and older;
- Surveyed cities in Belarus: Minsk, Svetlogorsk, Pinsk;
- Surveyed cities in Kyrgyzstan: Bishkek, Chui region and Jalal-Abad region.

In addition, in Kyrgyzstan, when selecting PLHIV to be invited to the survey, the survey was oriented to choose respondents who had a change of regimen, a large proportion of those who had taken ARV therapy for more than 12 months, an equal proportion of men and women, and a small proportion of respondents with definable VL.

Sample size in countries

In Belarus, a total of **301** interviews were conducted in three regions:

Table 3. Number of respondents from the total number of PLHIV by cities, Belarus

	Total PLHIV	Respondents	Percentage of all PLHIV in the region
Minsk	5000	150	3%
Svetlogorsk	2500	99	4%
Pinsk	800	52	6%

In Kyrgyzstan, a total of **302** interviews were conducted in three regions:

Table 4. Number of respondents from the total number of PLHIV by cities, Kyrgyzstan

	Total PLHIV	Respondents	Percentage of all PLHIV in the region
Bishkek	2892	99	3%
Chui region*	3121	102	3%
Jalal-Abad	1315	101	8%

*Excluding Bishkek

Data confidentiality and uniqueness

The participation in the survey was on a voluntary basis. All participants gave their informed consent, which they could withdraw at any time. No personal data of the respondents were entered into the questionnaire.

Data processing

Country data are presented in two formats, SPSS and Excel. The Excel file also includes coding of the open-type surveys. The response database in SPSS and Excel contain data in Russian, because the PLHIV questionnaire was conducted in Russian in both countries.

A code was assigned to the respondent to ensure uniqueness.

Respondent's code:

- **Interviewer's** initials: first letter of surname and first letter of first name;
- КИИВИЧ (KIIVICH), an unchanged set of letters, which means that the PLHIV key informant is being interviewed;
- The last 2 digits of the **respondent's** cell phone number.

When the respondent's code repeated, the date and time of the interview and the respondent's answers, including those to open-type questions, were reviewed separately. In case of doubts about the uniqueness of the interview, the questionnaire was deleted. During the initial data processing, 6 interviews were deleted from the Kyrgyzstan data set to exclude duplicate answers, and then 6 additional interviews were conducted.

Statistical processing of the obtained results was conducted on a personal computer with the help of SPSS 26.0 and Excel software using standard statistical methods of information processing.