

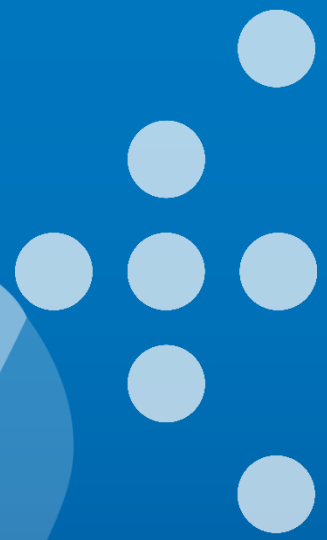
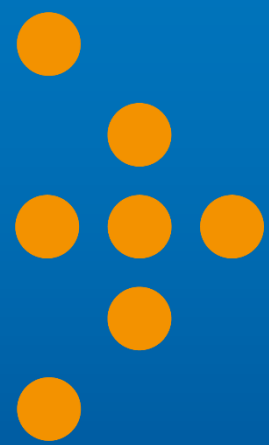
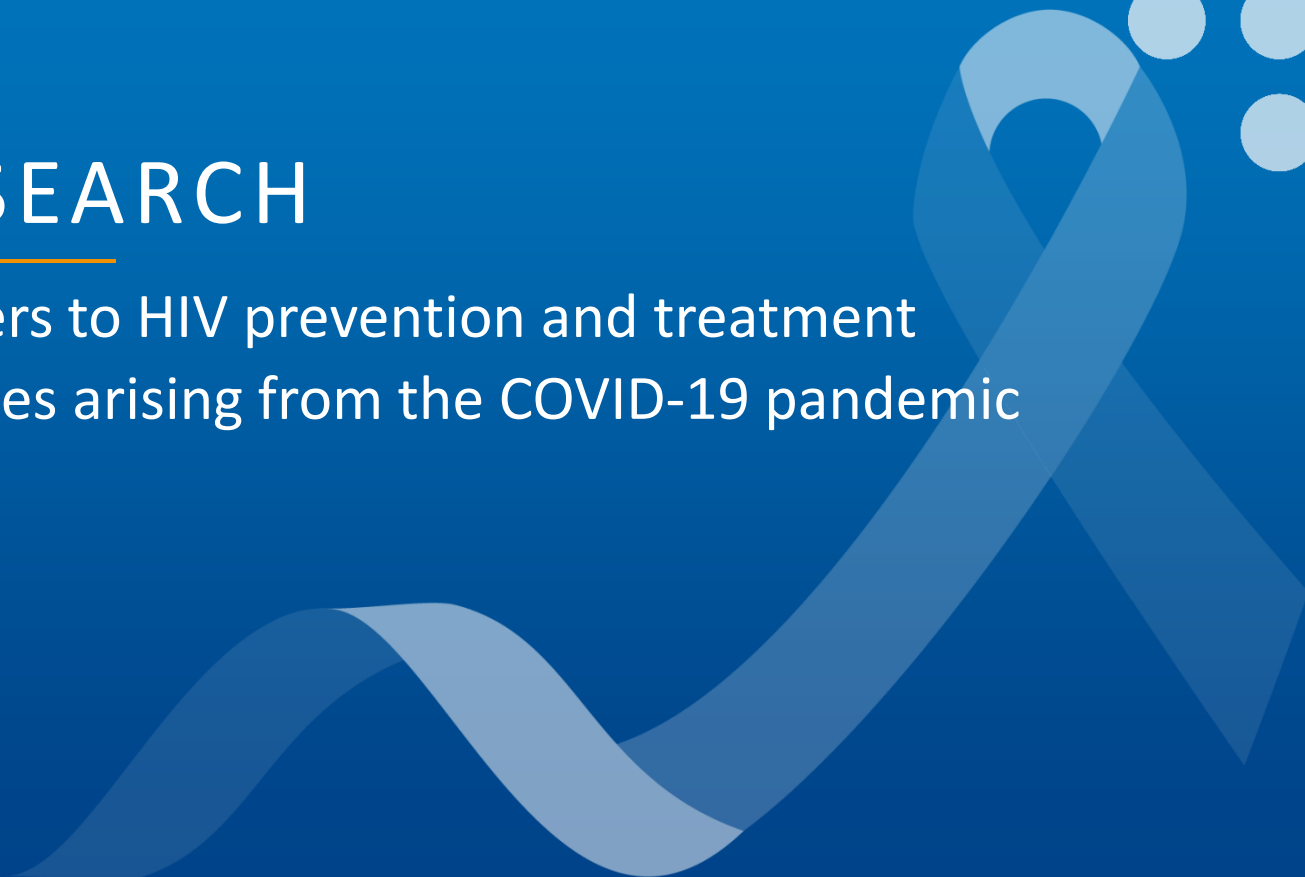


PUBLIC  
HEALTH  
CENTER

# RESEARCH

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Barriers to HIV prevention and treatment services arising from the COVID-19 pandemic







## Aim of the research

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the impact of the COVID-19 pandemic on access to HIV prevention and treatment services and their quality in selected regions in Ukraine.

## Research task:

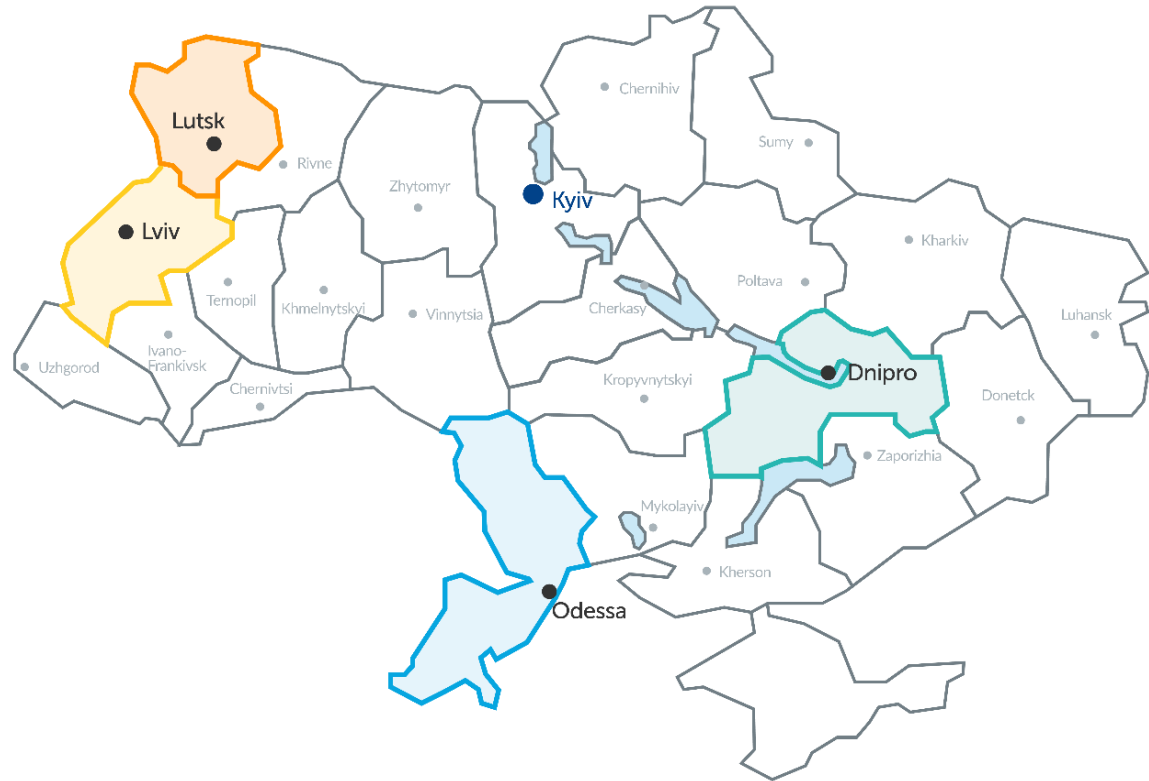
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-  To assess barriers to HIV services arising from the COVID-19 pandemic;
-  To compare the scope and types of HIV services provided before and during the COVID-19 pandemic;
-  To identify key factors influencing the availability, coverage and quality of HIV services;
-  To recommend solutions that should improve the availability of HIV services.

# Geography of the research:

Quantity of health care facilities:

- 7 City of Kyiv
- 8 Lviv region
- 9 Volyn region
- 10 Odessa region
- 12 Dnipropetrovsk region
- 46 TOTAL**



# Qualitative component of the research

Healthcare institutions

Cards patients

In each region of the survey, there are HCFs of the regional, district or city level

	Institutions that provide medical supervision for PLHIV		CPHC		Antenatal clinics		TOTAL	TOTAL	
Dnipropetrovsk region	5	545	6	80	1	6	12	631	
Odesa region	4	527	5	6	1	6	10	539	
City of Kyiv	2	248	3	0	2	12	7	260	
Lviv region	3	91	2	0	3	18	8	109	
Volyn region	3	22	3	21	3	18	9	61	
							<b>TOTAL</b>	<b>46</b>	<b>1600</b>

## **Analysis of quantitative data from patients' cards regarding the services received and from the cards on the provision of services in health care facilities for the period of 2019-2021**

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UNAIDS Fast Track strategy expresses the global consensus to achieve the goal of 95% of people living with HIV knowing their HIV status, 95% of people who know their status receiving treatment, and 95% of people who receive treatment having the undetectable viral load level so that their immune system remains strong, and they are no longer spreading the infection. This strategy also forms the basis of the National Strategy in the field of combating HIV, Tuberculosis and viral Hepatitis until 2030.

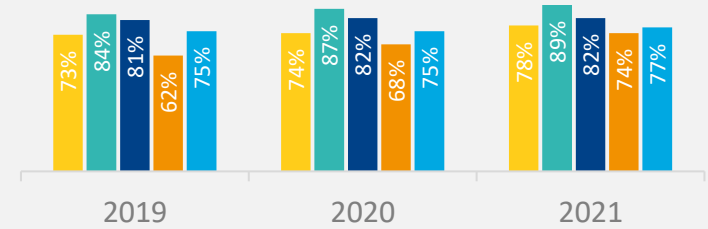
In our research, we tried to compare the data obtained from the health care facilities that participated in the research with the data of regional and national indicators of official statistics and target strategic indicators.

# Institutions providing medical supervision of PLHIV (“Trust” cabinets, ART sites, AIDS Centers)

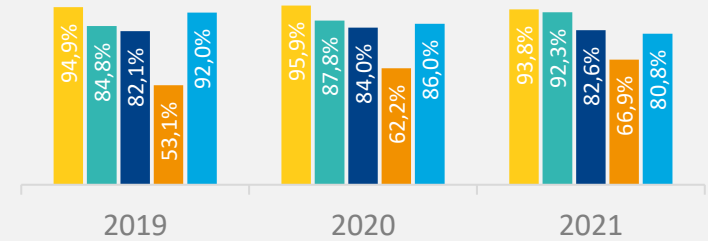
## ART coverage of people living with HIV

ART coverage of people living with HIV is the target indicator of the Fast Track strategy until 2030 and the National Strategy in the field of combating HIV, Tuberculosis and viral Hepatitis until 2030, which involves determining the percentage of people who know about their HIV status from the estimated number of people living with HIV. The strategic goal of the international and national program is to raise this indicator up to ≥ 95% until 2030.

### Aggregated official data in selected regions in 2019-2021



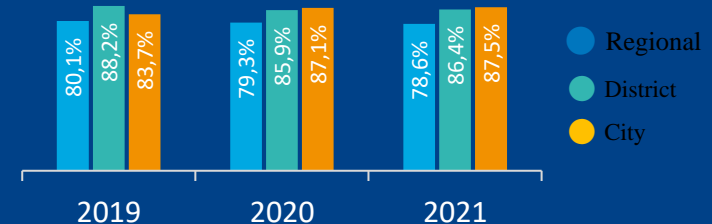
### Obtained results. Distribution by regions:



\* The ratio of this indicator between regions coincided quite precisely in Dnipropetrovsk region and city of Kyiv, but in other regions the maximum difference reached 21.9% (data on health care facilities of Volyn region in 2019 and 2020), which reflects the excellent performance of these health care facilities in comparison with regional and national indicators.

● Volyn reg. ● Dnipropetrovsk reg. ● Kyiv ● Lviv reg. ● Odesa reg.

### Obtained results. Distribution by levels of health care facilities:

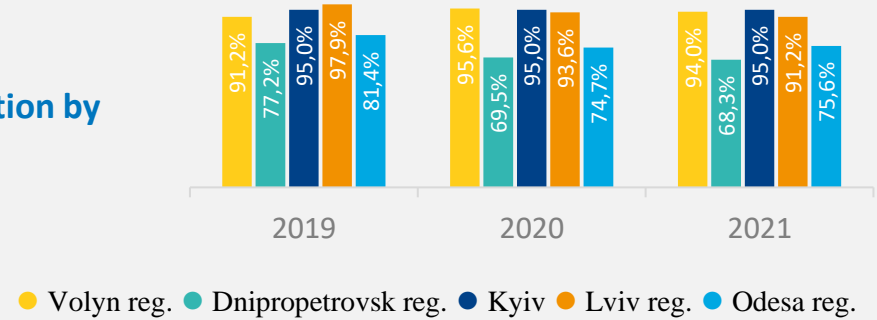


\* There was a decrease in ART coverage of people living with HIV in regional and district levels of health care facilities, which may have been caused by the COVID-19 pandemic, which was gaining momentum at that time. However, the city health care facilities that provided data for our research managed to improve this indicator in 2020 and maintain it in 2021.

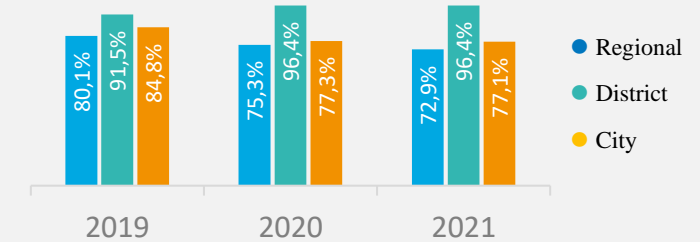
## Percentage of PLHIV who receive ART and have undetectable level of VL

This level of PLHIV who receive ART and have the undetectable level of viral load is facilitated by the fact that every year more and more PLHIV are registered at the earlier 1st and 2nd clinical stages of HIV infection. Thus, in 2021, according to the general information of health care facilities that participated in the research, the total number of patients who were registered in AIDS health care facilities at the 1st and 2nd clinical stages was 55.5%, that is, more than patients who were registered in AIDS health care facilities at the 3rd and 4th clinical stages.

**Distribution by regions:**

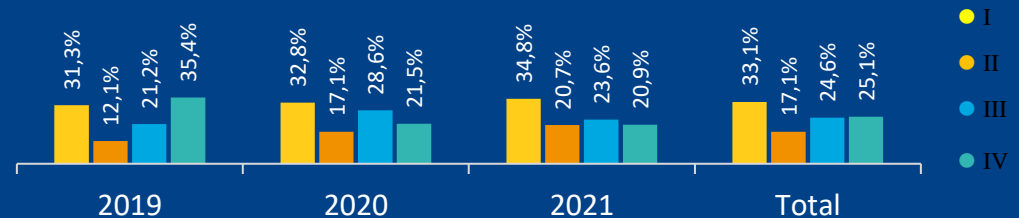


**Distribution by levels of health care facilities:**



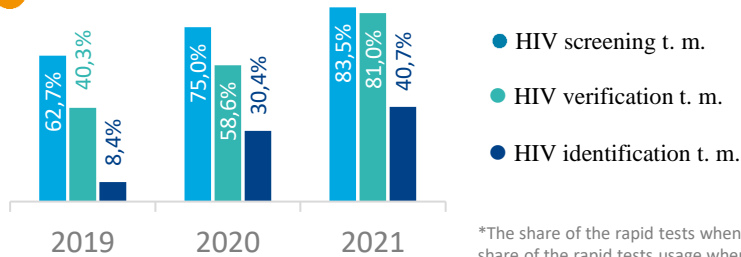
\* Only district-level health care facilities among all institutions that participated in the research were able to reach the  $\geq 95\%$  mark, namely 96.4% in 2020 and 2021. While this indicator was lower in 2019 at regional and city levels of health care facilities, and then further it significantly decreased in 2020.

## Clinical stage of HIV infection when the patient is registered at the AIDS health care facilities, participants of the research in 2019-2021



# Share of rapid tests

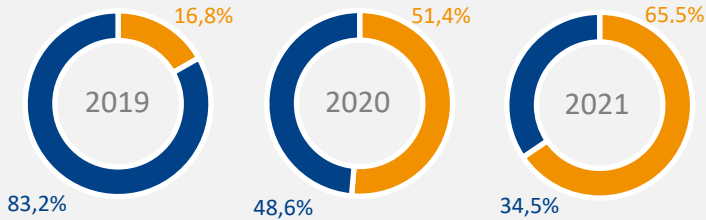
for screening, verification and identification HIV testing in AIDS health care facilities, participants of the research in 2019-2021



Share of rapid tests for HIV testing in AIDS health care facilities, participants of the research in 2019-2021

According to the data of AIDS health care facilities that participated in the research, for the period of 2019-2021, there were significant changes in the format of primary testing. In 2020, rapid tests have rapidly gained advantages over other testing methods.

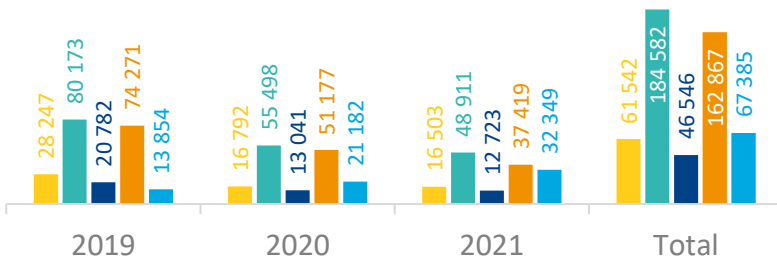
\*The share of the rapid tests when applying the HIV screening testing method in 2020 increased by 12.3% compared to the previous year, and by another 8.5% in 2021. Likewise, the share of the rapid tests usage when applying the HIV verification testing method has increased significantly. But the most rapid increase is in the share of the rapid tests usage when applying the method of identification testing for HIV in 2020, more than three times compared to 2019.



Redirection of PLHIV from non-governmental organizations to AIDS health care facilities, participants of the research in 2019-2021

The increase in the involvement of rapid tests in the process of primary testing coincides with the growth of the share of non-governmental organizations involvement in the process of primary identification of PLHIV.

● No ● Yes



Number of people who were tested for HIV in AIDS health care facilities, participants of the research in 2019-2021

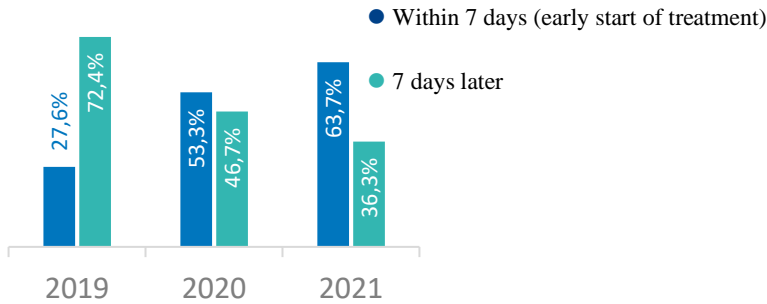
Number of people who were tested for HIV in AIDS health care facilities from the sample of our research in the Volyn, Dnipropetrovsk, Lviv regions and the city of Kyiv significantly decreased during the period of 2019-2021.

● Volyn reg. ● Dnipropetrovsk reg. ● Kyiv ● Lviv reg. ● Odesa reg.



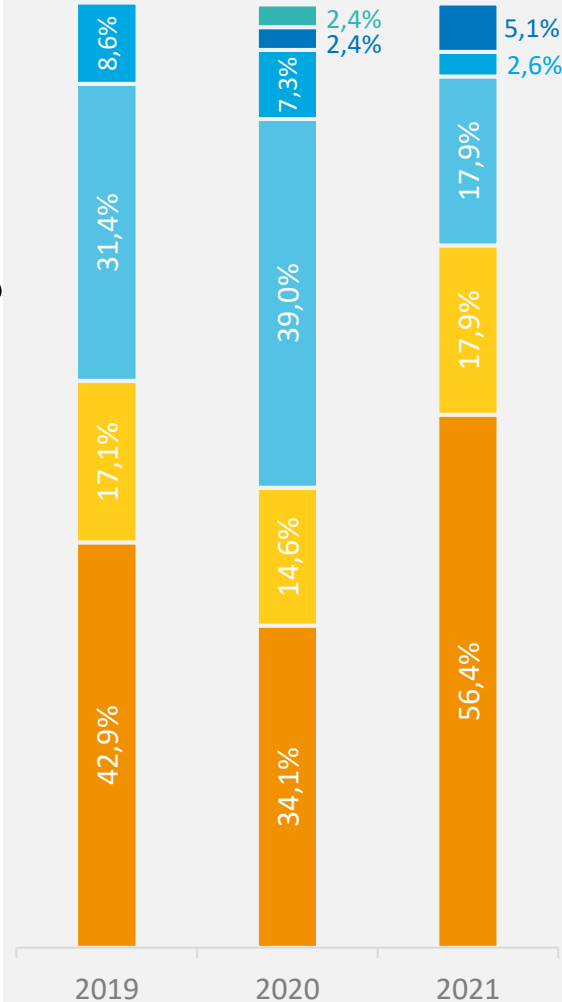
## Early start of ART

Start of ART in AIDS health care facilities, participants of the research in 2019-2021



This is the important indicator of the success in the fight against the HIV epidemic. Early start of ART is clinically feasible and economically sound both in countries with high and in countries with low and medium levels of economic resources.

In the generalized data of the general information received from the health care facilities that participated in the research (Table 12) the rate of early start of treatment is growing rapidly in 2020, and continues to increase in 2021.



Period for detection of HIV-positive status of pregnant patients in AIDS health care facilities, participants of the research in 2019-2021

- Before pregnancy
- Up to 12 weeks through
- From 13 to 24 weeks through
- 25 or more weeks
- In childbirth
- After childbirth

One of the components of PMTCT is HIV screening testing of pregnant women at the first visit of a pregnant woman for registration. [The recommended timely period for detection of HIV-positive status of pregnant patients](#) is the 12th week of pregnancy. The indicator of the timeliness of detection of HIV-positive status of pregnant patients decreased in 2020 but recovered and improved in 2021.

## Early start of ART

Timely conduct of HIV viral load research before childbirth

This examination is recommended to be made at 34-36 weeks of pregnancy. According to the data from the cards of the patients who were included in our sample, in 2021 only 8.3% of cases accounts for this period, but this happened because another 41.7% of research cases were recorded at the adjacent 33 and 37 weeks. Taking into account this fact, we cannot talk about dramatic differences in the dynamics of this indicator in 2019-2021 in AIDS health care facilities that participated in the research.

The period of pregnancy during which HIV viral load was tested before the childbirth for the patients at the AIDS health care facilities, participants of the research in 2019-2021

	2019	2020	2021
5	0,0%	0,0%	8,3%
16	0,0%	0,0%	8,3%
17	0,0%	4,3%	0,0%
25	0,0%	4,3%	0,0%
27	0,0%	4,3%	0,0%
29	0,0%	0,0%	8,3%
30	0,0%	8,7%	0,0%
31	6,3%	13,0%	8,3%
32	12,5%	8,7%	8,3%
33	0,0%	0,0%	25,0%
34	18,8%	17,4%	8,3%
35	0,0%	26,1%	0,0%
36	12,5%	8,7%	0,0%
37	6,3%	4,3%	16,7%
38	12,5%	0,0%	0,0%
39	25,0%	0,0%	8,3%
40	6,3%	0,0%	0,0%
	<b>31,3%</b>	<b>52,2%</b>	<b>8,3%</b>

WEEKS OF PREGNANCY

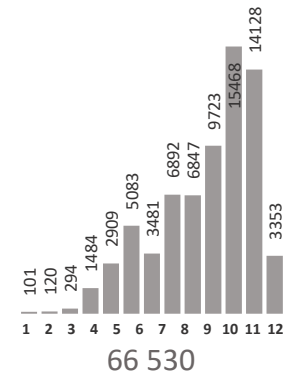
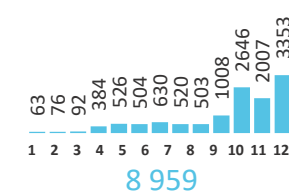
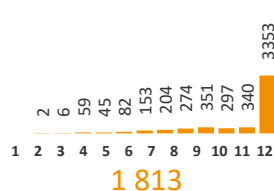
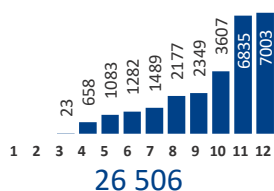
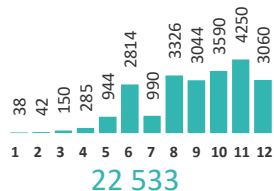
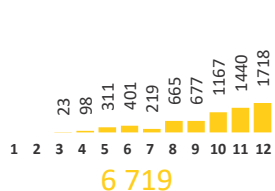
TIMELY  
(34-36 weeks  
of pregnancy)

# Institutions providing primary health care (CPHC)

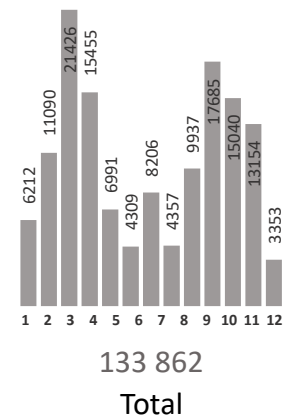
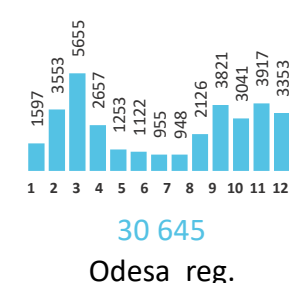
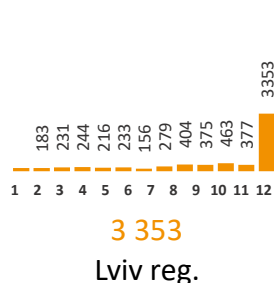
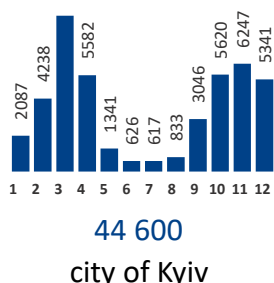
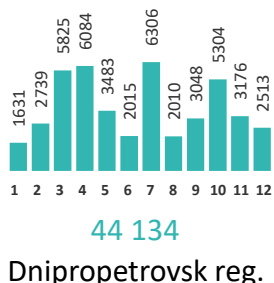
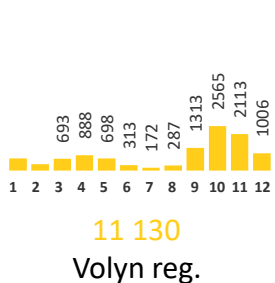
Number of people tested for COVID-19  
in the data of CPHP-participants of the research in 2020-2021



This type of health care facilities lacks the data necessary to determine the target indicators of the Fast Track strategy until 2030 and the National Strategy in the field of combating HIV, Tuberculosis and viral Hepatitis until 2030 regarding the coverage of people living with HIV and others by medical supervision and ART. But it is precisely in this type of health care facilities that we can see data on the primary detection of HIV, as well as data on the level of testing and infection for COVID-19. Thus, based on the number of people who have been tested for COVID-19 in this health care facility, we can get an approximate impression of the ever-increasing workload in primary health care facilities.



2020 2021

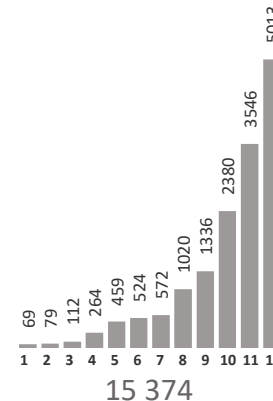
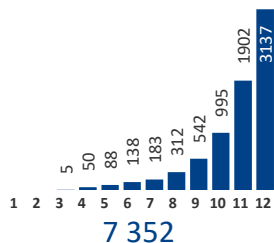
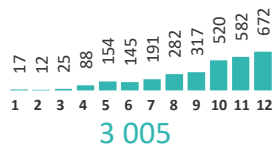
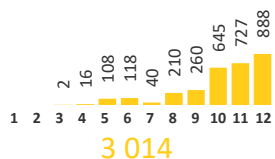


# Institutions providing primary health care (CPHC)

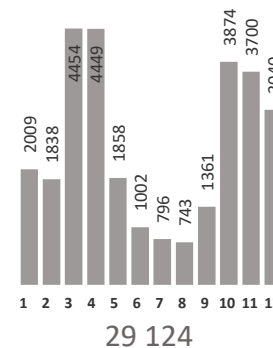
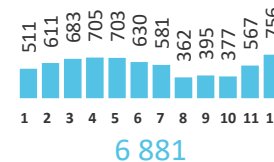
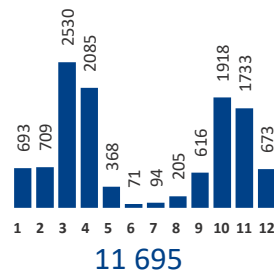
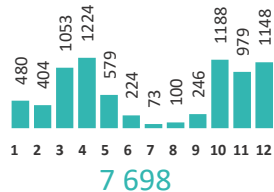
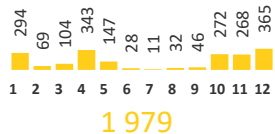


Number of patients sick with COVID-19 (regardless of where they were tested) in the CPCH-participants of the research in 2019-2021

The wave of refers to primary care doctors from the second half of 2020 and the spring of 2021 is even more clearly visible on the example of the CPHC data on the number of people who were sick with COVID-19 (regardless of where they were tested)



2020  
2021



Volyn reg.

Dnipropetrovsk reg.

city of Kyiv

Lviv reg.

Odesa reg.

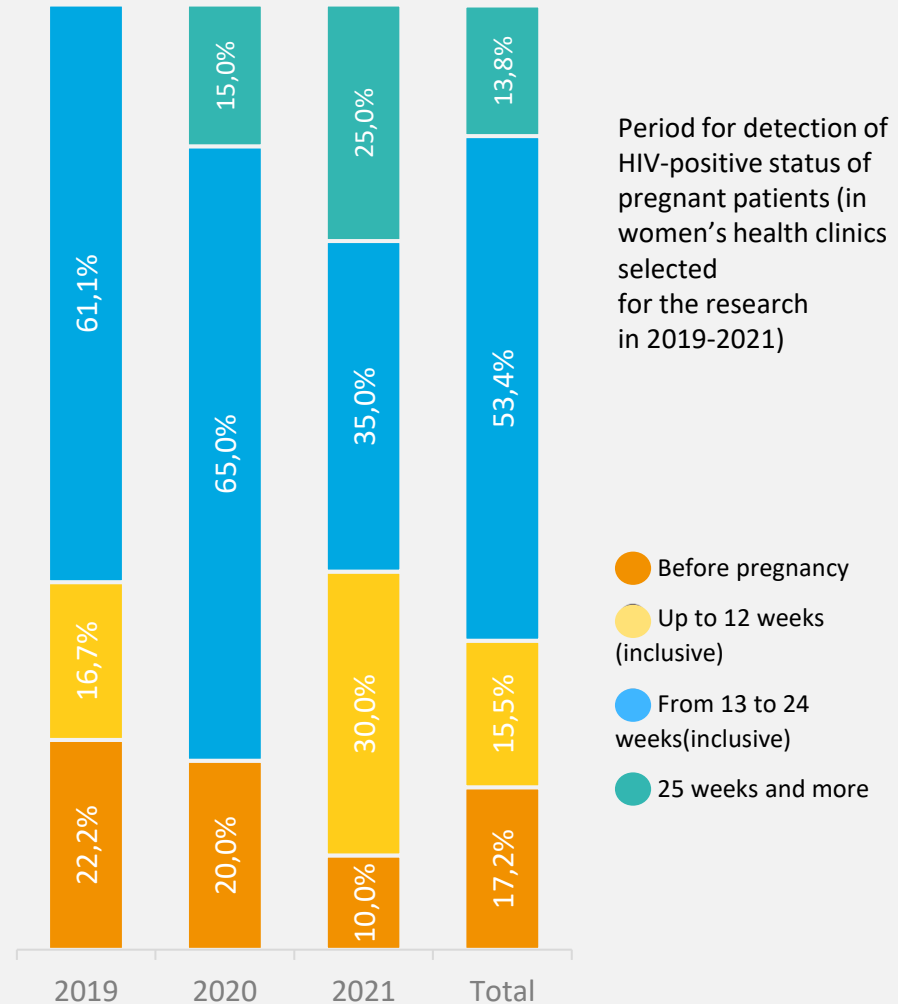
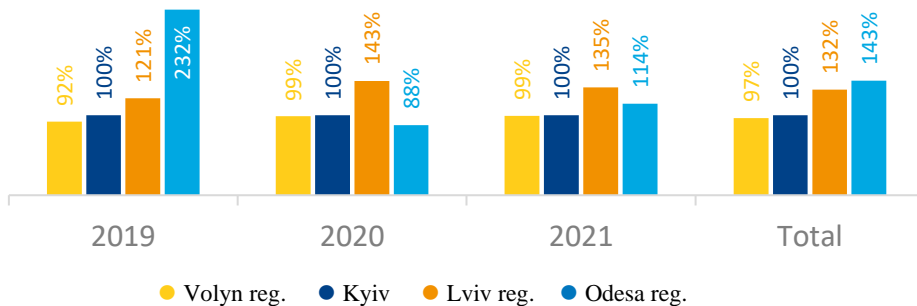
Total

## Institutions providing antenatal care (women's health clinics)

HIV testing coverage of pregnant women in Ukraine and selected regions in 2019-2021

Coverage of pregnant women with HIV testing is the target indicator of WHO and involves determining the percentage of pregnant women who are covered by HIV testing, out of their total number. According to WHO recommendations, this indicator should be  $\geq 95\%$ .

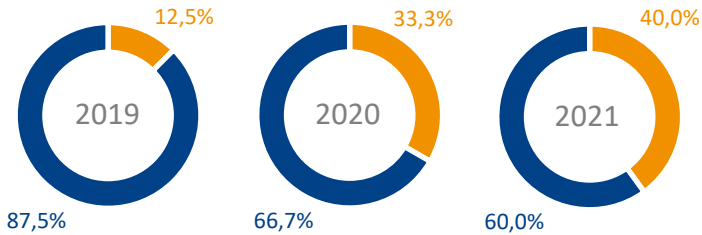
And according to official statistics on the coverage of pregnant women with HIV testing in Ukraine, in general it was determined at the level of 98.7%-99.3%, and concerning to the regions selected for the research – at the level of 97.5%-100 % in 2019-2021.



## Early start of ART

(ART started within 7 days after the screening test) for pregnant women who were registered in the women's health clinics selected for the research (Table 30) in the period of 2019-2021 shows stable increase every year

Early start of ART for pregnant patients (in women's health clinics selected for the research in 2019-2021)



### Number of visits to the women's health clinic during pregnancy

Among the received data, we observe moderate positive dynamics in the period of 2019-2021, and as of 2021, in 45% of cases pregnant women made at least the recommended 8 visits during pregnancy.

Number of visits to the women's health clinic during pregnancy for each individual pregnant woman (in women's health clinics selected for the research in 2019-2021)

NUMBER OF VISITS	2019	2020	2021
	0	0,0%	0,0%
2	5,0%	0,0%	5,0%
3	15,0%	15,8%	10,0%
4	15,0%	5,3%	0,0%
5	15,0%	21,1%	15,0%
6	10,0%	15,8%	15,0%
7	0,0%	0,0%	5,0%
8	0,0%	15,8%	5,0%
9	0,0%	10,5%	10,0%
10	0,0%	5,3%	15,0%
11	10,0%	0,0%	10,0%
12	15,0%	10,5%	5,0%
13	10,0%	0,0%	0,0%
14	5,0%	0,0%	0,0%
Minimum 8 visits	40,0%	42,1%	45,0%

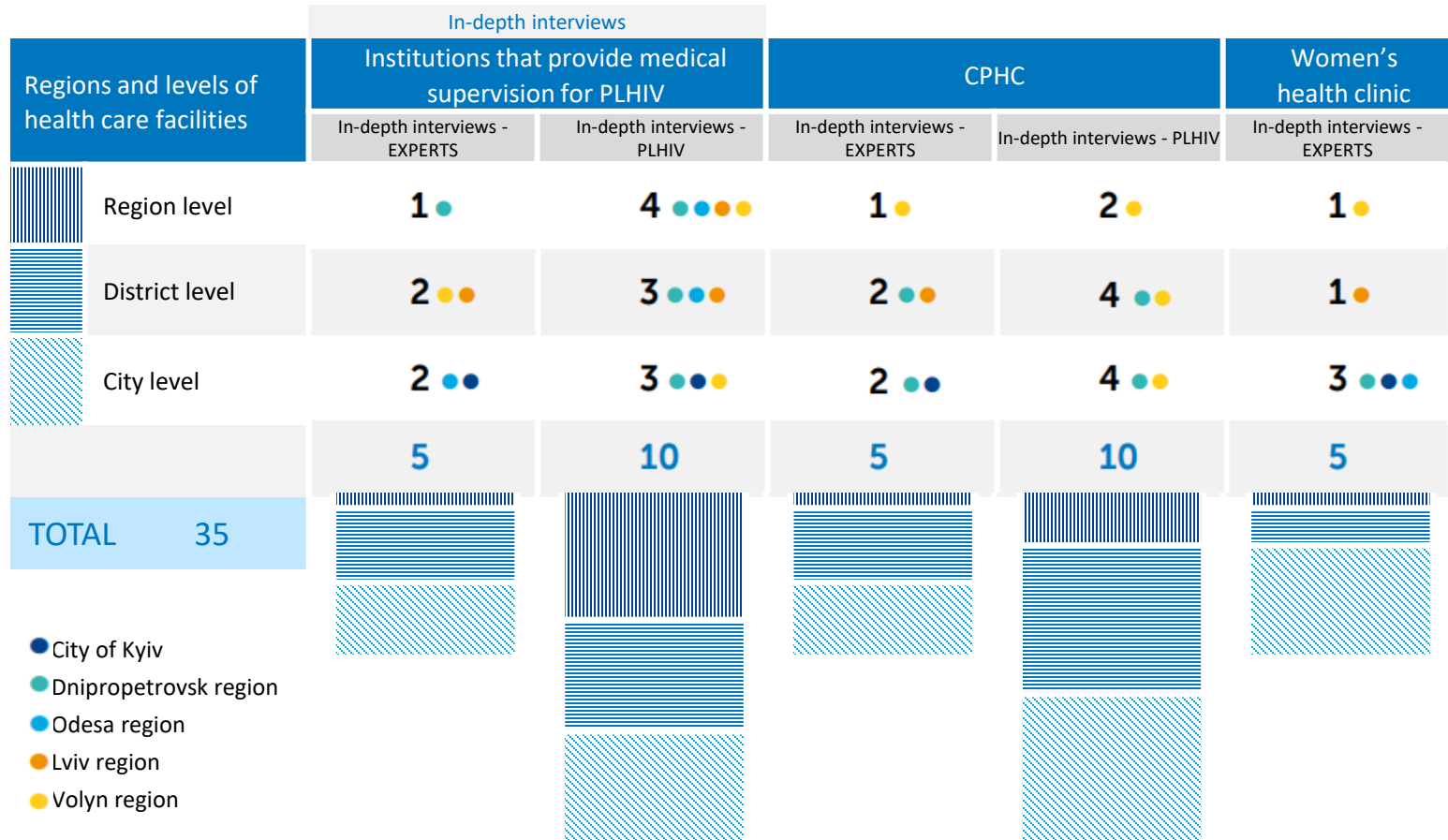


## Difficulties in implementation of quantity component of the research

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- Impact of war. Poor or delayed patient card maintenance due to power cuts and frequent air raid alerts at healthcare facilities associated with war operations.
- Insufficient human resources. Doctors were often too busy to fill out patient cards and had no available staff to delegate the task.

# Qualitative component of the research







# Results of in-depth interviews with experts

## General characteristics of HIV services in health care facilities where the interviewed doctors work



### Medical services:

- HIV testing of the patient, his/her partner and/or child
- clarification of the diagnosis (HIV infection), test for the level of CD4 lymphocytes and viral load
- ART (antiretroviral therapy)



### Information services:

- consultation of infection disease doctor
- consultation of family doctor
- consultations of other doctors



### Social services:

- psychological assistance
- social assistance

## Barriers to access to HIV services that have arisen in connection with COVID-19 pandemic

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- increase in the workload of doctors due to the COVID-19 pandemic
- lack of medical staff
- difficulties with the organization of the process of patients' reception and the space of hospitals under epidemiological conditions
- insufficient amount of rapid HIV tests
- low level of responsibility of some patients
- discrimination of PLHIV by some doctors
- unstable supply of ART drugs during the pandemic
- lack of verified and reliable information about COVID-19 virus at the beginning of the pandemic
- fear of being infected by COVID-19 in the hospital

## Factors of positive impact on the availability, level of coverage and quality of HIV services indicated after the beginning of COVID-19 pandemic

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- consistency and clear coordination of processes in health care facilities
- complete list of HIV services in one place
- possibility of teleconsultations
- flexible and patient-oriented dispensing scheme for ART drugs
- constant awareness-raising work about HIV/AIDS
- motivation of PLHIV by doctors
- constant opportunity to train doctors
- personal efforts and initiative of doctors

## Proposals of doctors regarding increasing the level of HIV services availability

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- provision of more rapid tests
- additional equipment in health care facilities in order to increase opportunities for examinations in case of concomitant diseases
- expansion of the list of health care facilities that dispense ART drugs
- increasing the volume of one-time dispensing of ART drugs for a period of up to 1 year
- free sale of HIV tests in pharmacies
- change of working hours of health care facilities (longer working day, work on weekends)
- additional opportunities for training and advanced training for the medical staff of health care facilities
- awareness-raising work among various strata of the population

## Results of in-depth interviews with PLHIV

General characteristics of HIV services in  
health care facilities where informants are  
treated

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- HIV testing
- clarification of the diagnosis (HIV infection), test for the level of CD4 lymphocytes and viral load
- antiretroviral therapy
- accompanying examinations such as fluorography, blood analysis for hemoglobin or liver tests
- screenings for the use of narcotic substances and tuberculosis
- HIV information services
- psychological assistance

## Barriers to access to HIV services that have arisen in connection with COVID-19 pandemic

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- dissatisfaction with the quality of medical services in other, often territorially closer and more convenient health care facilities
- reduce the list of AIDS Center services
- reduce the terms of dispense of ART drugs
- discrimination and prejudice from doctors
- violation of confidentiality by medical workers
- denial of their HIV-positive status by patients and sabotage of the start of treatment
- unauthorized termination of ART therapy
- severe individual reactions to ART drugs
- increased workload of doctors with the beginning of the pandemic
- emergence and increase of queues for receiving HIV services
- violation of the regular examinations periodicity
- complications of access to the hospital in conditions of the pandemic
- overload of the hotline for PLHIV
- fear of being infected by COVID-19
- inconvenience of epidemiological rules

## Factors of positive impact on the availability, level of coverage and quality of HIV services indicated after the beginning of COVID-19 pandemic

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- clarity of instructions and adjustment of processes in health care facilities
- patient coordination by health care workers
- doctor's appointment schedule aimed at reducing the risk of COVID-19 infection
- pre-planned schedule of consultations and absence of queues
- flexible format for receiving ART drugs
- possibility of teleconsultations
- possibility of receiving all or most of HIV services in one place
- help of social workers
- support of relatives
- goodwill and friendliness of medical workers
- possibility of constant, round-the-clock communication with the doctor
- increasing the period of dispensing ART drugs
- receiving ART drugs in other ways than before the pandemic began
- possibility of consultations with a doctor regarding COVID-19 and vaccination

## Proposals of PLHIV regarding the increase of the level of HIV services availability

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- better insurance of patient confidentiality
- spread of anonymous HIV testing
- simplification of the procedure for obtaining services
- improvement of the quality of ART drugs
- free receipt of concomitant medicines and vitamins for therapy
- increased educational work among the population about HIV/AIDS to prevent its spread
- need for awareness-raising work about HIV/AIDS among medical workers



## Difficulties in implementation of quality component of the research

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- Impact of war. mostly due to air raids, in-depth interviews with doctors and PLHIV often had to be postponed, sometimes for days or even weeks.
- Some PLHIV changed their minds and canceled or did not come for interviews.
- Some doctors reported other commitments and could not participate in an interview.



# Barriers to access to HIV services that have arisen in connection with COVID-19 pandemic

- Organizational difficulties in the provision of HIV services (lack of medical staff, lack of rapid tests in some primary health care centers, and sometimes lack of ART drugs in the AIDS Center). With the COVID-19 pandemic, these problems have worsened, primarily due to:
  - increased workload of doctors and other healthcare professionals, especially primary care doctors, as they were overburdened with testing and treating patients with COVID-19 and vaccinations
  - reducing the level of primary HIV testing during the pandemic
  - increasing queues for receiving HIV services
  - temporary difficulties with dispensing ART drugs for the usual period
  - violation of the periodicity of regular examinations for the level of CD4 lymphocytes and viral load.
- Lack of trust in local (closer territorially) doctors, they do not inspire trust, or there is less convenient communication format, compared to the AIDS Center
- With the beginning of the pandemic, doctors felt lack of verified and reliable information about the COVID-19 virus and, accordingly, the possibility of providing consultations on this issue.
- Problem of motivation for testing, examination and starting treatment of some new patients
- Problem of disciplined adherence to therapy is associated with patients' poor understanding of the processes of their therapy, poor individual reaction for the therapy, their belonging to key groups.
- Time of the pandemic was a particularly worrying period for PLHIV, due to the fear of being infected by COVID-19 in the hospital or on the way to the hospital and the prevalence of panicky moods in the information space.
- Cases of discrimination and prejudice from doctors who consulted outside the AIDS Center
- Cases of violation of their confidentiality by district, city and local levels of health care workers.



# Evaluation of the impact of COVID-19 pandemic on the volume and types of HIV services provided

Target indicator of the Fast Track Strategy until 2030 and the National Strategy in the field of combating HIV, Tuberculosis and viral Hepatitis until 2030

ART coverage of people living with AIDS was determined at the level of 85% for 2020-2021, and among separate regions, the lowest level was determined in Lviv region - 62.2% and the highest in Dnipropetrovsk region - 95.9%, which is quite comparable to the data of official statistics.

in the context of different levels of health care facilities - in regional and city institutions that provide medical supervision of PLHIV, in 2020 the level of ART coverage of people living with HIV was lower, but in 2020 city health care facilities managed to improve this indicator.

In 2020 and 2021, the percentage of PLHIV who receive ART and have the undetectable level of viral load (up to 1,000 copies/ml) was maintained at the target level of the National Strategy of  $\geq 95\%$  in health care facilities of the city of Kyiv and Volyn region. In health care facilities of Lviv oblast, this indicator was even higher in 2019, but declined in 2020 and 2021. In health care facilities of Dnipropetrovsk and Odesa regions, this indicator is significantly lower than the desired level of  $\geq 95\%$ .

We assume that this level of PLHIV who receive ART and have the undetectable level of viral load was facilitated by:

- In the period of 2019-2021, every year, more and more PLHIV are registered at the earlier 1st and 2nd clinical stages of HIV infection.
- In 2020 rapid tests have rapidly gained advantages over other testing methods.
- Increase in the rate of involvement of non-governmental organizations in the process of primary detection of PLHIV in 2020 more than twice compared to the previous year.
- Increase in the level of HIV testing of PLHIV partners.

However, the total number of people who were tested for HIV in AIDS health care facilities from the sample of our research significantly decreased in the Volyn, Dnipropetrovsk, Lviv regions and the city of Kyiv during the period 2019-2021.


Early start of ART in the generalized data of general information obtained from CPHC, participants of the research, increases rapidly to 53.3% in 2020, and continues to increase to 63.7% in 2021.



# Evaluation of the impact of COVID-19 pandemic on the volume and types of HIV services provided

## Indicators of prevention of mother to child transmission of HIV (PMTCT)

- **Coverage of pregnant women with HIV testing** - data from women's health clinic of the Volyn region and city of Kyiv were at the range of 99-100%, and in the Lviv and Odesa regions this indicator even exceeded 100%. The reason is the specifics of record keeping, as according to the protocol, the test may be repeated two or three times to exclude a false result, and several cases of testing of one patient may be included in the final statistics.
- **Coverage of HIV-positive pregnant women with medical supervision in connection with HIV** was less than 100% only in the women's health clinics in Kyiv, in the women's health clinic of Volyn region it remained at the level of 100%, and in Lviv and Odesa regions it rose significantly above 100%, which is also most likely caused by the specifics of record keeping in these health care facilities.
- **Timely period to determine HIV-positive status of pregnant patients** (12 weeks of pregnancy) decreased from 60% to 48.8% in the AIDS Centers dataset in 2020 but recovered and improved to 74% in 2021. According to the data from the cards of pregnant women, who were registered in the women's health clinic-participant of the research, this indicator decreased to 20% in 2020, and it recovered to the level of 40% in 2021.
- In 2020 and 2021, the timely testing on HIV viral load according to patient cards of the AIDS Centers remained at the level of about 50%.
- **Number of visits to the women's health clinics during pregnancy** - in the period of 2019-2021, we observe moderate positive dynamics, and as of 2021, in 45% of cases pregnant women made at least the recommended 8 visits during pregnancy.



## Key factors influencing the availability, level of coverage and quality of HIV services

- Consistency and clear coordination of processes in their health care facilities, clarity of instructions for PLHIV in the health care facility where they receive therapy, known in advance consultation schedule and absence of queues, flexible format for receiving ART drugs.
- Complete list of HIV services in one place (in AIDS Centers).
- Convenient location of the health care facility for PLHIV and supplementing it with teleconsultations.
- Goodwill and friendliness of health care workers
- Stable personal relationship with the doctor and the opportunity to receive consultations not only on ART therapy, but also on related issues.
- Awareness-raising work of doctors for PLHIV and support of PLHIV's motivation to undergo testing and receive therapy timely.
- Training opportunities for doctors and other health care workers.
- Assistance of social workers, whose work sometimes compensates for possible inconveniences in the coordination of obtaining medical services, in obtaining ART drugs, and in psychological support of patients.



# Recommendations on raising the HIV services level of availability

Experts' proposals for increasing the HIV services level of availability relate to the necessity of:

- **improvement of medical services:**
  - provision of a greater amount of rapid tests at the levels of primary care and women's health clinics,
  - improvement of opportunities for examinations in case of concomitant diseases in AIDS Centers,
  - provision of PLHIV with additional drugs,
  - provision of the possibility of dispensing ART drugs in district CPHC and women's health clinics,
  - increasing the volume of one-time dispensing of ART drugs in AIDS Centers and free sale of rapid tests in pharmacies.
- **improvement in organization of the medical workers' workflow**
  - provision of health care facilities with the necessary number of infectious diseases doctors,
  - changing of the working schedule for health care workers,
  - increased training opportunities and sharing experience for medical professionals.
- **strengthening the role of educational work** among the general population and medical professionals in order to improve the level of coverage and quality of HIV services, and to reduce cases of discrimination against PLHIV in Ukrainian society.

PLHIV's proposals for increasing the HIV services level of availability relate to the necessity of:

- better provision of confidentiality of patients in health care facilities;
- simplification of the procedure of obtaining services and the possibility of receiving all the necessary HIV services closer to home, perhaps from a family doctor or even at the nearest pharmacy;
- improving the quality of ART drugs and simplifying the treatment process in the future;
- free provision of concomitant medical drugs and vitamins;
- educational work about PLHIV among the general public and medical professionals.

The proposal from the research group is to pay additional attention and efforts to improving the consistency and uniformity of the accounting of all indicators provided by the National Strategy in the field of combating HIV, Tuberculosis and viral Hepatitis until 2030, which will allow to operate with more correct, complete and reliable data in research and management activities in the field of health care in the future.