Assessment of access to essential outpatient medicines in Ukraine

World Health Organization
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Abstract

WHO recently conducted a survey to assess the availability and cost of a national tracer list of essential medicines in the outpatient sector in Ukraine using a new collection tool – the WHO Essential Medicines and Health Products Price and Availability Monitoring Mobile Application. This tool facilitates rapid and inexpensive data collection at the facility level. The assessment also gathered data for Sustainable Development Goal indicator 3.b.3. A multidimensional index was recently introduced by WHO to enable joint assessment of the availability and cost of medicines. The findings are expected to support policy decisions to improve pharmaceutical management in Ukraine and to identify other factors that may improve access to essential medicines. The assessment's observations show that monitoring and evaluation of the effectiveness of pricing policies should be carried out on a regular basis to ensure equal access to essential medicines at low cost and, alongside indicators of service coverage and financial protection, to enable the government to track progress towards universal health coverage.

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Abbreviations

AMP	Affordable Medicines Programme
DALY	disability-adjusted life-year
DDD	defined daily dose
EDW	extra daily wages
EMP MedMon App	WHO Essential Medicines and Health Products Price and Availability Monitoring Mobile Application
GDP	gross domestic product
HAI	Health Action International
INN	international nonproprietary name
IRP	international reference price
LPGW	lowest-paid unskilled government worker
MPR	median price ratio
MUP	median unit price
NCD	noncommunicable disease
NEML	national essential medicines list
NHSU	National Health Service of Ukraine
SDG	Sustainable Development Goal
UHC	universal health coverage

Executive summary

Many people in Europe lack reliable access to needed medicines. Spending on medicines is also a major driver of financial hardship for households. High out-of-pocket payments for medicines reflect gaps in the coverage of medicines and problems with the price of medicines. In Ukraine, the evidence demonstrates that out-of-pocket payments for medicines are a leading cause of catastrophic health spending, particularly for poorer households.

In November – December 2019, at the request of the Ministry of Health, the WHO Country Office in Ukraine conducted a survey to assess the availability and price of a national tracer list of essential medicines in pharmacies. The survey used a new collection tool; the WHO Essential Medicines and Health Products Price and Availability Monitoring Mobile Application (MedMon). MedMon is an easy-to-use smartphone application that enables rapid and inexpensive data collection. The purpose of the tool is to provide a representative sample at the national level to ensure regular and systematic reporting on key indicators.

The information collected also enabled estimates of Sustainable Development Goal (SDG) indicator 3.b.3.[1] This indicator considers essential medicines to be accessible if a facility has at least 80% of the medicines on the list and these medicines are not only available in the facility but also "affordable" (that is, available at low cost).

The survey found that in Ukraine only 20% of the facilities surveyed provided accessible essential medicines for primary health care, although there was substantial variation by facility ownership. Only 19% of private facilities surveyed provided accessible medicines, compared to 37% of public facilities.

Results varied by region. In three of the seven regions, essential medicines were not found to be accessible in any of the facilities surveyed because none of the facilities offered at least 80% of medicines on the list. In the remaining four regions, medicines were found to be available at low cost in about 33% of the facilities surveyed.

There was also variation in the availability of different types of medicine. While essential medicines were on average found to be available in 80% of facilities, medicines in four categories (corticosteroid inhalers, antipsychotics, insulins and opioids) were found to be available in less than 50% of facilities.

The study provides insight into current challenges Ukraine faces in ensuring that key medicines included in the WHO Model List of Essential Medicines basket for the treatment of common chronic diseases are available at low cost. Its findings point to a need to strengthen policy on the pricing of outpatient medicines and access to medicines in certain categories. Monitoring and evaluating the effectiveness of current pricing policies will support new policy decisions to improve access to essential medicines, in line with Ukraine's strategy to provide medicines to meet population health needs.

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[1] SDG indicator 3.b.3 is: "Proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis".

Various policy measures may increase affordable access to essential medicines, such as ensuring the availability of low-cost generics and covered medicines without co-payments in outpatient settings, particularly for medicines used to treat noncommunicable diseases, which are a serious problem in Ukraine.

Other needed measures include efforts to strengthen supply chains and improve the prescribing and dispensing of medicines. This will require a shift towards a more comprehensive development of the pharmaceutical systems and markets. Managing medicine supply chains by monitoring data that are regularly collected and published in open data sources is an important element of the system for understanding and responding to market changes. It is important to understand the dynamics between the public and private sector and to foster collaboration and dialogue between all stakeholders involved in the development and implementation of essential medicines price regulation policy. This will contribute to increased transparency, as it creates the opportunity to pool resources; exchange data, knowledge and experience; and create information infrastructures. It is important to monitor and strengthen the pharmaceutical system, having agreed on indicators to evaluate the effectiveness of measures to strengthen it in relation to health and results in the population.

This report was developed to help policy-makers in Ukraine evaluate progress towards universal health coverage and the Agenda for Sustainable Development by:

- providing data on access to essential medicines in the outpatient sector, collected and analysed using WHO analytical tools and based on WHO methodology;
- presenting analyses of the price and availability of the essential medicines surveyed;
- determining the strengths and weaknesses of current pharmaceutical policies and identifying ways to improve them;
- drawing the attention of the Ministry of Health to the need for regular medicine price surveys to ensure the availability of quality data, enabling development of evidence-based policies.

The report can also be used to offer guidance to other countries that have identified the need to assess and improve access to essential medicines. MedMon proved to be an effective tool for collecting data on availability and price and this survey identified aspects for further development of the tool. Use and institutionalization of this tool, will enable governments to track progress towards universal health coverage.


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Introduction

Medicine price and availability surveys

Access to medicines, vaccines and health products is an essential component of universal health coverage (UHC). It represents one of the building blocks of a well functioning health system and is an important determinant of better health outcomes at both the individual and population levels.

Rapidly rising costs of health care and high prices for medicines are a constant concern worldwide, especially in countries where patients often have to pay the full price of medicines or a significant share of the medicine price. Reliable information on the price and availability of quality medicines is an essential requirement for governments to develop sound medicine pricing policies and to evaluate the impact of policy implementation. To support governments in collecting this information, medicine price and availability surveys have been carried out around the globe for several years, using a standard survey methodology developed by WHO and Health Action International (HAI) *(1)*. These surveys are among activities involved in implementation of resolu-

tion WHA54.11 as endorsed by the Fifty-fourth World Health Assembly in 2001, which requested the Director-General "to explore the feasibility and effectiveness of implementing, in collaboration with nongovernmental organizations and other concerned partners, systems for voluntary monitoring drug prices and reporting global drug prices with a view to improving equity in access to essential drugs in health systems, and to provide support to Member States in that regard". To this end, WHO and HAI jointly launched the Project on Medicine Prices and Availability in 2011.

A key element of access is the availability and price of quality medicines and health products at the point of service or patient level. Historically, little information on patient-level access has been collected or measured regularly owing to resource-intensive and complicated data collection tools. Until 2000, analyses of availability and affordability of medicines globally were limited owing to a lack of appropriate data and methodology.

Monitoring the use of medicines is not conducted in a uniform way among countries in the Region. Routine data analysis would support efficiency and help to identify the optimal mix of policies to provide access to low-cost medicines in the context of constrained health care budgets. It would also facilitate identification of areas where improvements are needed to address inappropriate use *(2)*.

Previous surveys in Ukraine

Since 2007 Ukraine has collected data on medicine prices and availability using a standard WHO/HAI methodology for the survey. The data collected, aggregated across facilities, are available via open access *(3)*.

In March 2012 a survey was conducted focusing on essential medicines: 50 medicines were surveyed, including 14 from the WHO/HAI global list and 36 selected medicines of national importance. Data were collected from 35 public sector pharmacies and 35 private pharmacies across seven regions of the country: Kyiv, Vinnytsia, Dnipropetrovsk, Zhytomyr, Lviv, Poltava and Kharkiv. Two surveys were conducted in September 2007: the first focused on palliative care medicines and surveyed 38 medicines; the second focused on essential medicines and surveyed 24 medicines. Reports on all three surveys are available via the HAI database *(3)*.

Affordability

The Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.

They include 17 Goals, with 169 targets and more than 230 indicators. SDG 3 aspires to "ensure health and well-being for all at all ages".

Among the health-related SDG targets are:

- target 3.b to "provide access to affordable essential medicines and vaccines … and, in particular, provide access to medicines for all" and
- target 3.8 to "achieve UHC, including financial risk protection, access to quality essential health care services, and access to safe, effective, quality and affordable essential medicines and vaccines for all".

SDG indicator 3.b.3 ("the proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis") is one way to assess achievement of SDG target 3.b, in conjunction with indicators of service coverage and financial protection, which are used to measure SDG target 3.8 *(4)*.

SDG indicator 3.b.3 assesses the price of a single medicine in relation to the minimum wage and the national poverty line. Using this indicator, a medicine is considered to be "affordable" if a person earning the minimum wage does not need any additional wages in order to pay for a monthly course of treatment and meet their basic needs (with basic needs represented by the national poverty line). In other words, the indicator assesses whether a medicine is affordable for a person earning at least as much as the minimum wage (where the minimum wage is equal to or greater than the national poverty line plus the cost of the medicine) who does not need to pay out of pocket for any other medicine or any other health services for themselves or anyone else in their household.

Because of the way in which SDG indicator 3.b.3 assesses affordability, it can be used to assess whether medicines available in a given facility are low cost, but it does not give a good assessment of whether the medicines are actually affordable for a given household. The affordability of medicines is more accurately measured using established indicators of financial protection (catastrophic and impoverishing health spending), which consider the impact of out-of-pocket payments for medicines and other health services on poverty and household living standards *(5, 6)*. For an assessment of the affordability of health services (including medicines) in Ukraine, see Goroshko et al. *(7)*.

For this reason, when referring to the affordability dimension of SDG indicator 3.b.3, the report refers to the "low cost" of medicines rather than their "affordability".

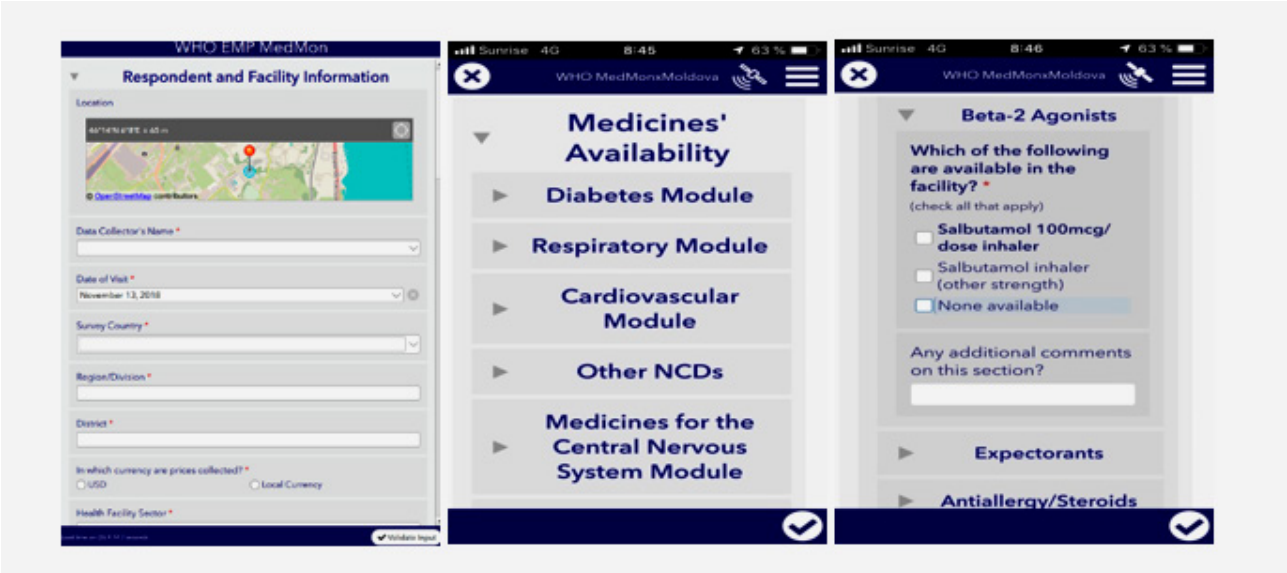
By investing in systems for data collection, statistics and analysis, countries can track their progress towards the SDGs; ensure evidence-informed policy-making; monitor policy implementation and evaluate outcomes; and strengthen accountability. Coun-

tries with reliable information systems on access to medicines are better able to identify disparities between population groups and understand the effects of interventions across their medicine supply and distribution chain.

The EMP MedMon App

To enable regular monitoring of important indicators of access at the patient level, WHO launched the WHO Essential Medicines and Health Products Price and Availability Monitoring Mobile Application (EMP MedMon App) in 2016 *(8)*. This is a new collection tool, built on Survey123 for ArcGIS, an easy-to-use smartphone application, piloted in over 20 countries. It facilitates rapid and inexpensive data collection and assessments of medicines and other health products in health facilities (Fig. 1).

Fig. 1. The EMP MedMon App interface



Source: WHO *(8)*.

The EMP MedMon App allows users to monitor medicine prices and availability routinely in a sustainable, cost-effective and timely manner, regardless of access to the internet or cellular data. The tool is designed to avoid duplication of effort and manual data entry errors, which can occur when data are collected on paper and transferred to an electronic format. It offers proof of concept that data collection can be done more quickly.

Immense amounts of information that can be collected rapidly using the EMP MedMon App require a powerful system to calculate information for reporting. WHO designed such a system using the Power BI platform – a business analytics service by Microsoft.

The system can connect directly with the data server to allow real-time reporting of facility-level prices and availability of medicines.

The tool's innovations in routine medicines monitoring include:

- customizability for any country's needs;
- ability to collect data online or offline;
- compatibility with Android, iOS, Windows, Linux and Mac operating systems;
- ability to support Global Positioning System data, photo and barcode capture;
- ability to support inclusion of national product registries for rapid data collection and analysis;
- facility to download submitted data immediately for validation and analysis;
- ability to connect to the App's Power BI platform for interactive analytics and reporting;
- ability to collect routine medicine data in a fraction of the time and at a significantly lower cost than earlier systems.

New analytics created with the EMP MedMon App's Power BI platform allow real-time visualization of collected data (Fig. 2 and Fig. 3).

Fig. 2. Power BI platform main menu

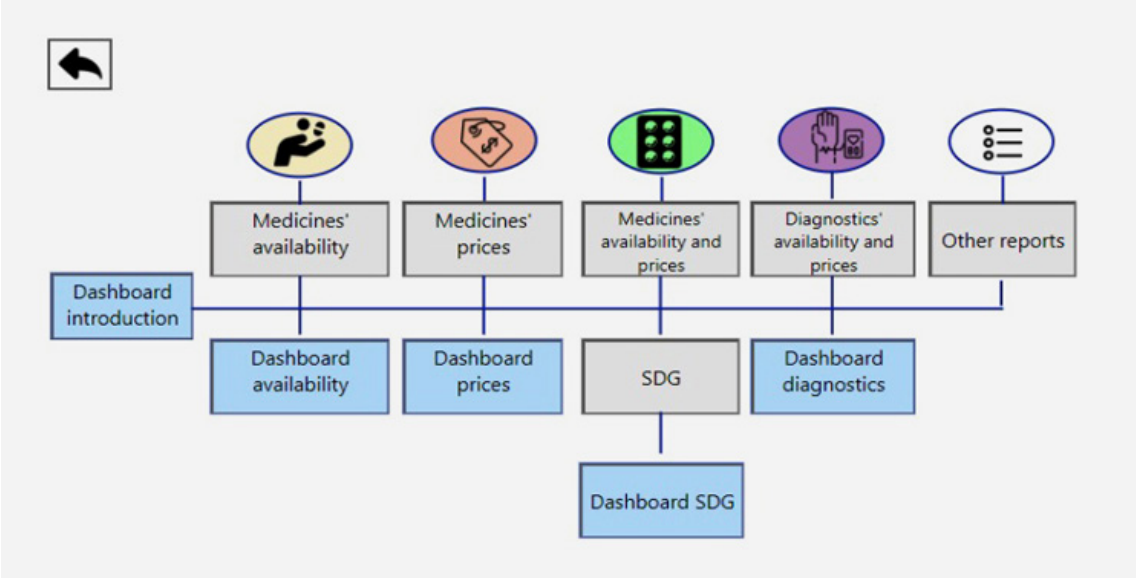
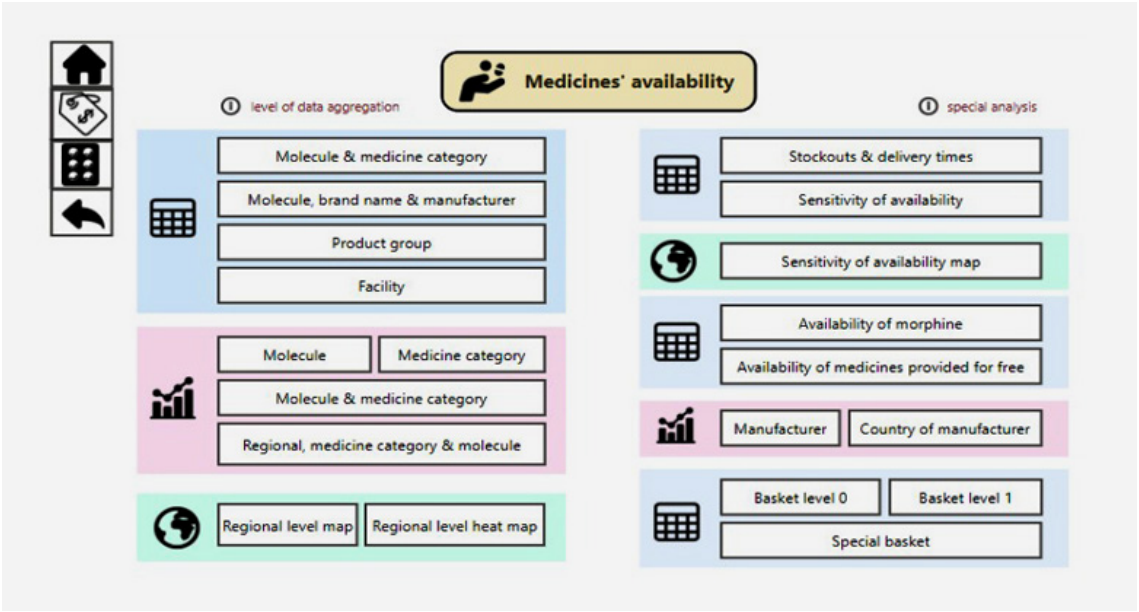


Fig. 3. Power BI platform submenu



Use and institutionalization of the EMP MedMon App will enable governments to track progress towards SDG target 3.b while monitoring indicator 3.b.3. In 2019 it was piloted in Europe to integrate routine medicine price and availability monitoring activities into standard regulatory functions, particularly in areas without comprehensive logistic management information systems.

The 2019 assessment in Ukraine: background and objectives

WHO contributes to improving access to quality health services and increasing financial protection for the population of Ukraine through specific activities undertaken by the WHO Country Office and WHO Regional Office for Europe to strengthen the function of the Ukrainian health system within the framework of the biennial collaborative agreement *(9)*. The activities are based on the 2030 Agenda for Sustainable Development – and in particular SDG 3, which aims to ensure healthy lives and promote well-being for all at all ages *(10)*. All countries have committed to meet the SDGs.

They are also associated with European Programme of Work and the three core areas of WHO's Thirteenth General Programme of Work 2019–2023 achieving UHC, addressing health emergencies and promoting healthier populations *(11)*. The planning framework for this provides a structure for identifying priorities at the country level and for planning and budgeting WHO's work. WHO's roadmap for access to medicines, vaccines and other health products 2019–2023 *(12)* aligns with the five outputs identified within this framework under Outcome 1.3, of which Output 1.3.2 is "improved

and more equitable access to health products through global market shaping and supporting countries to monitor and ensure efficient and transparent procurement and supply systems".

The Ministry of Health of Ukraine asked WHO to conduct a pilot survey using the EMP MedMon App to monitor access to essential medicines and support the following monitoring objectives:

- to assess current availability and prices of a national tracer list of essential medicines, to facilitate measurement of SDG indicator 3.b.3;
- to compare prices across manufacturers and brand names;
- to estimate the retail price ratio to national and international reference prices;
- to estimate accessibility of medicines by measuring SDG indicator 3.b.3.
- to test a smartphone/tablet-based survey application adapted for users where the national language uses the Cyrillic (Russian) alphabet for collecting data on medicine availability and prices to enable regular monitoring of a national tracer list of essential medicines.

To support data analysis, a background history of national health reform and pharmaceutical policies in Ukraine was collected and can be found in Annex 1.

Survey methodology

Proposed metadata for price assessment

To facilitate international comparisons, medicine prices found during the survey are expressed as ratios relative to a standard set of international reference prices (IRPs). This is known as the median price ratio (MPR), which is an expression of how much greater or lower the median local medicine price is than the IRP (for example, an MPR of 2 would mean that the local medicine price is twice the IRP).

The IRP is not country-specific: it does not consider geographical or other differences between countries. When national reference prices are available, therefore, it is preferable to compute the MPR using these and IRPs. Management Sciences for Health reference prices are recommended as the most useful standard for computing MPRs. These are prices offered by mostly not-for-profit suppliers to developing countries for multisource products, and generally do not include insurance or transportation charges. Management Sciences for Health reference prices are always expressed in US dollars and are publicly available *(13)*.

A more detailed explanation of MPR calculation can be found in the manual for managers undertaking a medicine price and availability survey using the WHO/HAI methodology *(1)*.

Methods

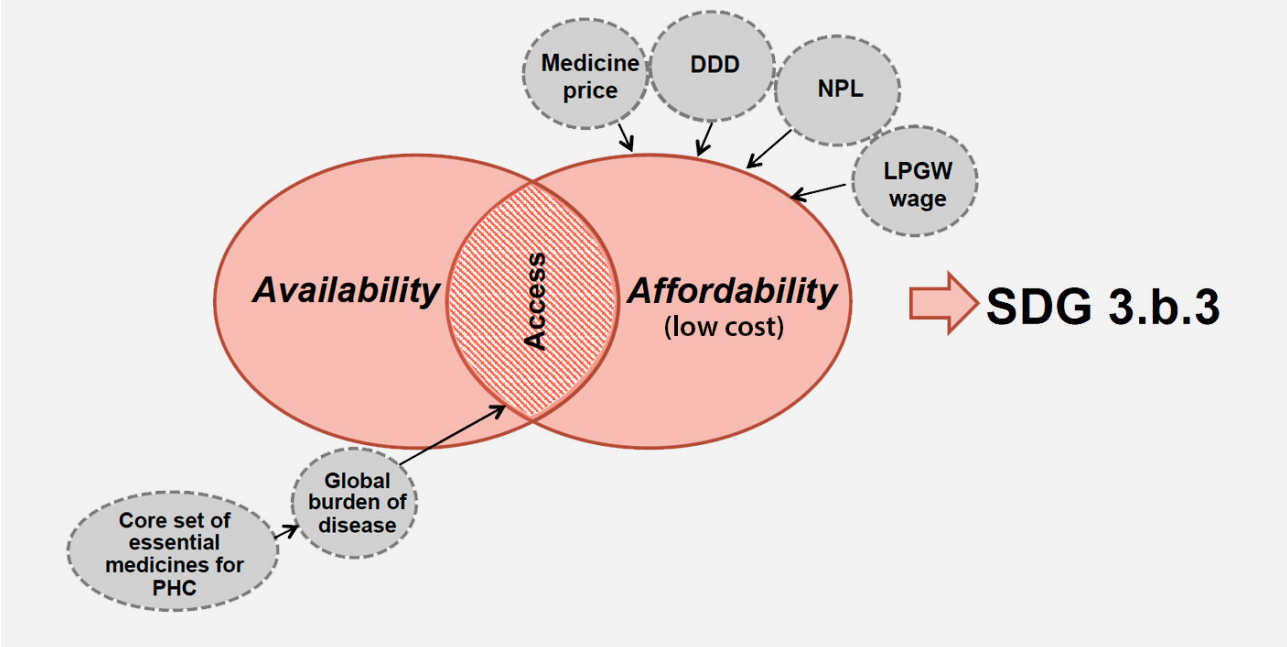
The WHO/HAI methodology to measure medicine prices, availability, "affordability" (low cost of a single medicine) and price components was developed in 2003 for field testing, and a second edition was published in 2008 *(1)*. It has been widely implemented to produce useful analyses of the availability of medicines at low cost, but the two dimensions have so far been evaluated separately. WHO therefore developed a new methodology *(14)*, combining two separate dimensions of access – availability and low cost – into a multidimensional index to measure access to medicines, embodied in SDG indicator 3.b.3 (Fig. 4).

A medicine is considered **available** when it is found in the facility by the interviewer on the day of data collection. Affordability (low cost of a single medicine) is measured as the number of days of wages the lowest-paid unskilled government worker (LPGW) is required to pay for a single course of treatment. The medicine is considered "**affordable**" (**low cost**) when no additional daily wages are needed for the LPGW to purchase a monthly course after meeting basic needs, represented by the national poverty line.[1]

Access to essential medicines is measured as the proportion of health facilities where a core set of relevant essential medicines is available at low cost *(15)*.

[1] The original WHO/HAI approach measures the number of daily wages needed for the LPGW to pay for a monthly course of treatment with a medicine. The updated WHO approach measures the extra number of daily wages needed for the LPGW to pay for a monthly course of treatment with a single medicine without sacrificing basic needs (defined here as the national poverty line).

Fig. 4. Access to medicines as defined in SDG indicator 3.b.3



Notes: DDD = defined daily dose; NPL = national poverty line; PHC = primary health care.
Source: WHO *(14)*.

The new methodology includes:

- a modified approach to measuring affordability (low cost of a single medicine);
- the ability to measure multidimensional access to medicines (that is, combining measures of availability and low cost);
- disaggregated analysis across:
  - public or private sector facilities (managing authority);
  - facility types (pharmacy/hospital);
  - geography – rural and urban areas;
  - therapeutic groups.

The methodology defines availability as the medicine being on the shelf on the day of the survey, and defines price as the medicine price for a pack (or unit) sold to patient.

For the statistical analysis, affordability (low cost of a single medicine) is measured as the number of daily wages the LPGW needs to pay for a monthly course of treatment with a single medicine. The medicine is considered to be "affordable" (low cost) when no additional daily wages are needed for the LPGW to purchase a monthly course of this single medicine after meeting basic needs (defined here as the national poverty line). See the section on affordability for more information.

Availability can be measured by molecule, product group and manufacturer. Measurements include:

- proportion of facilities with available medicine (molecule, product group, manufacturer);
- number of facilities with expected delivery time of less than seven days;
- number of facilities with stockouts.

Prices can be measured per unit, by molecule and by manufacturer or at a product group level. Measurements include:

- median unit price;
- MPR (relative to the IRP and national reference price), the 25th percentile and 75th percentile, and the minimum and maximum.

Steps to compute SDG indicator 3.b.3

SDG indicator 3.b.3 is measured as a ratio of the health facilities where a core set of relevant essential medicines for primary health care is available at low cost at a given point in time over the total number of health facilities surveyed.

The following variables are considered for a multidimensional understanding of the components of access to medicines:

- a core set of relevant essential medicines for primary health care;
- the regional burden of disease;
- availability of a medicine;
- the price of a medicine;
- the treatment courses for each medicine (number of units per treatment and duration of treatment);
- the national poverty line and LPGW daily wage.

The index is measured for each facility separately; then the proportion of facilities with accessible medicines is calculated. Core definitions and measures can be found in Annex 2, and an example SDG indicator 3.b.3 measurement for one randomly selected facility is presented in Annex 3.

The following steps must be taken to measure SDG indicator 3.b.3 at the facility level.

1. Review and selection of the core basket of medicines for primary health care relevant for the assessment country

The core set of relevant essential medicines is a list of 32 tracer essential medicines for acute and chronic, communicable and noncommunicable diseases (NCDs) in the primary health care setting. It has been selected from the 2017 WHO Model List of Essential Medicines used in primary health care *(16)*. By definition, essential medicines are those that satisfy the priority health care needs of the population. They are selected for inclusion in the Model List based on consideration of disease prevalence, evidence of efficacy and safety, and consideration of cost and cost–effectiveness. This basket of medicines is intended as a global reference, but to address regional and country specificities in terms of medicine needs, the medicines in the set are weighted according to the regional burden of disease.

2. Estimation of weights for the defined medicines based on regional burden of disease

Each medicine in the basket is weighted according to the regional disability-adjusted life-years (DALYs) for relevant diseases from WHO global health estimates *(17)* to address the distribution of demand between selected medicines in the assessment country. Equal weights are assigned to medicines that are used to treat, cure and control the same diseases (for example, gliclazide (or another sulfonylurea), metformin and regular insulin are assigned equal weights according to the diabetes disease burden). For a medicine indicated for multiple diseases, DALY values for each disease are totalled.

3. Measurement of the two dimensions of access to medicine as defined by SDG indicator 3.b.3: availability and affordability (low cost)

Availability of medicines is measured as a binary variable (coded “1” when the medicine is in the facility on the day of the survey and “0” otherwise).

The cost of a daily dose of treatment for each medicine is computed as a price per defined daily dose (DDD):

$$price\ per\ DDD = \frac{Medicine\ price\ (month) * Units\ per\ treatment\ (month)}{365/12}$$

The medicine is considered to be “affordable” (low cost) if the price per DDD of a medicine, together with the daily national poverty line, can be covered by the minimum

daily wage of the LPGW and no extra money (no extra daily wages) is needed for that person to pay for the medicine:

$$Extra\ daily\ wages\ (EDW) = \frac{National\ poverty\ line + price\ per\ DDD}{daily\ wage\ of\ LPGW}$$

In particular, the variable for affordability (low cost) is generated by transforming EDW into a binary variable using a threshold of 1. EDW equal to or less than 1 means that no extra money is required to pay for the medicine. See the section on affordability for more information.

4. Combining the two dimensions

This calculation transforms the availability and affordability (low cost) of medicines into a weighted access matrix and gives the main indicator of access to medicines *(14)*.

5. Applying the weights to the medicines in the basket and classifying the facility

To identify whether a facility has a core set of relevant essential medicines that are accessible, at least 80% of the defined medicines must be available at low cost.

6. Calculating the national average

The proportion of facilities with accessible medicines is then calculated at the national level across all the facilities surveyed.

$$SDG\ indicator\ 3.b.3 = \frac{Facilities\ with\ available\ and\ affordable\ (\text{low cost})\ basket\ of\ medicines\ (\text{n})}{Surveyed\ facilities\ (\text{n})}$$

Design of the assessment

Macro-level information for SDG indicator 3.b.3 measurement

- To calculate the MPR for the defined list of essential medicines, US dollar prices of the IRPs were converted to hryvnia, applying an exchange rate of 23.81 as a weighted average in November – December 2019, based on the exchange rate set by the National Bank of Ukraine.
- The minimum wage in Ukraine with effect from 1 January 2019 to 31 December 2019 was 4173.00 hryvnia per month, according to the Ministry of Finance *(18)*.
- The subsistence level approved by the Law on the State Budget of Ukraine for 2019 (No. 2629-VIII of 1 December 2019) for the working population was 2027.00 hryvnia *(19)*.

Selection of the core set of tracer essential medicines

WHO recommends a core set of 32 tracer essential medicines for acute, chronic, communicable diseases and NCDs in ambulatory and primary health care settings to monitor SDG target 3.b *(4)*. To address national and regional specificities of medicine needs, the basket of medicines used in the assessment in Ukraine was based on this core set and was refined and modified to suit the local context, resulting in selection of 28 international nonproprietary names (INNs) (Table 1).

To prevent artificial bias and capture a more pragmatic view of availability, the EMP MedMon App was used to capture specific product availability as well as availability of alternatives (alternative strengths or therapeutic equivalents). Additional product data were only captured for the core tracer medicines.

Table 1. Basket of essential medicines selected to analyse SDG indicator 3.b.3

INN	Alternative INN
Insulin human regular	
Metformin	
Glibenclamide	Gliclazide
Salbutamol	
Beclometasone	Budesonide
Acetylsalicylic acid (aspirin)	
Amlodipine	Nifedipine
Atenolol	Bisoprolol
Simvastatin	
Enalapril	
Hydrochlorothiazide	
Furosemide	
Folic acid	
Magnesium sulfate	

INN	Alternative INN
Oral rehydration	
Oxytocin	
Carbamazepine	
Levonorgestrel/ ethinylestradiol	
Amoxicillin	
Morphine tablet	
Ceftriaxone	
Gentamicin	
Ibuprofen	
Paracetamol	
Paroxetine	
Fluconazole	
Levothyroxine	
Dexamethasone	Prednisolone

Ukraine's national essential medicines list (NEML) includes 27 INNs from WHO's SDG tracer list *(20)*. Paroxetine is not included but was chosen as representative of selective serotonin reuptake inhibitors instead of fluoxetine for the assessment because of

predicted wider presence in the retail chain, based on the register of medicines with market authorization in Ukraine *(21)*.

Some additional INNs were included in the survey as national monitoring priorities. The full set of essential tracer medicines for primary health care assessed comprises 39 INNs (see Table A4.1 in Annex 4 for detailed information).

Preparation for the survey

Governance

Price monitoring activities were initiated by the Ministry of Health and the WHO Country Office in Ukraine provided support with design development and conducting the survey. A service provider – the nongovernmental organization All-Ukrainian Pharmaceutical Chamber – was chosen to provide the data collectors. WHO analysed the collected data and developed the report on the findings to facilitate review of the price policies by the Ministry of Health, if required, and to ensure that adequate policies were in place.

Price type

The objective of the study was to monitor the retail price of the lowest-priced medicine available at the pharmacy on the day of visit for each medicine in the list. The data collector also monitored price distribution – the range of medicine prices within one INN.

IRPs (sourced from Management Sciences for Health; see Annex 5) and national reference prices set by the Ministry of Health were used for analysis of median unit prices.

Number of facilities

WHO suggests following the HAI guideline on minimum random sample selection: six survey areas (the capital city and five areas reachable within one day's travel), with a random selection of at least five public and five private health facilities in each area. The survey team for Ukraine found it appropriate to choose six regions (include the region's main city and other regional cities/settlements) and the capital city to ensure a representative set of data, so that the survey findings could be used for data extrapolation to gain a nationwide picture.

The survey was designed to collect information about the availability and prices of a list of tracer essential medicines in state-owned (public) and private sector pharmacies. The proportion of selected public and private facilities in the Ukrainian survey

does not correspondent to the HAI guideline because the national share of public facilities is very small (10.6%). Thus, a random selection was made, taking into account the coverage of privately owned outlets to get more accurate representation of the medicines' availability.

Sampling was made from the national register of places of activity on wholesale and retail trade of medicinal products, based on random selection. The sample list of facilities included at least 10 per region, but due to limited access to some pharmacies, the total number surveyed turned was lower.

In total, 81 pharmacies were selected for the survey: 73 (90%) private and eight (10%) public. Distribution of the facilities across regions and rural/urban areas was as follows (see Fig. 5):

- Kyiv city (12 pharmacies);
- Kharkiv city and region (15 pharmacies);
- Sievierodonetsk city and Luhansk region[2] (6 pharmacies);
- Lutsk city and Volyn region (12 pharmacies);
- Chernihiv city and region (9 pharmacies);
- Ivano-Frankivsk city and region (15 pharmacies);
- Kherson city and region (12 pharmacies).

Fig. 5. Distribution of facilities surveyed

Notes: Surveyed regions are in blue

2 The survey was conducted on government-controlled territory.

Among the sample list of facilities, 77% were in urban areas, 17% were in urban-type settlements and 6% were in rural areas.

Data collectors

One supervisor per region was trained by a WHO trainer; a team of 2–4 data collectors was then trained by each regional supervisor. It was recommended that two data collectors were appointed to conduct the survey at each pharmacy: one to ask the questions (or call out the product details) and one to type the information into the tablet or smartphone.

Data collection tool

The EMP MedMon App was used with the Russian language interface: Ukraine's assessment was the pilot for the Russian language application. One tablet was provided per region to facilitate data collection, but data collectors used their own smartphones widely, such as when two facilities in a region were surveyed simultaneously.

Adapting the EMP MedMon App to fit the country context

The EMP MedMon App uses the Power BI analytic platform, which works with the Latin alphabet. Therefore, all data inserted in the official language of the country (if this uses a different alphabet, such as the Cyrillic or Russian alphabet) to adapt the application interface to the user must be translated into English for proper analysis.

Ukraine's medicine list, including all brands with valid market authorization for the tracer list of essential medicines (39 INNs) and a list of licensed manufacturers, were inserted into the EMP MedMon App, along with translations into English. The list of facilities selected for the survey was also inserted, with the affiliations of each facility to the region, area (rural/urban), sector (public/private) and type (hospital, pharmacy and so on).

Data collection

To test the EMP MedMon App once it had been adapted for the local context, and to fix errors in the beta version of the application, the first trial study was conducted in all regions of Ukraine at the end of October 2019. The data collected in this trial were not taken into account in the general analysis because they were used only to ensure that the survey design and technical details were verified, to facilitate smooth data collection in the main assessment.

The main survey was conducted over 10 days in all regions in November – December 2019. Letters from the Ministry of Health and State Service of Ukraine on Medicines and Drugs Control were issued to inform the owners of pharmacies about the goals and design of the study. Participation was voluntary, and some facilities refused to accept the data collectors. In these cases, the facility closest to the original location was substituted.

The team of data collectors visited health facilities and collected information on availability and prices of the core tracer list using the EMP MedMon App. Availability of essential medicines was determined by direct observation: a medicine was considered available if it was on the shelf ready to be dispensed at the time of the visit.

Two modules of the survey were completed sequentially. The data collector tracked and inserted information on medicine availability for all INNs examined, then price information on the cheapest product in each category was added. In some facilities photographs of packages of the cheapest products were taken to facilitate data validation in future analyses using the Power BI platform.

The average time taken to collect the data on 39 INNs in one facility was three hours. In big cities like the capital Kyiv, where the range of brand names within one INN varied between two and six, data collectors required four hours. In small rural facilities it was possible to finish the survey within 1.5–2 hours, when price information was collected for one medicine within each INN.

Data from the EMP MedMon App were extracted from the Survey123 for ArcGIS platform in a machine-readable format, then combined and analysed using the Power BI platform and Excel.

Results of the assessment

Medicine availability

The Power BI analytics platform enabled a number of reports to be created, based on the collected data, including:

- availability of medicines across regions;
- stockout lengths (days) for all unavailable medicines;
- availability of medicines by molecule and medicine category (whether at least one medicine from the category is available in a facility);

Availability of medicines across regions

- Greatest availability of medicines was found in Luhansk and Volyn regions (although availability of opioids and insulin was similar to that in other regions).

- Lowest availability was found in Ivano-Frankivsk region, with zero availability in the facilities surveyed of oral rehydration salts, opioids, insulin and corticosteroid inhalers.
- Opioids, insulin, oral contraceptives, antipsychotics and corticosteroid inhalers were the medicines least available across all regions.
- Average availability of medicines at the category level across all regions was 80.10%.

The detailed distribution of availability across medicine categories and regions is set out in Annex 6.

Stockout lengths

Further analyses were developed for the medicines reported as unavailable. Stockouts and delivery times were calculated to identify the length of reported stockouts as well as the time until expected delivery of the unavailable medicine at both the facility and the medicine category level. Values of the availability of medicines were also re-estimated when those with stockout lengths of less than seven days were considered potentially available.

- Stockout lengths (for medicines reported as unavailable) exceeded half a year for the majority of the medicines surveyed.
- Medicines that were reported as unavailable belonged to product categories that were either part of reimbursement programmes (insulin, corticosteroid inhalers) or required special licences for operations (opioids, antipsychotics).
- Stockout lengths for morphine in facilities that reported unavailability were 365 days.

Availability of medicines (by medicine category)

- Each medicine category was represented by either one INN or several molecules (in such categories as antiallergy drugs, diuretics, anticonvulsants, sulfonylureas and corticosteroid inhalers).
- The lowest availability identified was for opioids (12.35% of the facilities). Morphine in any formulation was available in 12.35% and morphine in tablets was available in 8.64% of the facilities surveyed.
- Insulin, antipsychotic medicines and corticosteroid inhalers also demonstrated low availability (20.99%, 38.27% and 43.21% respectively).
- In the majority of other categories, the medicines were available in more than 80% of the facilities.

Detailed information about availability of medicines by category is set out in Annexes 6 and 7.

Medicine prices

The following analyses of the medicine price data were performed:

- price distribution across medicine categories and regions;
- prices per unit by INN for all available brand names, to compare price differences;
- prices per unit by product type (generic versus originator medicines), combined by production location relative to the MPR;
- comparison of medicine prices to IRPs and national reference prices by medicine category;

Both median unit prices (MUPs) and average prices[3] of medicines were estimated, measured in hryvnia. Both median and average prices of medicines were estimated, and that most relevant to the sample under consideration was used.

Price distribution across medicine categories and regions

- MUPs for more than five medicine categories across health facilities in Kyiv and Luhansk and Volyn regions were 15% higher than the average prices in Ukraine. In Kyiv city and Luhansk region, MUPs were higher than the average price across all regions for nine medicine categories; in Volyn region they were higher for six categories.
- The price for metformin was found to be noticeably higher than the national average (1.23 hryvnia) in Kyiv city and Luhansk region (2.16 and 2.28 hryvnia, respectively).
- Ibuprofen with a price higher than the national average (3.84 hryvnia) was reported in five regions, but was lower in Ivano-Frankivsk and Luhansk regions (0.79 and 0.75 hryvnia, respectively).

Further details are set out in Annex 8.

Prices per unit by INN for all available brands

A wide range of medicine prices was observed in such categories as insulin, cephalosporins and antiprotozoals.

[3] The median price is the price computed as the central point of a data set. The average price is the sum of all values of a data set divided by the total number of values (more properly called the "arithmetic mean").

- Insulin 100 IU/ml recorded the widest price range across regions in Ukraine compared to other medicines. MUPs for insulin were 26.76 hryvnia for insulin human regular and 235.38 hryvnia for insulin glargine/lixisenatide. MUPs for insulin human intermediate acting, insulin human mixed and insulin glargine were 27.46, 27.53 and 91.87 hryvnia, respectively.
- Cephalosporins and antiprotozoals also showed wide price distribution.
- MUPs for ceftriaxone 1 g were 91.83 hryvnia, with the lowest price 15.79 hryvnia and the highest 141.35 hryvnia among 18 observed products in this category.
- MUPs for fluconazole 500 mg capsules were 6.47 hryvnia, with the lowest price 2.09 hryvnia for locally produced generics and the highest 101.47 hryvnia for imported originators among 12 products observed in this medicine category.

In other categories, prevalence of locally produced generics at competitive prices was observed. Nevertheless, in several categories, actively marketed imported generics or originators with different price levels in relation to MUPs were recorded.

- The average price for originators in the antithrombotic agent category appeared cheaper than that for imported generics. Generic acetylsalicylic acid, produced by the Austrian manufacturer G L Pharma, had a higher price (2.74 hryvnia) and another generic produced by Ukrainian manufacturer Technolog had almost the same price (2.30 hryvnia) as the originator manufacturer Bayer in Germany (2.41 hryvnia) – the category MUP was 1.76 hryvnia.
- Prices of originators in the angiotensin-converting enzyme inhibitors and hypothyroidism categories (enalapril at 0.94 hryvnia and levothyroxine at 1.47 hryvnia, respectively), both by Merck, were higher than locally produced generics but lower than imported generics.
- In such categories as antidepressants, calcium channel blockers, anticonvulsants, cephalosporins, antiallergy drugs, antiprotozoals, diuretics, nonsteroidal anti-inflammatory drugs, biguanides and statins, prices for originators or actively marketed imported generics were almost twice as high as the, and three times more expensive than local generics.

The price range varied dramatically within some INNs. The difference between the lowest-priced generic in the category and the most expensive was:

- more than 1000% for fluconazole (2.09 versus 53.18 hryvnia);
- almost 900% for ceftriaxone (15.79 versus 141.35 hryvnia);
- more than 600% for metformin (0.49 versus 3.28 hryvnia).

The highest MUPs were reported for the following products:

- insulin glargine and human regular 100 IU/ml (91.87 and 26.76 hryvnia, respectively);
- ceftriaxone 1 g (91.83 hryvnia).

Distribution of medicine prices across categories by manufacturer is set out in Annex 9.

Prices per unit by product type combined by production location relative to the MPR

MUPs for the lowest-priced available generics within INNs at the facility level were analysed to estimate the saturation of pharmacies by the lowest-priced generics. Compared to the median price among all brands at the national level, median prices among the lowest-priced generics at the facility level appeared lower for the majority of INNs (see Annex 10). For insulin human regular and oxytocin, however, MUPs at the facility level were higher, indicating that most facilities do not offer the cheapest brand within the INN.

MUPs and MPRs by product type were combined by production location (Table 2).

Table 2. Product type and location of production

Product type	Location of production	Facility setting	Number of products	MUP (hryvnia)	MPR by molecule (INN)
Generic	Imported	Rural	68	3.9500	0.3677
Generic	Imported	Urban-type settlement	211	3.1833	0.2963
Generic	Imported	Urban	960	3.7183	0.3461
Generic	Local	Rural	132	0.9830	0.0836
Generic	Local	Urban-type settlement	294	0.8300	0.0706
Generic	Local	Urban	1282	0.9720	0.0827
Originator	Imported	Rural	29	5.5000	0.4678
Originator	Imported	Urban-type settlement	102	5.7400	0.4882
Originator	Imported	Urban	340	5.4521	0.4637

- MUPs of imported generics and local generics were 3.72 and 0.97 hryvnia, respectively. Imported medicines were more expensive than those produced locally.
- MPRs for all the product types surveyed were found to be less than 1.

- In urban-type settlement areas, generic medicines were slightly cheaper than in urban and rural areas.

To calculate MUPs for this report, the median prices for each medicine and across all facilities were computed and aggregated, and the median across product type was used.

Comparison of medicine prices to IRPs and national reference prices by medicine category

Analysis of MUPs relative to IRPs and national reference prices was also done. For products whose MUP is higher than the IRP, the MPR is higher than mean 1. MPRs for all the product types surveyed were found to be less than 1.

Prices of medicines by INN in a specific dosage relative to IRPs are presented in Table A11.1 in Annex 11 as MUPs and MPRs. Subsamples of medicines for which IRPs were available are listed in Annex 5.

The reimbursement sum per unit from the register of medicines subject to reimbursement, valid in December 2019, calculated within the framework of the national Affordable Medicines Programme (AMP) was used as the national reference price. For medicines whose MUP is higher than the national reference price, the MPR (national) is higher than mean 1. Reports on MPRs (national) by molecule provided analysis of aggregated information at the INN level (across all facilities and manufacturers).

Comparison to the national reference prices (based on a subsample from the AMP basket of medicines) indicates that the MUP for half the INNs exceeds the national reference price.

MPRs (national) had wide variation. The highest price variation, shown in the 25th and 75th percentiles to allow evaluation of variations in price across facilities and manufacturers, was observed for three INNs:

- amlodipine 5 mg tablet (1.1175 at the 25th and 2.5379 at the 75th percentile);
- enalapril 10 mg tablet (1.8075 at the 25th and 7.056 at the 75th percentile);
- metformin 500 mg tablet (1.3685 at the 25th and 4.6094 at the 75th percentile).

MPRs (national) for amlodipine, enalapril and metformin showed that MUPs for these INNs were 1.77, 2.28 and 1.62 times higher, respectively, than national reference prices.

Prices of medicines by INN relative to national reference prices as MUPs and MPRs (national) are presented in Table A11.2 of Annex 11.

Availability of medicines at low cost

Analysis of affordability (low cost) at the molecule level (aggregated across all manufacturers and facilities) showed that all the medicines were "affordable" (low cost) according to the two measurement approaches – the WHO/HAI approach *(1)* and the new WHO approach based on SDG indicator 3.b.3 *(14)*.

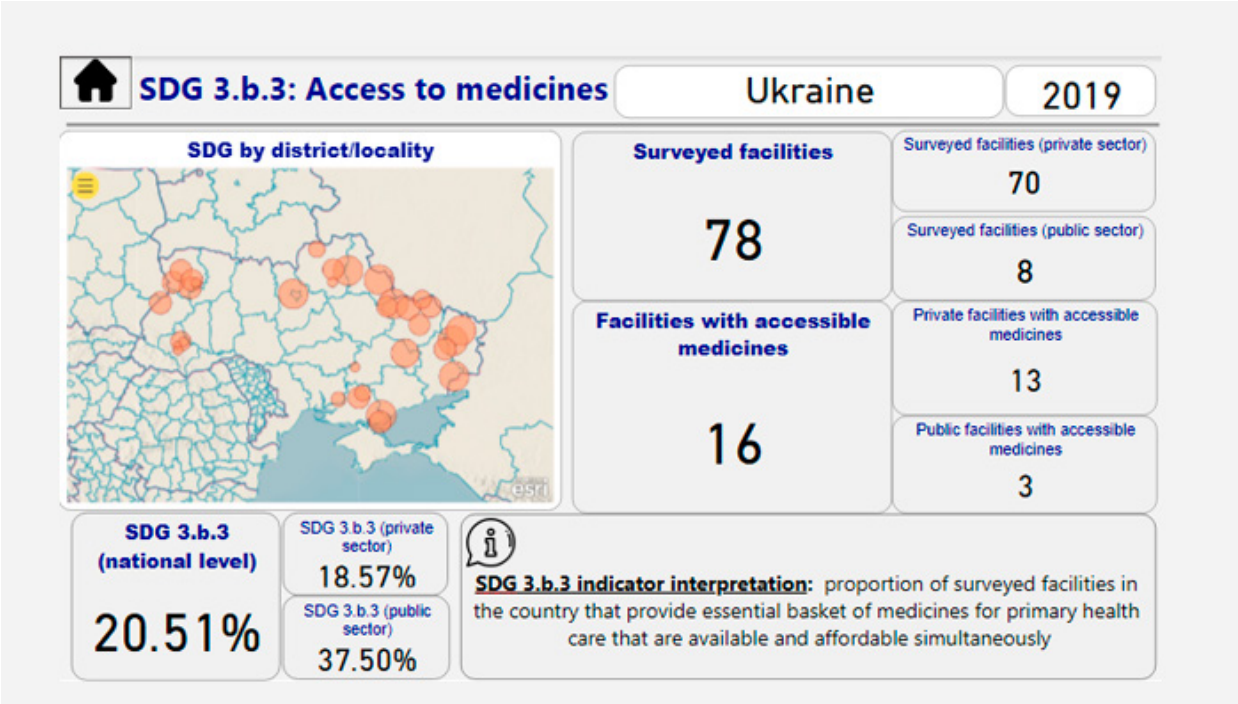
According to the new WHO approach, a medicine is "affordable" (low cost) if the LPGW does not have to work extra hours to be able to pay for the medicine (no EDW needed). Following this interpretation, if the value of EDW is greater than 1, the medicine is not affordable (low cost) (since extra money is needed for the LPGW to buy the medicine). If it is less than 1, the medicine is affordable (low cost). See the section on affordability for more information.

Detailed information about affordability ratios computed at the medicine (INN) level is presented in Annex 12.

SDG indicator 3.b.3 analysis results

Analysis of SDG indicator 3.b.3 provided information on access (available at low cost) to the cheapest available selected medicine in every facility surveyed at the medicine, facility and national levels (Fig. 6).

Fig. 6. SDG indicator 3.b.3 results at the national level



Source: WHO (Power BI platform)

Among the 78 surveyed facilities considered for SDG indicator 3.b.3 analysis,[4] eight were public sector and 70 private sector. The analysis found that the proportion of health facilities in Ukraine that had an essential basket of medicines for primary health care that were available at low cost was 20.5%. The SDG indicator 3.b.3 figure was substantially lower in the private sector (18.6%) than the public sector (37.5%).

According to the steps to measure SDG indicator 3.b.3, the access index was first computed at the facility level. Overall, 16 facilities (13 private and three public) reached the threshold level of 80% in the analysis of medicine accessibility, as they had a core set of relevant essential medicines that were available at low cost.

Distribution of facilities with accessible medicines across regions was uneven (Table 3). In three of the seven regions surveyed (the capital Kyiv and Ivano-Frankivsk and Volyn regions), no facilities had a recorded weighted access of more than 80%. Of the 78 facilities surveyed, 21 had a level lower than 50% for medicine accessibility.

Table 3. Facilities with accessible medicines across regions

Facility ID	Region	Weighted access
HFID_unlisted_Nizhynsky	Chernihiv	99.92%
HFID2-24837286	Chernihiv	89.43%
HFID7-36655448	Chernihiv	100.00%
HFID103-22678794	Kharkiv	96.79%
HFID40-37763205	Kharkiv	95.43%
HFID44-30883122	Kharkiv	92.25%
HFID48-25180279	Kharkiv	99.21%
HFID50-22654831	Kharkiv	80.55%
HFID14-01333643	Kherson	81.49%
HFID15-38199357	Kherson	99.92%
HFID20-31759963	Kherson	98.39%
HFID21-	Kherson	95.48%
HFID24-36400821	Kherson	81.49%
HFID25-37557072	Kherson	100.00%
HFID_unlisted_Severodonetsky2	Luhansk	99.92%
HFID38-23262004	Luhansk	99.48%

4 *Note*: for availability analysis the data from all 81 surveyed facilities were used. Due to the incorrect filling of data in the price section, three objects were not validated and therefore cannot be used to measure SDG indicator 3.b.3.

Weighted access in all facilities in Ivano-Frankivsk region was lower than 61%, with median access of 43.88%. Median weighted access in facilities in Kyiv city was 75.02%; it was 76.70% in Kharkiv, 78.15% in Volyn, 79% in Chernihiv, 79.06% in Luhansk and 79.73% in Kherson regions (see Annex 13).

Table 4 indicates the extent to which medicines from the defined basket were available at low cost across the 78 health facilities with validated data. Green colour coding indicates that the medicine was available at low cost in at least 80% of the facilities surveyed (at least 63 of the 78 facilities). Red colour coding indicates that medicine was not available at low cost in 50% of the facilities surveyed and more (in 39 or more of the 78 facilities).

Access at less than the 80% threshold was reported for half the categories assessed and at less than 50% was reported for four categories: opioids (morphine), insulin human regular, oral contraceptives and corticosteroid inhalers (beclometasone).

Table 4. Availability and affordability by medicine category

Medicine category	Available (proportion of facilities)	Affordable (proportion of facilities)
Angiotensin-converting enzyme inhibitor (enalapril)	100.00%	97.33%
Basic pain drugs (paracetamol)	100.00%	100.00%
Antiallergy drugs (dexamethasone)	98.72%	98.72%
Diuretic (furosemide)	98.72%	98.72%
Nonsteroidal anti-inflammatory drugs (ibuprofen)	97.44%	97.44%
Calcium channel blocker (amlodipine)	96.15%	93.59%
Hypothyroidism (levothyroxine)	94.59%	94.59%
Cephalosporins (ceftriaxone)	93.59%	93.59%
Salbutamol	93.42%	93.42%
Antifungal (fluconazole)	91.03%	91.03%
Biguanides (metformin)	85.53%	85.53%
Partial seizures (carbamazepine)	84.62%	84.62%
Sulfonylureas (gliclazide)	84.00%	84.00%
Folic acid	82.19%	82.19%
Oxytocin	78.21%	78.21%
Acetylsalicylic acid	75.00%	75.00%

Medicine category	Available (proportion of facilities)	Affordable (proportion of facilities)
Betablockers	74.36%	74.36%
Oral amoxicillin	73.08%	73.08%
Oral rehydration salts	71.62%	71.62%
Aminoglycosides (gentamicin)	71.23%	71.23%
Magnesium sulfate	70.83%	70.83%
Selective serotonin reuptake inhibitors (paroxetine)	70.31%	70.31%
Statins (simvastatin)	60.56%	60.56%
Corticosteroid inhalers (beclometasone)	33.82%	33.82%
Insulin human regular	24.56%	7.02%
Oral contraceptives	19.23%	19.23%
Oral morphine	0.00%	0.00%

Assessment findings

Overall, data on availability and prices were obtained for 39 INNs in 81 facilities. Within the 39 INNs, 280 brands were identified as available, and each data collector made a total of about 4900 entries. The number of available medicine categories and brands within these varied from pharmacy to pharmacy. Each facility had between 12 and 143 entries, based on the number of available products (core or alternative medicines) on the day of the visit. The assessment identified some observations regarding medicines distribution practices in the Ukrainian retail sector.

- Average availability of medicines at the category level across the regions surveyed was 80.10% (see Annex 7).
- The categories opioids, insulin, antipsychotics and corticosteroid inhalers were the least available in all regions; this is probably the result of low demand in private pharmacies, which do not participate in the AMP reimbursement scheme and do not have licences to sell controlled drugs.
- MUPs in the public and private sectors were competitive, and below IRPs.

- Prices of the lowest-priced generics and MUPs were higher in the public than the private sector.
- Almost half of the medicines observed and recorded were locally produced.
- The most common places medicines were imported from were France, Germany, Hungary, India, Poland, Slovenia and the United Kingdom.
- The majority of importers were manufacturers based in Europe.
- The proportion of originator products among the 280 observed brands was 11.39%; the United Kingdom was the most common country of origin (4.12%), represented by two manufacturers.
- Almost all the molecules analysed (except beclomethasone, budesonide, oral contraceptives and spironolactone) have at least one national manufacturer.

In terms of sourcing, 47.72% of products captured in the survey were locally manufactured (Fig. 7). The number of product records means that product was mentioned during the survey as available in that medicine category (a simple count of medicines in the database that were reported across all facilities surveyed).

Fig. 7. Medicine products by location of production

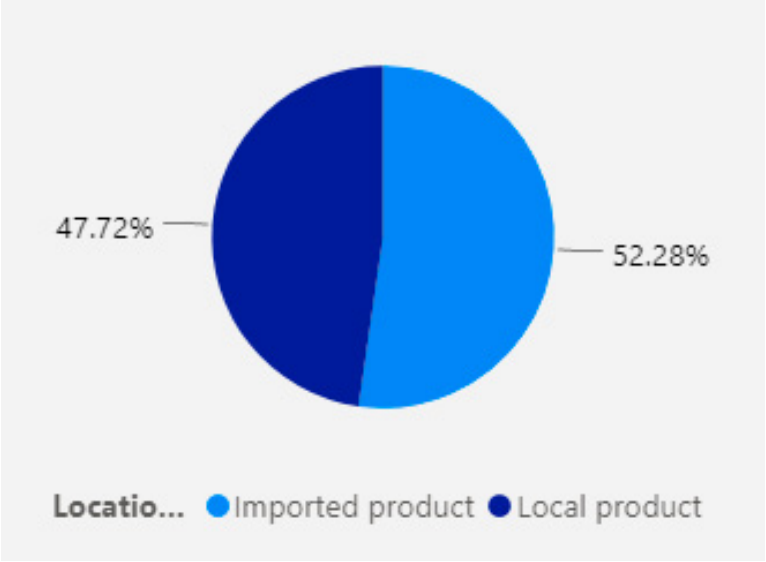


Table 5 illustrates market saturation based on the products found in pharmacies during the survey. Ukrainian manufacturers were the market leaders, supplying 47.72% of products, followed by manufacturers from Germany and India, which accounted for 6.2% and 5.91% of all surveyed medicines. Manufacturers from France, Great Britain, Poland, Slovenia and Hungary each captured around 4% of the market for the investigated medicines basket.

Table 5. Distribution of reported products by country of origin and product type

Proportion of total product records	Country of product origin	Product type	Number of product records
47.64%	Ukraine	Generic	2201
0.08%	Ukraine (insulin)	Originator	3
5.01%	Germany	Generic	244
1.20%	Germany	Originator	58
5.48%	India	Generic	269
0.43%	India (Lasix brand)	Originator	21
4.12%	United Kingdom	Originator	202
0.16%	United Kingdom	Generic	8
4.01%	Poland	Generic	197
0.12%	Poland	Originator	6
3.95%	Slovenia	Generic	194
3.46%	Hungary	Generic	170
2.24%	France	Generic	109
2.10%	France	Originator	103
1.75%	Austria	Originator	86
1.30%	Finland	Generic	64
0.96%	Netherlands	Originator	47
0.81%	Cyprus	Generic	40
0.61%	North Macedonia	Generic	30
0.59%	Pakistan	Generic	29
0.57%	Iran (Islamic Republic of)	Generic	28
0.55%	Denmark	Originator	27
0.14%	Denmark	Generic	7
0.55%	Thailand	Generic	27
0.49%	Czechia	Generic	24
0.47%	Spain	Generic	23
0.43%	Turkey	Generic	21
0.33%	Ireland	Generic	16
0.32%	Bulgaria	Generic	10
0.14%	Hungary	Generic	7
88.22%	Market share (23 countries of origin)		

Analysis of MUPs for the lowest-priced available generic within INNs at the facility level shows that, in general, while considerable price variation existed within product categories, generics were available and "affordable" (low cost) across the majority of facilities. Median prices across facilities for two molecules – insulin human regular and oxytocin – illustrated that the brand name of a product had an influence on patient or facility procurement officer choice in these categories: the prices of the lowest-priced generics were higher than the median price across all represented brands (see Annex 9).

The number of products found for a specific molecule varied from just a single brand/manufacturer (for trihexyphenidyl, prednisolone, morphine, budesonide and isosorbide mononitrate) to 12 (fluconazole, ibuprofen), 13 (metformin, enalapril), 16 (amlodipine) and 18 (ceftriaxone) unique brands and manufacturers (see Annex 8). Large numbers of unique products for these molecules are the result of the strong position of Ukrainian pharmaceutical manufacturers and healthy competition in the generics market.

The study also identified the market leading companies in terms of the number of INNs supplied:

- Company A (Ukraine), manufacturing 17 products, representing 7.30% of all products;
- Company B (Ukraine), manufacturing 14 products, representing 6.01% of all products;
- Company C (Ukraine), manufacturing 13 products, representing 5.58% of all products;
- Company D (European Union), manufacturing 9 products, representing 3.86% of all products.

Overall, only 20.5% of facilities met the SDG indicator 3.b.3 threshold level of availability of surveyed medicines (core or alternatives) that are also low cost (threshold = 80%). At the same time, if the threshold used was 75%, the number of facilities that meet the indicator concept is almost 50%, because they had 75% of surveyed medicines that are available and affordable.

Availability of medicines and MUPs across regions were uneven. Availability was highest in Luhansk and Volyn regions (about 92% and 89%, respectively). This may be due to the structure of the retail segment in regions with a predominance of outlets belonging to local or national pharmacy chains. Large chains offer consumers a wide range of medicines, which includes a larger number of INNs, different dosages of INNs, original medicines and different generics for each category of medicine. The lowest level of availability of about 70% in Ivano-Frankivsk region can be associated

with the fragmented structure of the market and ownership of retail outlets. Many retail outlets are owned by private entrepreneurs and are not united into a chain of pharmacies. This is typical in all Ukrainian rural and urban-type settlement areas. The "assortment" policy[5] in such outlets differs from big chain policies: the number of INNs and of brands per INN is limited; not all medicine categories can be represented; and stockouts for medicines can be longer than 1–2 days.

The affordability (low cost level) of medicines was similar in public and private pharmacies. It was generally good for all medicines, with standard treatment costing less than the minimum daily wage of the LPGW. According to both the WHO/HAI *(1)* and the new WHO *(14)* approaches, all the medicines surveyed were low cost.

5 An assortment policy is a model for determining the set of product groups best suited to successful work in the market and ensuring the economic efficiency of the enterprise as a whole. The assortment of goods is characterized by breadth (the number of assortment groups), depth (the number of positions in each assortment group), comparability (the presence of analogues in terms of common end use) and saturation (the total number of offered assortment positions).

Discussion

Access to essential medicines

Access to essential medicines is an aspect of fulfilment of the right to the highest attainable standard of health – in short, the right to health. Many people in the WHO European Region cannot access the medicines they need, however. Prices can be too high, and products are often not available.

Pharmaceuticals are the main contributor to out-of-pocket health payments in the European Region, and lead to catastrophic and impoverishing spending on health in many countries, including in Ukraine *(5–7)*. Ensuring access to essential medicines without creating financial hardship will contribute to ending poverty. Measurement and monitoring of access to essential medicines is therefore of high priority given that access is an integral part of UHC.

In 2014 the Health Strategic Advisory Group was established by the Ministry of Health with the aim of advising the Government of Ukraine on strategic approaches to reform, optimal use of international assistance and consolidation of donor policies to assist health reforms. The Group issued a paper to support the Government of Ukraine with the creation of the National Health Reform Strategy for Ukraine 2015–2020 *(22)*. The new implementation-focused model of health finance proposed by experts should reduce financial barriers to accessing health services, including medicines. This is an essential condition for reducing financial risk of illness and foregone care, and should include monitoring of the reform initiatives implemented.

Policy monitoring and evaluation has a critical role to play in effective design, implementation and delivery of public policies and services. It requires a thorough approach and includes establishment of standardized indicators; development of a procedure for data collection; analysis and dissemination of data in a user-friendly way to ensure understanding and use of data; capacity-building of monitoring practices; and institutionalization of processes. High-quality data inform and drive policy decisions. Field visits are one component of a monitoring strategy to ensure the quality of the data collected.

General official data indicate that current total spending on pharmaceuticals in Ukraine is about US$ 4–4.5 billion, which is about 30% of total health care spending. The allocation of public funds for medicines and medical devices in 2019 amounted to US$ 0.5 billion – that is, a small proportion of total spending on medicines. Given the dynamic nature of the sector, the outcome of the health reform can be expected to enable free competition in an open market. On the one hand, introducing market liberalization may make medicines price control seem like an excessive policy tool, taking into account the country's economic problems and the importance of domestic production. On the other hand, during the transition period, the mechanism of state regulation of medicines prices should be maintained using the NEML, which should improve implementation of the reform.

The NEML regulation mechanism could include:

- introduction of a price registration procedure similar to those found in the European Union;
- external price referencing for originator medicines that are part of the NEML;
- competitive price referencing for generics;
- continuing reimbursement based on internal price referencing;
- monitoring availability, prices and accessibility of medicines that are part of the NEML.

In addition to availability, health facilities must also ensure that patient has choice and that a high-quality generic is available and offered at low cost. Among the facilities visited during the survey, some stocked less than 75% of the essential medicines in the survey basket. The reasons pharmacies did not offer the full basket of essential medicines may differ. This could be caused by low demand; unwillingness of the owner to participate in government reimbursement programmes that require additional pharmacist time; the desire to exclude low-profit medicines from the product list; or lack of a policy indicating requirements, such as mandatory presence of specific INNs or availability of quality low-cost generics from the register of medicines subject to reference pricing.

The successful application of marketing principles by the majority of players in the pharmacy market is worth noting. Modern marketing technologies allow pharmacy owners to be more profitable and popular than their competitors, but at the same time this leads to an increase in out-of-pocket spending among the population. Customers can be offered the most expensive analogues because they are automatically selected by the facility's computer program and the pharmacist is instructed to suggest them by the owner via standard operating procedures. Cheaper analogues can be offered after a customer refuses the more expensive medicine. In parallel, a patient may receive information from the pharmacist about the ineffectiveness of a cheap medicine as an argument in favour of an expensive analogue. To form a fair pricing strategy for essential medicines, it is essential to expand the reference pricing mechanism and apply it to all imported medicines within the NEML.

The unevenness of the economic and social levels of the regions in Ukraine must be considered when formulating policy. Differences in coverage by pharmacies with different forms of ownership and the affiliation of outlets to pharmacy chains with different financial and economic characteristics affects the index of access to medicines. Since non-industrial regions and rural areas are covered by small-chain or single pharmacies owned by private entrepreneurs (up to 50% in relation to the share of pharmacies belonging to large chains of legal entities *(23)*), the selection policy and availability of the entire NEML cannot be guaranteed.

Absence of service provision due to unprofitable products or other reasons affects patient health. If insufficient public facilities provide a comprehensive pharmaceutical service owing to market liberalization, this will reduce access to essential medicines. If the current policy does not provide sufficient incentives for private facilities to dispense the full range of essential medicines, it will not support achievement of SDG 3. Without financial incentives for private health providers to participate in all govern-

ment initiatives to expand access to essential medicines, it is difficult to achieve the desired availability of low-cost quality essential medicines.

Private sector engagement to improve pharmaceutical management can support systems of transparency and accountability and include information exchange on medicines prices and availability, expanding private pharmacies' participation in the AMP to increase national coverage. It is important to study and learn how to use this strategy in the interests of the population.

All medicines surveyed were low cost, but ensuring only one of the dimensions (availability or price) is not enough to guarantee access to essential medicines. Further, when monitoring access, it is necessary to use complementary approaches to consider the quality of medicines.

Findings in relation to the recommendations of the 2012 survey

The survey conducted in March 2012, using the WHO/HAI methodology *(1)*, focused on essential medicines (report available via the HAI database *(3)*). It found that overall availability of generic medicines was good in public (77%) and private pharmacies (81%). Beclometasone and budesonide inhalers – essential medicines to control asthma – had poor availability in both sectors, however.

- The 2019 survey, which used the new WHO methodology *(1)*, showed that issues with access to corticosteroid and bronchodilator inhalers continued. This category was the least available in many of the regions surveyed.

In 2012 patient prices in public pharmacies were higher for both originator brands and generics than in private pharmacies.

- The 2019 survey found that the lowest-priced generics and MUPs remained higher in retail price in the public sector.

The low cost of medicines was similar in public and private pharmacies in 2012. For many treatments, people on the minimum wage would require no more than one day's wages when buying the lowest-priced generic, but originator brands were more expensive.

Overall, private sector patient prices for the lowest-priced generics were lower in Ukraine than in a selection of European countries, but some originator brands had higher prices in Ukraine.

The 2012 analysis showed that a combination of policies should be implemented to make more medicines available at low cost. Investigators recommended conducting an in-depth study of price components for essential medicines.

- A new mark-up regulation policy for NEML was put in place in July 2019, but its impact on access to medicines has not yet been monitored.

The 2012 investigators recommended determining the causes of regional differences in availability and prices of originator brands and generics, and including additional regions in the next survey.

- An assessment of the AMP by WHO in 2018 *(24)* and the 2019 survey showed uneven distribution of facilities with accessible medicines across regions.

Other recommendations of the 2012 analysis included strengthening generics policies – including permitting generic substitution by pharmacists for all medicines; publishing the results of bioequivalence studies; and educating physicians, pharmacists and the public about the economic benefits of using quality-assured generic medicines – and establishing a system to monitor the price and availability of essential medicines regularly in the public and private sectors.

- The 2019 survey found that a system to monitor the price and availability of essential medicines regularly was still not in place.

The 2012 survey also recommended improving transparency by publishing the prices paid by the government on a publicly accessible website, and supporting gathering and exchange of price and availability information from countries in the WHO European Region (including European Union and Commonwealth of Independent States countries).

- External price referencing was introduced in Ukraine in the outpatient sector in 2017 and in the inpatient sector in late 2019. Reference pricing is currently only applied to a small group of medicines within the AMP basket of medicines (23 INNs) and a short list within the NEML for procurement in the inpatient sector (23 INNs as of January 2020).

A roadmap to improve access to essential medicines in the outpatient sector, which was developed as a recommendation of the 2012 survey, has not been fully implemented, but its recommendations remain useful and necessary measures.

Conclusions and limitations

The main observations and conclusions, based on the results of both the 2012 and 2019 surveys, are as follows.

- The government's focus on health financing reforms is the way to catalyse transformation in service delivery, improve benefit packages and achieve UHC. To optimize service delivery efficiency, high-quality data should be used as accelerators.
- Price monitoring activities should be initiated and conducted by the Ministry of Health or other national medicines authority to ensure higher probability that the findings will be used to make any necessary changes to the policy.
- Price policy implementation needs to be upheld in the outpatient sector.
- The need for a pricing policy that ensures availability of the lowest-priced generic across a greater proportion of facilities and for awareness-raising about IRPs among patients to provide information about the lowest-priced generics within medicine categories is clear.
- Common barriers to access to medical products, such as geographically uneven access (distance to the point of service) and organizational problems (lack of available service providers with a full range of medicines/services) should be brought to the attention of regional health departments and implementation of the decisions made should be monitored.
- While WHO and other agencies can provide technical support for routine monitoring when requested, data collection, validation and analysis should be a regular function of national governments.
- Routine reporting intended to provide a general overview to high-level policy-makers should be brief, highlighting key findings and recommendations for improvement.
- Routine reporting intended to monitor and evaluate implemented policies may be more technical, rather than including conclusions and recommendations for improvement.

The findings of this study show the importance of legislative improvements in Ukraine to achieve the goal of health care reform – namely, to implement pricing policies for a broader list of medicines from the NEML to make more medicines available at low cost, and to encourage generic prescription and dispensing.

A major strength of this study is its use of a reliable and standardized method to measure medicine prices and the availability of medicines at low cost. A limitation is that two key dimensions – availability and low cost – were determined, but product quality in terms of the level of evidence of bioequivalence, and thus prices of generics

from different classes of medicinal products, indicating their evidence of bioequivalence, were not registered.

Another limitation is that the Management Sciences for Health reference prices are medians of recent procurement prices offered by for-profit and non-profit suppliers to international non-profit agencies for mostly generic products. This means that these IRPs are dependent on the number of supplier prices used; this also determines the reliability of the MPRs. In cases where very few or no supplier prices are available and the buyer price is used as a proxy, MPR results can be skewed by a particularly high or low IRP. For subsequent monitoring, it is thus necessary to select country-specific reference prices – external or internal reference pricing – that are available and calculated for the most essential (in volume of annual consumption) list from the NEML, in line with the purpose and design of the study, which may include additional monitoring parameters.

Progress towards the SDGs, 2020

Work on the SDGs began in Ukraine in 2015. The first step involved adapting the Goals in line with the specifics of national development. The 2017 national baseline report provided a basis for the national SDG system – it defined 86 targets and 172 indicators of national development and set target values for the 2030 horizon *(25)*. The number of indicators was increased to 183 as part of further developments of the national system of SDG monitoring, through adoption of Order No. 686-p of 21 August 2019 of the Cabinet of Ministers. The first monitoring report was drafted in 2019, based on these 183 indicators, and 16 indicators were chosen to measure progress towards achievement of SDG 3, which aims to ensure health and well-being for all at all ages.

All United Nations Member States are expected to review national progress towards the SDGs at least once, and to present a report to the United Nations High-level Political Forum; Ukraine's first Voluntary National Review *(26)* was presented in July 2020. This highlighted a number of positive trends in relation to SDG 3. Progress in Ukraine has been hampered, however, by:

- insufficient public funding of the health system;
- the absence of a unified system for monitoring circulation of medicines, meaning that the number of counterfeit medicines cannot be determined.

In the context of the COVID-19 pandemic, the Ukrainian medical system must cope with both the challenges of responding to the epidemic and the need to provide medical services in the new environment. Any disruptions to the provision of services and

medicines, which could affect the outcome of treatment or deteriorate quality of life, thereby endangering the lives of patients, must be prevented. In such an environment, it is especially important to monitor access to essential medicines regularly – in particular, those for outpatient treatment of NCDs, which are a significant public health burden.

To measure progress towards SDG target 3.8 (achieve UHC, including financial risk protection, access to quality essential health care services and access to safe, effective, quality and affordable essential medicines and vaccines for all), Ukraine has chosen to monitor only the indicator on the decline in smoking prevalence in the population to reduce the level of NCDs. Monitoring of target 3.8 is incomplete unless it tracks two aspects of UHC: financial protection and coverage of essential health services. The government should implement measurement of these indicators to be accountable to people's rights to health.

The following SDG indicators, proposed in the global framework of the United Nations Economic and Social Council *(27)*, support monitoring progress towards access to essential medical products:

- 3.b.1 – proportion of the population with access to affordable medicines and vaccines on a sustainable basis;
- 3.b.2 – total net official development assistance to medical research and basic health sectors;
- 3.8.1 – coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health; infectious diseases; NCDs; and service capacity and access, among the general and the most disadvantaged population);
- 3.8.2 – proportion of population with large household expenditures on health as a share of total household expenditure or income.[6]

Credible data sources to monitor progress include nationally representative health facility assessments and dedicated surveys of health facilities (with reference to SDG indicator 3.b.3).

To maintain support from development partners in its progress towards achieving the 2030 Agenda for Sustainable Development, the government should develop strategic documents and policies, based on public recommendations following discussion of the Voluntary National Review and assessments conducted by United Nations agencies

6 In the WHO European Region, regional indicators of financial protection are used to monitor country-level and regional progress towards UHC, to address the limitations of SDG indicator 3.8.2. See, for example, WHO Regional Office for Europe *(5)*.

and other stakeholders. Implementation of an evidence-based SDG-oriented policy is crucial to success in achieving progress in the SDGs. Monitoring of SDG targets 3.b and 3.8 should be comprehensive, and relevant indicators should be introduced for adequate monitoring and evaluation.

Availability of high-quality data with a high level of disaggregation facilitates development of evidence-based policies.

The assessment conducted to measure SDG indicator 3.b.3 showed that monitoring of access to essential medicines is now feasible, and can become part of overall SDG monitoring in Ukraine.

Recommendations

The following actions are recommended to support the government's strategy of providing the population with medicines:

- to integrate routine medicine price and availability monitoring activities into standard regulatory functions;
- to determine the causes of regional differences in availability and prices of essential medicines and undertake further research into the causes of uneven availability of some medicines, initiating another study to assess access to essential medicines in rural areas;
- to improve transparency by computing reference prices and publishing the prices of the lowest-priced generics for the NEML on a publicly available or promoted website;
- to contribute validated data to WHO's Price Information Exchange for Medicines portal, for inclusion in the regional searchable pricelist database and price comparison dashboard;

- for subsequent monitoring, to select the purpose and design of the study, which may include additional monitoring parameters (such as the level of evidence of bioequivalence) and a country-specific reference price – external price referencing or IRPs;
- to analyse access to low-cost essential medicines, moving away from measuring only availability and towards measuring other dimensions (including low cost and quality) –as owing to the lack of data before 2019, progress towards SDG target 3.8 on access to medicines cannot be assessed, and success in ensuring one of the dimensions does not necessarily indicate realization of others;
- to include SDG indicator 3.b.3 in the set of indicators used to review national progress towards the SDGs.

To ensure that regular monitoring is integrated into country activities, the Ministry of Health should identify the unit within the Ministry or national regulatory authority and the government official who will be responsible for official annual reporting. The following steps are also recommended:

- organization and management of the medicines price monitoring unit with the necessary human, technical and financial resources, including a qualified data analyst, statistician and data collection manager;
- use of the advisory committee on selection of medicines for the NEML to support the development of monitoring methodology, analysis and interpretation, and dissemination of results;
- conducting training for data collectors and survey coordinators – through online platforms where possible – to ensure the sustainability of medicines monitoring programmes;
- designating personnel outside the monitoring team to be responsible for quality assurance management, to ensure the validity of data collected and consistency of data analysis;
- periodic reviews and updating of study methodology and design – for example, including new medicines in the basket to be monitored or replacing a facility during an ongoing study if it is impossible to conduct a survey due to inaccessibility of a selected object.

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Annexes

Annex 1.
National health reform and pharmaceutical policies

Background

As of 2019, Ukraine is a lower middle-income country with US$ 3.659 gross domestic product (GDP) per capita *(1)*; public health expenditure as a share of GDP is 2.9% (95.8 billion hryvnia). Life expectancy at birth is 71.2 years, with NCDs the major causes of death. The number of patients enrolled with primary health care providers is 30.1 million (71.44% of the population) *(2)*.

Access to safe, affordable, quality-assured essential medicines and health technologies is an integral component of an effective health care system – which is crucial to the attainment of UHC *(3)* – and considered to be a fundamental human right *(4)*. Providing access to the appropriate medicines at the correct time and at an affordable price remains a key issue globally, as availability of medicines varies depending on the level and type of service provision (public government, private or nongovernmental charity provision). Member States in the WHO European Region, including Ukraine, are maintaining progress towards UHC, and recognize that access to essential medicines can be further hampered in emergencies such as a pandemic.

After gaining independence in 1991, Ukraine inherited a centralized Semashko model of health care, according to which all citizens are eligible for state-funded health services that are supposed to be provided free of charge at the point of service. The population has to make out-of-pocket payments for a high proportion of outpatient and inpatient services, however, and for almost all medicines, because of significant gaps in health care coverage.

The situation with access to essential medicines has improved in recent years, but still requires policy initiatives from the government to maintain progress towards UHC. For example, according to a 2011 household survey, 22.6% of those who needed to buy medicines were not able to get them, primarily for affordability reasons *(5)*. During 2005–2012, annual spending on medicines in public institutions was only 5–6% of total expenditure, which forced households to pay for the majority of pharmaceuticals and other medical supplies; this led to patients avoiding seeking medical care *(6)*.

Political instability and dramatic economic decline in 2014 and 2015 significantly increased out-of-pocket payments. A 2018 WHO publication examining financial

protection in Ukraine *(7)* showed that medicines and inpatient care are the largest drivers of catastrophic spending. Household budget survey data show that the share of households reporting out-of-pocket payments grew from 86% in 2010 to 90% in 2013 and 93% in 2015. Financial hardship has also increased over time. Between 2010 and 2015, the incidence of impoverishing out-of-pocket payments rose from 7.6% of households to 9.0%, and the incidence of catastrophic out-of-pocket payments rose from 11.5% to 14.5%. For the poorest households, catastrophic spending is mainly caused by medicines.

National Health Reform Strategy for Ukraine 2015–2020

The Health Strategic Advisory Group was established on 24 July 2014, according to Order of the Ministry of Health No. 522. The initiative was set up to attract highly skilled Ukrainian and international experts, multilateral partners (World Bank, WHO and International Renaissance Foundation founder George Soros) to advise the government on strategic approaches to reform, optimal use of international assistance and consolidation of donor policies to assist health reforms. As a result of meetings and draft documents by Health Strategic Advisory Group experts, the National Health Reform Strategy for Ukraine 2015–2020 *(8)* was developed.

In 2015 the government initiated transformative reforms of its health system to improve population health outcomes and ensure financial protection from excessive out-of-pocket payments. This was to be achieved through increasing efficiency, modernizing the obsolete service delivery system and improving access to better quality of care. Implementation has successfully moved forward.

In April 2017 the Government of Ukraine made significant progress on its path toward UHC when it introduced the new AMP for outpatient medicines reimbursement. No previous mechanism had been in place for reimbursement of prescription medicines in the outpatient sector. The AMP contains 23 INNs for the treatment of cardiovascular diseases, type 2 diabetes and asthma, which are included in the NEML. Since its introduction, the AMP has gradually become a regular component of the new health benefit package. At the request of the Ministry of Health, WHO conducted an evaluation of this government initiative in 2018 *(9)*. This combined both quantitative and qualitative analysis, and the findings confirmed that the AMP has contributed to improved access to outpatient medicines, with a positive impact on the health of participating patients.

On 19 October 2017 Ukraine adopted the Law on Government Financial Guarantees of Health Care Services (No. 2168-VIII of 19 October 2017). According to this new health financing law, the state guarantees full payment according to the tariff to provide citizens with necessary medical services and medicines included in benefit package. The National Health Service of Ukraine (NHSU) was established as an institution to begin strategic purchasing with health care providers for services stipulated in the benefit package. NHSU contracting mechanisms and procedures have been in place since 2018. Overall, 98% of primary health care providers have signed contracts with the NHSU and received their first payments based on the number of citizens enrolled.

In line with the ongoing health system reform, the government conducted activities to ensure equitable access to essential medical products, vaccines and technologies of assured quality, safety and efficacy for the population. The Ministry of Health led the process of harmonizing national legislation in the pharmaceuticals area; strengthening capacity in quality assurance; promoting a pharmacovigilance system; and ensuring public procurement of safe, affordable, effective medicines.

Since 2015, procurement of medicines and medical devices under the centralized programmes of the Ministry of Health has been transferred to international procurement organizations – the United Nations Development Programme, the United Nations Children's Fund and Crown Agents. In 2015, international organizations purchased medicines and medical devices under separate programmes, and since 2016, purchases under all centralized programmes have been transferred to international organizations. At the end of 2019, the opportunity to purchase some medicines and medical devices through international organizations was extended until 31 March 2022.

The state enterprise Medical Procurement of Ukraine was established in 2018 and received the status of a central procurement agency to purchase medicines and medicinal products from the state budget and grants from 2020. It also provides procurement services for regional hospitals, and supports the Ministry of Health with the administration of procurement through international organizations. In 2020 a simplified procedure for registration for and exemption from value added tax was introduced for medicinal products purchased through Medical Procurement of Ukraine. In addition, if no analogues are registered in Ukraine, the agency can purchase medicines registered elsewhere, if they are approved for use in at least one of the following countries – Australia, Canada, Japan, Switzerland and the United States of America – or authorized by the European Medicines Agency centralized procedure.

In 2018 the Cabinet of Ministers of Ukraine adopted the State strategy of realization of the state policy of providing the population with medicines until 2025 in Resolution No. 1022 of 5 December 2018. This was developed on the basis of WHO recommendations, according to which the State strategy is defined as a political commitment and guidance for action to ensure the availability and rational use of effective and safe medicines of adequate quality. The State strategy sets out the framework of interaction of all participants – in particular, the public and private sectors, public organizations, donors and other stakeholders – and defines their roles in this process.

Providing the population with medicines and increasing their availability is an integral part of state policy in the field of health care, which aims to create a patient-centred system, as implemented in developed European countries. The State strategy also aims to reduce the financial burden on the population, creating an effective financing mechanism and introducing a new model that will stimulate rational use of medicines by health care facilities and the population, as well as increasing medicine affordability.

Rights and guarantees in the field of health care related to medical care, and provision of medicines are provided by other laws for certain categories of people and are financed by programmes from the state and local budgets, trust insurance funds

and other sources that are not prohibited by law. Laws may establish additional state financial guarantees for the provision of medical services and medicines. The law stipulates that medicines included in medical guarantee programmes should be in the NEML, and are subject to payment via the state budget.

To support and improve reimbursement and pricing policies, in January 2019 the Department of Health Technology Assessment was established within the structure of the state enterprise State Expert Centre of the Ministry of Health of Ukraine. This is responsible for rational pharmacotherapy, reference pricing and health technology assessment in the health sector, taking into account pharmacoeconomic analysis.

In 2019 total budget expenditure on health care amounted to 95.8 billion hryvnia or 2.9% of GDP. At the same time, about 7.7% of GDP was spent on health care, according to experts; thus, the remaining 4.8% was from out-of-pocket spending.

As of 13 April 2020, health care expenditure increased to 132.3 billion hryvnia, or around 2.6% of GDP. It is important to note that, in accordance with the Law on Government Financial Guarantees of Health Care Services of 2017, funds from the state budget of Ukraine in the amount of not less than 5% of GDP should be directed to implementation of the programme of medical guarantees.

Serious challenges are still facing the government, but these can be overcome, health outcomes improved and financial hardship for the population reduced through consistent implementation and careful policy dialogue. As part of continuous technical support from development partners in such government initiatives, a report was developed, based on a joint WHO–World Bank review of April – July 2019 *(10)*. The review looked at progress in implementing health financing reforms in Ukraine and concluded that the overall design of the reforms was in line with international good practices to improve access, quality and efficiency of health services.

Key indicators and trends of the pharmaceutical market

- The significance of domestic production is a notable feature of the Ukrainian pharmaceutical market. National manufacturers represent around 70% of the retail and hospital market in volume and almost 40% in value. The market is also dominated (in both volume and value) by generic and traditional medicines *(11)*.
- For medical devices there is a predominance of foreign production in monetary and physical terms, with the share of foreign goods exceeding 50%.
- Three distributors provide almost 82% of total pharmaceutical wholesale supplies.
- A huge share of retail outlets belongs to private legal entities. The top three pharmacy chains currently provide 30% of total retail turnover.
- The main driver of pharmaceutical sales market development is the retail segment. The share of hospital segment is 11% in monetary terms and 9% in physical terms.
- In 2009–2018 the State Service of Ukraine on Medicines and Drugs Control issued 113 licenses on pharmaceutical manufacturing that were valid in 2019.

- The pharmaceutical industry in Ukraine is a significant contributor to the national economy, alongside the information technology, agricultural and chemical production sectors. It employs only 0.15% of the total number of employees but creates 0.83% of the country's GDP and provides 24 billion hryvnia of added value.
- The pharmaceutical sector overcame the crisis of 2014 and is rapidly recovering. Over the past three years, the industry has grown by an average of 11% per year, which is three times faster than Ukraine's economy as a whole *(12)*.

The retail pharmaceutical sector

Marketing organizations and distributors in the retail pharmaceutical sector

According to 2019 results based on data from market research company Proxima Research, the top marketing organizations in terms of sales of pharmacy basket goods in monetary terms are Farmak (Ukraine), Arterium Corporation (Ukraine) and Sanofi (France) *(13).*

The volume of medicine retail sales in 2019 was 86.0 billion hryvnia (US$ 3.35 billion), or 1.1 billion packages (a consumer unit according to the certificate of registration of a medicinal product in Ukraine). An increase in sales of 15% in hryvnia and 22% in dollars was noted, while in physical terms (packages), sales decreased by almost 3% compared to the same period in 2018.

Active promotion of drugs and advertising is one of the key factors in increasing sales. Farmak (Ukraine), GSK Consumer Healthcare (United Kingdom) and Reckitt Benckiser Healthcare International (United Kingdom) rank first in the list of companies in terms of audience contact (equivalent gross rating points).

In recent years, three clear leaders have emerged in the pharmaceutical wholesale distribution segment: BaDM, Optima-Pharm and Venta. In 2019, the share of sales of these distributors was almost 82%.

Infrastructure of the retail pharmaceutical sector

The pharmacy market in Ukraine is very saturated and, as a result, highly competitive. Overall market profitability is not high, but the market is quite liquid, because demand for medicines grows from year to year. Factors that increase demand include a lack of trust among the population in primary health care doctors, in connection with which self-medication and unjustified use of medicines with unproven efficacy, or prophylactic use of potent medicines, are widespread.

Over the past few years, the total number of outlets in the territory controlled by the Government of Ukraine has not changed significantly, according to Axioma syndicate database and Proxima Research data *(14)*. The pharmacy market is still fragmented and one of the least consolidated in Europe, which may be due to a lack of foreign investors in the segment.

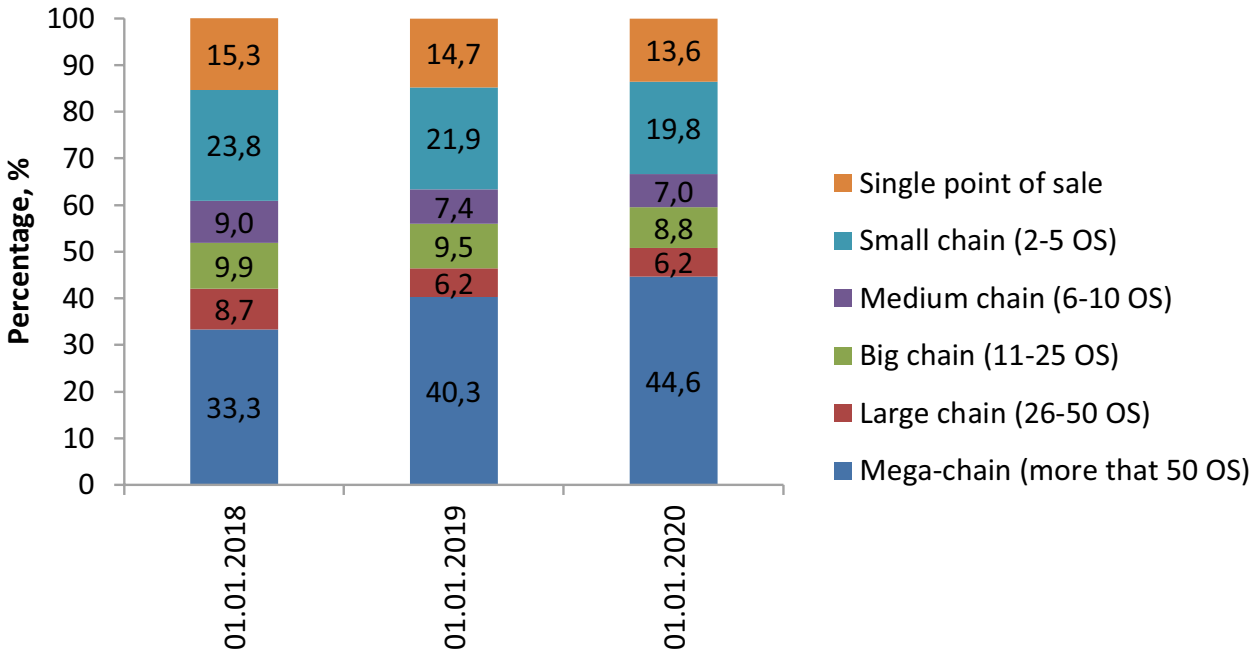
At the same time, there is a tendency towards gradual market consolidation. The trend of increasing the share of mega-chains, as well as local (regional) networks in the structure of outlets continues.

As of January 2020, there are slightly fewer than 20 000 outlets in Ukraine: 16 000 pharmacies and 3900 pharmacy outlets. This gives a total of about 1900 people per outlet.[1] The density of pharmacies is 53 outlets per 100 000 inhabitants. For comparison, according to the Organisation for Economic Co-operation and Development, the European Union average is 31 pharmacies per 100 000 inhabitants.

In 2019, the top 10 pharmacy chains by the number of outlets were Pharmacy-Magnolia, Gamma-55, Sirius-95, Podorozhnik, Pharmastor, Med-Service Group, Pharmaciia (Odessa), 3i, Zdorova Rodyna and D.S.

The share of mega-chains (including more than 50 outlets) is increasing: over the past three years, the share of outlets belonging to mega-chains has increased by more than 10% and now stands at 44.6% (Fig. A1.1).

Fig. A1.1. Share of outlets in terms of the pharmacy chain size, 2018–2020



The top three pharmacy chains (Pharmacy-Magnolia, Gamma-55 and Sirius-95) currently provide 30% of total turnover. The top 100 pharmacy chains currently hold 78% of the market, and their share in terms of sales has increased by 9% over the past two years.

It should be noted that most pharmacy chains represented in the market are local. In total, as of January 2020, 4400 chains that operate within only one region in Ukraine.

[1] According to the electronic census, the current population of Ukraine on 1 December 2019 was 37 289 million people (data published on 23 January 2020).

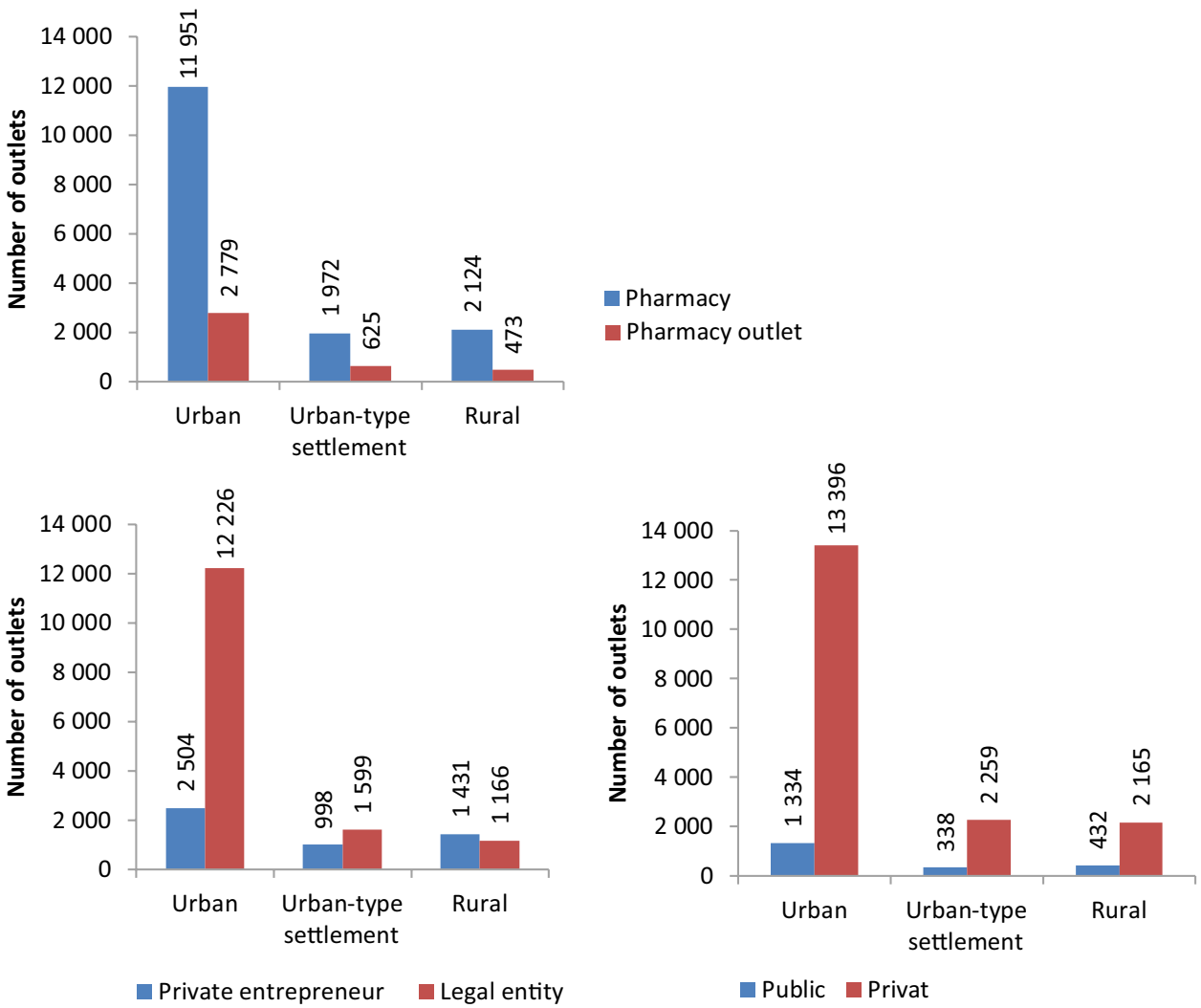
Only seven national pharmacy chains (covering all areas in more than 15 regions) are operational: Pharmacy-Magnolia, Gamma-55, Sirius-95, Podorozhnik, Pharmastor, Med-Service Group and IK VEL.

The top five regions in terms of the number of outlets are Dnipropetrovsk, Odesa, Kharkiv, Lviv and Kyiv regions (the most densely populated regions). The capital city Kyiv, represented as an independent administrative unit, has 1500 outlets (or 7.7%) in its territory.

Form of ownership

The vast majority of outlets belong to legal entities, and the larger the settlement, the greater the share of outlets owned by legal entities (Fig. A1.2). The share of outlets owned by private entrepreneurs continues to decline, and as of January 2020 was less than 25% (fewer than 5000 outlets).

Fig. A1.2. . Number of pharmacies of different types by type of settlement



The share of municipal pharmacies (a form of public health ownership) also continues to decline and currently stands at 10.6%. It should be noted that among enterprises licensed to manufacture medicines in pharmacies or dispense controlled drugs, the majority belong to the municipal form of ownership. At the beginning of 2020 there were slightly more than 2000 municipal pharmacies, which is about 10% of Ukrainian pharmacies.

On average, each outlet has about three employees (extrapolated data), but staffing largely depends on the type of institution and form of ownership.

A total of 14 700 of pharmacies and pharmacy outlets are located in cities (74%), and 5200 in rural and urban-type settlement areas (26%).

The cities are dominated by retail outlets owned by legal entities – their share is actively increasing and currently stands at 83%. In urban-type settlements, the share of outlets owned by legal entities is also gradually increasing (currently more than 60% of retail outlets). In villages, on the contrary, pharmacy establishments belonging to private entrepreneurs are in the lead, with a small advantage.

According to 2019 results, the average revenue per outlet in Ukraine is 459 000 hryvnia per month. In terms of different types of outlet, however, the average revenue varies: for pharmacies the figure is 521 300 hryvnia per month; for pharmacy outlets it is 240 800 hryvnia per month.

Medicines consumption

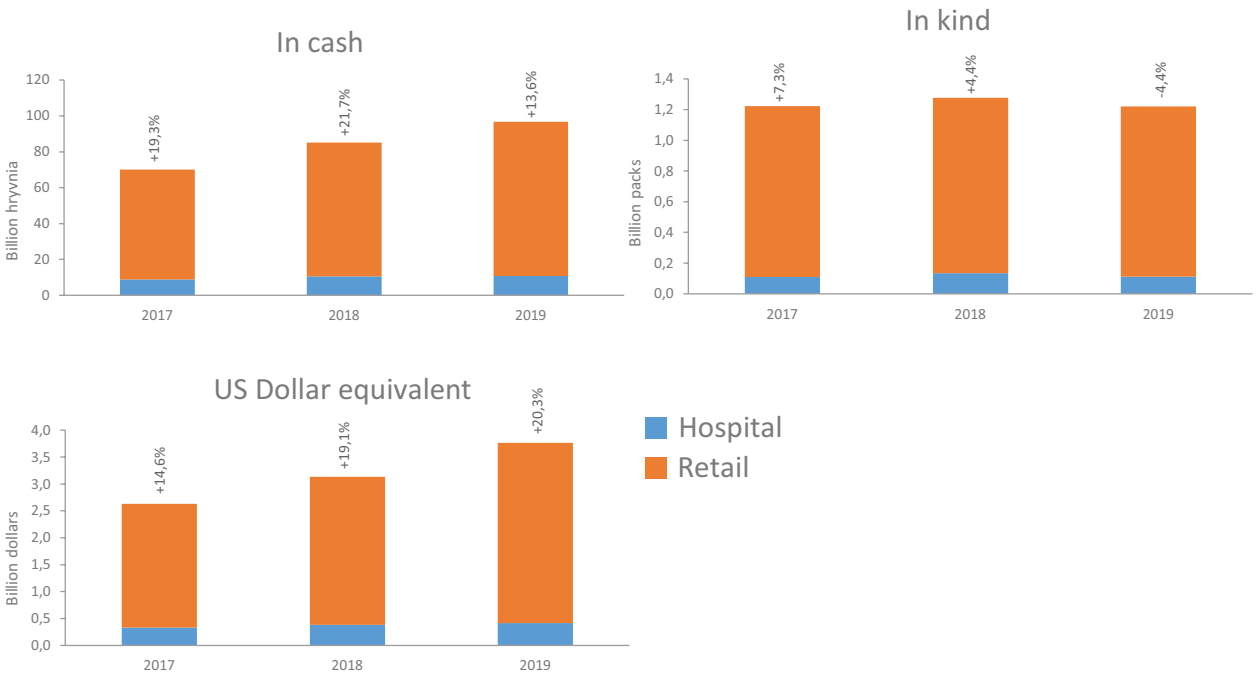
The Proxima Research methodology for calculating hospital purchases in Ukraine uses data from accepted tenders, distributor shipments and samples from health care facilities *(15)*. The calculation takes into account monthly funding from local and state budgets, and includes monitoring and systematization of data on the results of procurement of medicines by international organizations authorized to meet the needs of state programmes of the Ministry of Health.

According to Proxima Research data for 2019, the total volume of the Ukrainian market of medicines – which includes both the retail and hospital segments – amounted to 96.8 billion hryvnia or US$ 3.8 billion. The overall growth of the market was recorded at 13.6% in hryvnia and 20.3% in dollars. In physical terms, conversely, there was a decrease in sales by 4.4%, and the market volume was 1.2 billion packages.

The main driver of market development is the retail segment. The share of hospital segment remains extremely small, at 11% in monetary terms and 9% in physical terms.

In 2019 the volume of hospital supplies amounted to 10.7 billion hryvnia (US$ 416.4 million) and 111 million packages. Fig. A1.3 shows the dynamics of retail sales and hospital supplies of medicines in cash and in kind, as well as in dollars for 2017–2019.

Fig. A1.3. Dynamics of retail sales and hospital supplies of medicines



In the hospital segment, the main components of medicines procurement in 2019 can be identified as:

- direct purchases of the Ministry of Health under state centralized programmes;
- procurement of the Ministry of Health under state centralized programmes through international organizations;
- purchases from local budgets;
- purchases from the state budget;
- purchases by private medical institutions.

In the structure of hospital supplies of medicines in terms of contractors, a significant proportion is purchased using local budgets. Deliveries to private hospitals amount to about 1 billion hryvnia and 4 million packages in volume.

In 2020 financing of medicines provision in the inpatient and outpatient sectors should come from:

- procurement under centralized programmes of the Ministry of Health, carried out by international organizations and Medical Procurement of Ukraine;

- financing of the NHSU within the framework of the AMP, as well as payment for medicines that are part of defined state-guaranteed benefit packages;
- insulin reimbursement by local governments through a subvention[2] until September 2020 and within the AMP framework, to be administrated by the NHSU from October 2020;
- funding from local budgets under regional programmes;
- purchases of medicines by hospitals independently;
- charitable or humanitarian aid.

In 2020 the budget provides about 9.7 billion hryvnia (around US$ 370 million) for centralized procurement of medicines and medical devices, of which about 6.6 billion hryvnia is provided for purchases through Medical Procurement of Ukraine.

In 2019, 887.15 million hryvnia of the allocated 1 billion hryvnia was used for implementation of the AMP. In January 2019 the register of medicines subject to reimbursement included 254 trade names, 78 of which were 100% reimbursed by the state. As of February 2020, the NHSU had concluded contracts with 1066 legal entities. According to the signed contracts 7828 pharmacies and branch pharmacies participate in the programme, but regular prescription services and dispensing of prescribed medicines (actual participation in the AMP) was shown by about 70% of pharmacies (5381).

The insulin reimbursement programme currently differs from the AMP: reimbursement of the cost of insulin is carried out by local governments through a subvention.

In 2020 around 2 billion hryvnia was provided for implementation of the AMP. To extend the reimbursement programme, the NHSU plans to add two new classifications from autumn 2020: medicines for outpatient stroke treatment and outpatient myocardial infarction treatment without increasing funding. From October 2020 the NHSU is also transitioning to administering a programme of reimbursement of insulins for the treatment of diabetes mellitus, for which around 1.1 billion hryvnia is budgeted for April to December 2020. In total, 3 090 256 800 hryvnia (US$ 124.4 million) is provided for medicine reimbursement programmes (AMP and insulin) in 2020.

Pharmaceutical pricing policies

The cost of a medicine is an important factor in ensuring affordability for the public in both the hospital and private sectors of the health care system. Ensuring availability of medicines has been identified as a priority area of the Cabinet of Ministers of Ukraine

[2] Subvention is a form of financial assistance to local budgets from the state budget, intended for a specific purpose

for the next seven years, as reflected in the State strategy for implementation of state policy of providing the population with medicines for the period up to 2025.

The most recent last edition of the NEML was approved by Resolution No. 1081 of Cabinet of Ministers of 13 December 2017. It includes 427 INNs and is based on the 2017 WHO Model List of Essential Medicines *(16)*. Medicines included in the NEML are procured and reimbursed via the state budget.

Resolution No. 426 of the Cabinet of Ministers of 3 April 2019 amended Resolution No. 955 of the Cabinet of Ministers Ukraine of 17 October 2008 on measures to stabilize the prices of medicines. As a result, from 1 July 2019, the marginal supply and marketing mark-ups on medicinal products included in the NEML cannot exceed 10%, accrued to the wholesale price including taxes and fees. Marginal retail mark-ups, based on the purchase price including taxes, cannot exceed 10–25%.

An NEML provision sets restrictions on procurement of medicines via state and local budgets. Health care facilities can purchase medicines that are not included in the NEML only after meeting 100% of the need for medicines included in it, and depending on the availability of budget allocations remaining after meeting this need.

The NEML provision and restrictions do not apply to procurement of:

- medicines manufactured in pharmacies;
- medicines to be purchased in accordance with agreements with specialized organizations;
- medicines and medical devices to be purchased by Medical Procurement of Ukraine within the framework of centralized programmes;
- medicines to be procured by structural health care units of regional and Kyiv city state administrations to implement measures of approved regional health programmes for which health technology assessment has been undertaken.

The purchase of medicines by regional health care departments is not linked to health technology assessment, but restrictions are in place for priority provision of 100% of the need for medicines in the NEML.

Resolution No. 426 of the Cabinet of Ministers of 3 April 2019 introduced reference pricing for some medicines in the NEML for procurement in the inpatient sector from the second quarter of 2019. This rule has, in fact, been in force since 11 October 2019, however, when an Order of the Ministry of Health approved the first edition of the register of marginal wholesale prices. The current version of the register is in force from 24 February 2020.

Price regulation is based on the model of reference pricing. The comparators are prices in five neighbouring countries (Czechia, Hungary, Latvia, Poland and Slovakia). This price cap affects the purchase of medicines by health care facilities from the state budget. It is used only for those medicines for which the price in Ukraine is higher than the prices in the reference countries, and for which the volume of sales per year is over 5 million hryvnia. The reference price is calculated for INNs.

Reimbursement and pricing of medicines in the outpatient sector

The AMP

The AMP operates with a list of 23 INN medicines for the treatment of cardiovascular diseases (17 INNs), type 2 diabetes mellitus (three INNs) and bronchial asthma (three INNS), which are included in the NEML and the cost of which is reimbursed from the state budget in full or with co-payment. From 1 April 2019, pharmacies released reimbursed medicines exclusively through electronic prescriptions.

The NHSU has administered the AMP since April 2019. The programme's principles include the following.

- Participation by pharmacies and manufacturers is voluntary.
- Reimbursed medicines are included in the NEML.
- Reimbursed medicines are prescribed by INN.
- The register of medicines subject to reimbursement includes brand names with and without co-payment – the patient can make a choice of a brand-name medicine.
- Market authorization holders submit an application to the NHSU for inclusion of their medicines in the AMP based on the register of marginal wholesale prices for medicines, which is published twice a year.
- The register is based on reference prices in reference countries (external price referencing).
- The NHSU updates the register of medicines subject to reimbursement twice a year, based on market authorization holder applications, and only the cheapest brand can be reimbursed in full (defined using internal price referencing).
- The NHSU informs market authorization holders about the medicines for which they can decrease the price for patients to be fully reimbursed.
- Market authorization holders can participate in reductions and resubmit an application for inclusion of the medicines in the AMP at a reduced price.

AMP pricing procedure

Price regulation is carried out by comparing prices in five reference countries (Czechia, Hungary, Latvia, Poland and Slovakia). Based on these data, the wholesale marginal prices for the 23 INNs are established and recalculated into the recommended amount by DDD.

In accordance with Resolution No. 862 of the Cabinet of Ministers of Ukraine of 9 November 2016 on state regulation of prices for medicines and the procedure for calculating marginal wholesale prices for medicines based on reference prices, approved by Order of the Ministry of Health No. 1423 of 29 December 2016, the NHSU recalculates marginal wholesale prices for medicines that are purchased and/or the cost of which is reimbursed from the budget, and that are included in the list of INNs twice a year. The mechanism for calculating marginal wholesale prices is based on reference prices, which are determined on the basis of prices for medicines registered in the reference countries, obtained from official sources of the reference authorities. The median of registered prices for each dosage form in terms of a DDD is used for calculation. The Ministry of Health of Ukraine publishes a recalculated register of marginal wholesale prices, followed by formation of new register of medicines subject to reimbursement.

In accordance with the procedure for determining the amount of reimbursement of medicines, approved by Resolution No. 152 of the Cabinet of Ministers of 17 March 2017, the NHSU announces the a call for proposals to the register of medicines subject to reimbursement, and the register is updated twice a year. A market authorization holder or authorized representative who wishes to apply to the NHSU to entering the trade name of the medicinal product in the register must submit documents in electronic form.

As of December 2019 the register of medicines subject to reimbursement contained 254 brands of medicines (78 dispensed without co-payment):

- 195 (61 with no co-payment) for cardiovascular diseases;
- 45 (11 with no co-payment) for type 2 diabetes mellitus;
- 14 (6 with no co-payment) for bronchial asthma.

Government programme to reimburse the cost of insulin for patients with type 1 diabetes

Patients who receive insulin are included in a register of patients who need insulin therapy. They receive it with or without a co-payment. Insulin in a vial is prescribed at no additional cost to all patients enrolled in the programme. If adult patients – diag-

nosed with diabetes after the age of 18 years – who are eligible to receive insulin in a vial prefer to co-finance the cost of human insulin in a cartridge or syringe pen, this can be prescribed with a co-payment.

Some patient categories are eligible to receive insulin preparations in the form of cartridges or syringe pens, and insulin analogue with no co-payment. These include pupils at primary and secondary schools, university students, children under 18 years, pregnant women, patients with diabetes with an allergy to insulin (as recorded in a specialized endocrinological hospital) and adults who have suffered from diabetes mellitus since childhood. The patients who receive insulin preparations either with or without a co-payment are approved by Cabinet of Ministers Resolution No. 239 of 22 March 2016.

Reimbursement of the cost of insulin is done at the level not higher than the approved (reimbursement) price for the insulin preparation in the insulin register. The register of prices for insulin preparations subject to reimbursement is approved by the Ministry of Health twice a year (in February and August). As of December 2019, the register of insulin prices contained 77 brands of insulin preparations, dispensed either with or without a co-payment.

The reference (reimbursement) price for foreign-produced insulin preparations is calculated based on prices in reference countries (Bulgaria, Czechia, Hungary, Latvia, Poland, Republic of Moldova, Serbia and Slovakia).

The plans for 2020 include prescribing insulin products via an electronic prescription and transferring administration of the insulin reimbursement programme to the NHSU.

Regulation of mark-ups

On the AMP list of 23 INNs for the treatment of cardiovascular diseases, type 2 diabetes and asthma included in the NEML, mark-ups are set at 10% for wholesale and 15% for retail.

The programme to reimburse the cost of insulin has mark-ups set at 10% for wholesale and 10% for retail.

For medicines included in the NEML, margins are set at not higher than 10% for wholesale. Regressive retail margins are set at a ratio between 10% and 25%, depending on the cost of the medicine.

Reimbursement and pricing of medicines in the inpatient sector

Reference pricing

State regulation of prices for the 23 INNs purchased from budget funds and included in the NEML was introduced in October 2019. The price regulation mechanism is similar to the AMP mechanism, comparing prices in five reference countries (Czechia, Hungary, Latvia, Poland and Slovakia) and using the data to set the marginal wholesale price for purchases.

Medicines from NEML fall under reference pricing if annual procurement of such medicines (by INN) is more than 5 million hryvnia (US$ 202 000), and if prices in Ukraine for this category of medicines are higher than in the reference countries (Czechia, Hungary, Latvia, Poland and Slovakia).

Procurement and provision of medicines to patients

Centralized procurement of medicines from the state budget is carried out via:

- international organizations and Medical Procurement of Ukraine, which procure medicinal products to cover the main therapeutic areas (oncology, tuberculosis, hepatitis, autism and so on: 38 programmes/diseases in total in the 2020 budget year) on the basis of tender proposals from pharmaceutical manufacturers;
- procurement of medicines included in the NEML by secondary health care facilities, according to the need of patients undergoing treatment in these facilities;
- procurement of medicines under regional programmes;
- from April 2020 via the introduction of the benefit packages of guaranteed health care services, the cost of which is covered from the state budget via NHSU administration, on the basis of health care facility contracting.

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Annex 2.
Core definitions and measures

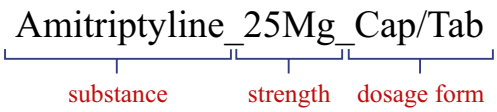
Definitions

Affordability (low cost) has two definitions:

- the original WHO/HAI approach measures the number of daily wages needed for the lowest-paid unskilled government worker (LPGW) to pay for a monthly course of treatment with a single medicine;
- the updated WHO approach measures the extra number of daily wages needed for the LPGW to pay for a monthly course of treatment with a single medicine without sacrificing basic needs (defined here as the national poverty line).[1]

Access to medicines is a combination of two dimensions of access: availability and affordability of medicines.

A ***medicine*** is a substance with a specified strength and dosage form:



A ***medicine product*** is a medicine produced under a specified brad name by a specified manufacturer:

Universal health coverage (UHC) means that all people and communities can use the health services they need, of sufficient quality to be effective, without exposure to financial hardship.

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1 WHO, HAI. Measuring medicine prices, availability, affordability and price components, second edition. Geneva: World Health Organization; 2008 (https://www.who.int/medicines/areas/access/medicines_prices08/en/);
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Sustainable Development Goal (SDG) target 3.8 and related indicators, as of February 2020

SDG target 3.8 is to achieve UHC, including financial risk protection, access to quality essential health care services, and access to safe, effective, quality and affordable essential medicines and vaccines for all. The related indicators are:

- 3.b.1 – proportion of the population with access to affordable medicines and vaccines on a sustainable basis;
- 3.b.2 – total net official development assistance to medical research and basic health sectors;
- 3.b.3 – proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis;
- 3.8.1 – coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health; infectious diseases; NCDs; and service capacity and access, among the general and the most disadvantaged population);
- 3.8.2 – proportion of population with large household expenditures on health as a share of total household expenditure or income.

Measures

Prices found during the survey are expressed as ratios relative to a standard set of international reference prices (IRPs), known as the ***median price ratio (MPR)***. This shows how much greater or less the median unit price (MUP) of the medicine is than the IRP. An MPR of 2 would mean that the medicine unit price is twice the IRP. If a medicine price was collected for several manufacturers, the median price across these manufacturers is estimated.

$$MPR = \frac{MUP}{IRP}$$

25th/75th MPR percentiles and ***minimum/maximum MPRs*** allow variations in price of the medicine across health facilities and manufacturers to be evaluated. IRPs are provided at the medicine level, so this analysis is usually provided at the medicine level.

The ***MPR (national)*** may also be compared to national reference prices, which are usually provided at the product level.

Affordability (low cost) (WHO/HAI approach) is estimated as the number of daily wages needed for the LPGW to pay for a one-month course of treatment with a single medicine:

$$Affordability\ (WHO/HAI) = \frac{Price_{unit}\ * number\ of\ units\ per\ treatment}{Wage\ of\ the\ LPGW}$$

Affordability (low cost) (new WHO approach) is estimated as the extra number of daily wages needed for the LPGW to pay for a one-month course of treatment with a single medicine without sacrificing basic needs (defined here as the national poverty line). A medicine is considered affordable (low cost) if no extra daily wages are required for the course of treatment:

$$Extra\ daily\ wages\ (EDW) = \frac{National\ poverty\ line + price\ per\ unit}{Daily\ wage\ of\ LPGW}$$

$$\begin{cases} if\ EDW\ \leq 1, affordability = 1, \\ otherwise, affordability = 0 \end{cases}$$

A medicine is considered ***available*** if it is found in a facility by the data collector on the day of data collection (binary variable yes/no).

Availability across facilities measures the proportion of facilities with available medicine:

$$Availability\ (medicine) = \frac{Number\ of\ facilities\ with\ available\ medicine}{Total\ number\ of\ surveyed\ facilities}$$

Annex 3.

Example of computing SDG indicator 3.b.3, based on data collected in Ukraine

Tables A3.1–A3.4 set out data exported from the Power BI platform and used to calculate the index. The "Medicine name" column contains the coded numerical name used to match the INN of a given dosage to all brands that match those parameters.

Table A3.1. Step 1: selection of medicines

Medicine name	Medicine category	Medicine is available *(1)*
IBUPROFEN_200MG_CAPTAB	Nonsteroidal anti-inflammatory drugs	1
ENALAPRIL_10MG_CAPTAB	Angiotensin-converting enzyme inhibitors	1
GENTAMICIN_40MG_ML_INJ	Aminoglycosides	1
DEXAMETHASONE_4MG_ML_INJ	Antiallergy drugs	1
FLUCONAZOLE_50MG_CAPTAB	Antifungals	1
ACETYLSALICYLIC_ACID_100MG_CAPTAB	Aspirins	0
PARACETAMOL_500MG_CAPTAB	Basic pain drugs	1
AMLODIPINE_5MG_CAPTAB	Calcium channel blockers	1
CEFTRIAXONE_1G_VIAL_INJ	Cephalosporins	1
BECLOMETASONE_250MCG_DOSE_INH	Corticosteroid inhalers	0
LEVOTHYROXINE_50MCG_CAPTAB	Hypothyroidism drugs	1
FUROSEMIDE_40MG_CAPTAB	Diuretics	1
METFORMIN_500MG_CAPTAB	Biguanides	1
AMOXICILLIN_250MG_CAPTAB	Oral amoxicillin	0
LEVONORGESTREL_1.5MG_CAPTAB	Oral contraceptives	0
OXYTOCIN_5IU_ML_INJ	Oxytocin	1
CARBAMAZEPINE_200MG_CAPTAB	Partial seizure drugs	1
SALBUTAMOL_100MCG_DOSE_INH	Salbutamol	1
SIMVASTATIN_20MG_CAPTAB	Statins	1
GLIBENCLAMIDE_5MG_CAPTAB	Sulfonylureas	1

Table A3.2. Step 2: estimation of weights

						Adjusted weights
Medicine name	Disease code	Number of surveyed medicines in a facility (T)	DALYs	DALYs (total)	Weight	Weight normalized
IBUPROFEN_200MG_CAPTAB	1/T[a]	20	0	0	0.050	0.043
ENALAPRIL_10MG_CAPTAB	1120	20	6 700 000	171 412 972	0.039	0.033
GENTAMICIN_40MG_ML_INJ	390	20	13 000 000	171 412 972	0.076	0.065
DEXAMETHASONE_4MG_ML_INJ	0.5*1/T[b]	20	0	0	0.025	0.021
FLUCONAZOLE_50MG_CAPTAB	0.5*1/T	20	0	0	0.025	0.021
ACETYLSALICYLIC_ACID_100MG_CAPTAB	1130	20	42 000 000	171 412 972	0.245	0.209
PARACETAMOL_500MG_CAPTAB	1/T	20	0	0	0.050	0.043
AMLODIPINE_5MG_CAPTAB	1120	20	2 700 000	171 412 972	0.016	0.013
CEFTRIAXONE_1G_VIAL_INJ	20	20	7 600 000	171 412 972	0.044	0.038
BECLOMETASONE_250MCG_DOSE_INH	1190	20	2 400 000	171 412 972	0.014	0.012
LEVOTHYROXINE_50MCG_CAPTAB	0.5*1/T	20	0	0	0.025	0.021
FUROSEMIDE_40MG_CAPTAB	1150	20	4 100 000	171 412 972	0.024	0.020
METFORMIN_500MG_CAPTAB	800	20	6 700 000	171 412 972	0.039	0.033
AMOXICILLIN_250MG_CAPTAB	20	20	7 600 000	171 412 972	0.044	0.038
LEVONORGESTREL_1.5MG_CAPTAB	420	20	156 486	171 412 972	0.001	0.001
OXYTOCIN_5IU_ML_INJ	420	20	156 486	171 412 972	0.001	0.001
CARBAMAZEPINE_200MG_CAPTAB	970	20	1 400 000	171 412 972	0.008	0.007
SALBUTAMOL_100MCG_DOSE_INH	1180	20	9 200 000	171 412 972	0.054	0.046
SIMVASTATIN_20MG_CAPTAB	1130	20	61 000 000	171 412 972	0.356	0.303
GLIBENCLAMIDE_5MG_CAPTAB	800	20	6 700 000	171 412 972	0.039	0.033
Total					**1.175**	**1.000**

[a] For medicines that cannot be assigned to a specific disease category (e.g. paracetamol), the weight is computed as 1T (where "T" represents the total number of medicines in the surveyed basket). This assumes equal use of the medicine relative to other medicines in the core list.

[b] For medicines not in the list but "suggested for monitoring" by the country, the weight is computed as 0.5 * 1T , assuming a minor relevance of these medicines for this indicator and to avoid statistical errors in inter-country comparison.

Source: Methodology to measure access to medicines for Sustainable Development Goal indicator SDG 3.b.3. In: World Health Organization [website]. Geneva: World Health Organization; 2020 (https://www.who.int/medicines/areas/policy/monitoring/methodology_access_medicines_SDG_3_b_3/en/).

Table A3.3. Step 3: estimation of availability and low cost; Step 4: combining the two dimensions

Medicine name	Price per unit	Minimum DDD	EDW	Availability	Low cost	Medicine is accessible (available and affordable)
IBUPROFEN_200MG_CAPTAB	0.740	1.460	0.496	1	1	1
ENALAPRIL_10MG_CAPTAB	0.230	0.227	0.487	1	1	1
GENTAMICIN_40MG_ML_INJ	1.750	0.863	0.492	1	1	1
DEXAMETHASONE_4MG_ML_INJ	2.400	0.079	0.486	1	1	1
FLUCONAZOLE_50MG_CAPTAB	3.160	2.909	0.507	1	1	1
ACETYLSALICYLIC_ACID_100MG_CAPTAB	N/A	N/A	N/A	N/A	N/A	0
PARACETAMOL_500MG_CAPTAB	1.410	8.344	0.547	1	1	1
AMLODIPINE_5MG_CAPTAB	0.230	0.227	0.487	1	1	1
CEFTRIAXONE_1G_VIAL_INJ	2.413	0.079	0.486	1	1	1
BECLOMETASONE_250MCG_DOSE_INH	N/A	N/A	N/A	N/A	N/A	0
LEVOTHYROXINE_50MCG_CAPTAB	1.598	3.152	0.509	1	1	1
FUROSEMIDE_40MG_CAPTAB	0.150	0.148	0.487	1	1	1
METFORMIN_500MG_CAPTAB	0.480	1.420	0.496	1	1	1
AMOXICILLIN_250MG_CAPTAB	N/A	N/A	N/A	N/A	N/A	0
LEVONORGESTREL_1.5MG_CAPTAB	N/A	N/A	N/A	N/A	N/A	0
OXYTOCIN_5IU_ML_INJ	13.700	0.450	0.489	1	1	1
CARBAMAZEPINE_200MG_CAPTAB	1.090	5.375	0.525	1	1	1
SALBUTAMOL_100MCG_DOSE_INH	0.290	0.286	0.488	1	1	1
SIMVASTATIN_20MG_CAPTAB	1.190	1.174	0.494	1	1	1
GLIBENCLAMIDE_5MG_CAPTAB	0.310	0.612	0.490	1	1	1

Note: LPGW daily wage = 137.195; national poverty line = 66.641.

Table A3.4. Step 5: applying weights to classify the facility

Medicine name	Weight normalized	Weighted access
IBUPROFEN_200MG_CAPTAB	0.043	0.043
ENALAPRIL_10MG_CAPTAB	0.033	0.033
GENTAMICIN_40MG_ML_INJ	0.065	0.065
DEXAMETHASONE_4MG_ML_INJ	0.021	0.021
FLUCONAZOLE_50MG_CAPTAB	0.021	0.021
ACETYLSALICYLIC_ACID_100MG_CAPTAB	0.209	–
PARACETAMOL_500MG_CAPTAB	0.043	0.043
AMLODIPINE_5MG_CAPTAB	0.013	0.013
CEFTRIAXONE_1G_VIAL_INJ	0.038	0.038
BECLOMETASONE_250MCG_DOSE_INH	0.012	–
LEVOTHYROXINE_50MCG_CAPTAB	0.021	0.021
FUROSEMIDE_40MG_CAPTAB	0.020	0.020
METFORMIN_500MG_CAPTAB	0.033	0.033
AMOXICILLIN_250MG_CAPTAB	0.038	–
LEVONORGESTREL_1.5MG_CAPTAB	0.001	–
OXYTOCIN_5IU_ML_INJ	0.001	0.001
CARBAMAZEPINE_200MG_CAPTAB	0.007	0.007
SALBUTAMOL_100MCG_DOSE_INH	0.046	0.045
SIMVASTATIN_20MG_CAPTAB	0.303	0.304
GLIBENCLAMIDE_5MG_CAPTAB	0.033	0.033
Proportion of medicines accessible in a facility (%)		**74.10%**
Threshold (%)		80.00%
Facility does not provide accessible medicines		**74.10%<80.00%**

Annex 4.

Basket of core set of essential medicines for primary health care relevant to Ukraine

Tables A4.1 and A4.2 set out a basket of medicines for monitoring in Ukraine, based on the list recommended by WHO as a core set of tracer essential medicines for acute, chronic and communicable diseases and NCDs in ambulatory and primary health care settings to monitor SDG target 3.b.

Table A4.1. Full set of essential tracer medicines for primary health care assessed

Name	Strength	Dose form
Core list		
Salbutamol	0.1 mg dose	inhaler
Beclometasone	250 mcg dose	inhaler
Budesonide	100 mcg dose	inhaler
Glibenclamide	5 mg	cap/tab
Metformin	500 mg	cap/tab
Insulin human regular	100 IU/ml	injection, 10 ml
Amlodipine	5 mg	cap/tab
Enalapril	5 mg	cap/tab
Simvastatin	20 mg	cap/tab
Acetylsalicylic acid	100 mg	cap/tab
Hydrochlorothiazide	25 mg	cap/tab
Bisoprolol	5 mg	tab
Paroxetine	20 mg	tab
Carbamazepine	200 mg	tab
Gentamicin	40 mg/ml, 2 ml	injection
Amoxicillin	500 mg	cap/tab
Ceftriaxone	1 g/vial	injection
Oral rehydration salts	WHO form	for 1 litre
Amoxicillin (dispersible tablets)	250 mg/5 ml	suspension
Omeprazole	20 mg	tab
Oxytocin	5 IU/10 IU	injection
Ethinylestradiol + levonorgestrel	30 mcg + 150 mcg	tablet
Folic acid	1 mg	tablet
Ibuprofen	200 mg	cap/tab
Dexamethasone	4 mg/ml	injection
Fluconazole	50 mg	cap/tab
Levothyroxine	50 mcg	cap/tab
Magnesium sulfate	50%	injection
Morphine	10 mg	cap/tab
Paracetamol	500 mg	cap/tab
NCD module		
Spironolactone	25 mg	cap/tab
Furosemide	40 mg	cap/tab
Isosorbide mononitrate	20 mg	tab
Gliclazide	60 mg	tab
Prednisolone	5 mg	cap/tab
Digoxin	0.25 mg	cap/tab
Mental health module		
Chlorpromazine	25 mg/ml, 2 ml	injection
Trihexyphenidyl	2 mg	tablet
Amitriptyline	25 mg	tablet

Note: cap/tab = capsule/tablet.

Table A4.2. Diseases treated with the medicines in the core list of WHO essential medicines basket

Medicine name	Affiliated disease (code)[a]
Salbutamol	→ Asthma (1190) → Chronic obstructive pulmonary disease (1180)
Beclometasone or other corticosteroid inhaler	→ Asthma (1190)
Gliclazide or other sulfonylurea	→ Diabetes mellitus (800)
Metformin	
Insulin human regular, soluble	
Amlodipine	→ Hypertensive heart disease (1120)
Enalapril or other angiotensin-converting enzyme inhibitor	→ Hypertensive heart disease (1120) → Cardiomyopathy, myocarditis, endocarditis (1150)
Hydrochlorothiazide or chlorthalidone	→ Hypertensive heart disease (1120) → Ischaemic heart disease (1130)
Bisoprolol or alternative betablocker (atenolol or carvedilol or metoprolol only)	→ Other circulatory diseases (1160) → Cardiomyopathy, myocarditis, endocarditis (1150)
Furosemide	→ Cardiomyopathy, myocarditis, endocarditis (1150)
Simvastatin or other statin	→ Ischaemic heart disease (1130) → Stroke (1140)
Acetylsalicylic acid (aspirin)	→ Ischaemic heart disease (1130)
Morphine	→ Malignant neoplasms (610)
Paracetamol	→ weight = 1/T[b]
Ibuprofen	→ weight = 1/T
Fluoxetine or other selective serotonin reuptake inhibitor	→ Depressive disorders (830)
Phenytoin or carbamazepine	→ Epilepsy (970)
Gentamicin	→ Lower respiratory infections (390) → Infectious and parasitic diseases (20)
Amoxicillin	→ Infectious and parasitic diseases (20)
Ceftriaxone	
Procaine benzylpenicillin or benzathine benzylpenicillin	

Medicine name	Affiliated disease (code)[a]
Ethinylestradiol + levonorgestrel (or alternative combined oral contraceptive)	→ Maternal conditions (420)
Medroxyprogesterone acetate injection	
Progesterone-releasing implant (etonogestrel or levonorgestrel)	
Levonorgestrel	
Oral rehydration	→ Diarrhoeal diseases (110)
Zinc sulfate	
Oxytocin	→ Maternal conditions (420)
Magnesium sulfate	→ Epilepsy (970)
Folic acid	→ Iron-deficiency anaemia (580)
Artemether + lumefantrine	→ Malaria (220) → HIV/AIDS (100) → Neonatal sepsis and infections (520)
Artesunate + amodiaquine	
Artesunate + mefloquine	
Dihydroartemisinin + piperaquine	
Artesunate + sulfadoxine-pyrimethamine	
Artesunate	
Efavirenz + emtricitabine + tenofovir disoproxil fumarate	
Efavirenz + lamivudine + tenofovir disoproxil fumarate	
Chlorhexidine	
Ready-to-use therapeutic food	→ Nutritional deficiencies (540)
Isoniazid + pyrazinamide + rifampicin	→ Tuberculosis (30)
Erythropoiesis – stimulating agents	→ Other chronic kidney disease (1273)
Suggested for monitoring (optional)	
Epinephrine or dexamethasone	→ weight = 0.5*(1/T)[c]
Fluconazole	
Nystatin	
Levothyroxine	
Propylthiouracil	

[a] Codes are from the International Classification of Diseases, 11th Revision.

[b] For medicines that cannot be assigned to a specific disease category (e.g. paracetamol), the weight is computed as 1T (where "T" represents the total number of medicines in the surveyed basket). This assumes equal use of the medicine relative to other medicines in the core list.

[c] For medicines not in the list but "suggested for monitoring" by the country, the weight is computed as 0.5 * 1T , assuming a minor relevance of these medicines for this indicator and to avoid statistical errors in inter-country comparison.

Source: Methodology to measure access to medicines for Sustainable Development Goal indicator SDG 3.b.3. In: World Health Organization [website]. Geneva: World Health Organization; 2020 (https://www.who.int/medicines/areas/policy/monitoring/methodology_access_medicines_SDG_3_b_3/en/).

Annex 5.

IRPs for a subsample of medicines

Medicine name	IRP per unit, US dollars (2019)	Medicine name	IRP per unit, US dollars (2019)
AMITRIPTYLINE_25MG_CAP_TAB	0.0281	FUROSEMIDE_40MG_CAP_TAB	0.0062
AMLODIPINE_5MG_CAP_TAB	0.0061	GENTAMICIN_40MG_ML_INJECTION	0.0616
AMOXICILLIN_500MG_CAP_TAB	0.0299	GLIBENCLAMIDE_5MG_CAP_TAB	0.0053
AMOXICILLIN_50MG_ML_SUSPENSION	0.0078	HYDROCHLOROTHIAZIDE_25MG_ CAP_TAB	0.0237
ATENOLOL_50MG_CAP_TAB	0.0059	IBUPROFEN_200MG_CAP_TAB	0.0069
AZITHROMYCIN_500MG_CAP_TAB	0.1855	INSULIN_HUMAN_MIXED	0.2484
BECLOMETASONE_250MCG_DOSE_ INHALER	0.0149	INSULIN_HUMAN_REGULAR_100IU_ML_ INJECTION	0.5657
BISOPROLOL_5MG_CAP_TAB	0.0462	ISOSORBIDE_MONONITRATE_ 20MG_CAP_TAB	0.1594
CARBAMAZEPINE_200MG_CAP_TAB	0.0202	LEVOFLOXACIN_500MG_CAP_TAB	0.0677
CEFALEXIN_500MG_CAP_TAB	0.0628	LEVONORGESTREL-ETHINYLESTRADIOL_ 150MCG_30MCG_CAP_TAB	0.1665
CEFIXIME_200MG_CAP_TAB	0.2106	LEVOTHYROXINE_50MCG_CAP_TAB	0.0755
CEFTRIAXONE_1G_VIAL_INJECTION	0.4251	LOSARTAN_50MG_CAP_TAB	0.0181
CHLORPROMAZINE_25MG_ML_ INJECTION	0.1187	METFORMIN_500MG_CAP_TAB	0.0162
CIPROFLOXACIN_500MG_CAP_TAB	0.0269	METRONIDAZOLE_250MG_CAP_TAB	0.0067
CLOPIDOGREL_75MG_CAP_TAB	0.1011	MORPHINE_10MG_CAP_TAB	0.1311
CO-AMOXICLAV_31.3MG_ML_ SUSPENSION	0.0113	MORPHINE_10MG_ML_INJECTION	0.1436
CO-AMOXICLAV_625MG_CAP_TAB	0.117	NIFEDIPINE_R_20MG_CAP_TAB	0.384
DEXAMETHASONE_4MG_ML_INJECTION	0.2358	OMEPRAZOLE_20MG_CAP_TAB	0.0154
DICLOFENAC_SODIUM_50MG_CAP_TAB	0.0127	ORAL_REHYDRATION_SALTS_1L_SACHET	0.0561
DIGOXIN_25MCG_CAP_TAB	0.0169	OXYTOCIN_5IU_ML_INJECTION	0.4423
DOXYCYCLINE_100MG_CAP_TAB	0.0192	PARACETAMOL_500MG_CAP_TAB	0.0058
ENALAPRIL_5MG_CAP_TAB	0.0062	PREDNISOLONE_5MG_CAP_TAB	0.0108
FLUCONAZOLE_150MG_CAP_TAB	0.0451	SALBUTAMOL_100MCG_DOSE_INH	0.0058
FLUCONAZOLE_50MG_CAP_TAB	0.0451	SIMVASTATIN_20MG_CAPTAB	0.0163
FLUOXETINE_20MG_CAP_TAB	0.0103	SPIRONOLACTONE_25MG_CAPTAB	0.0442
FOLIC_ACID_1MG_CAP_TAB	0.028	TRIHEXYPHENIDYL_2MG_CAP_TAB	0.022

Note: The "Medicine name" column contains the coded numerical name used to match the INN of a given dosage to all brands that match those parameters.

Source: International medical products price guide [website]. Medford, MA: Management Sciences for Health; 2020 (https://www.msh.org/resources/international-medical-products-price-guide).

Annex 6.
Availability of medicines by medicine category, by region

Medicine category	Chernihiv	Ivano-Frankivsk	Kharkiv	Kherson	Kyiv city	Luhansk	Volyn	Average
Diuretics	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Basic pain drugs (paracetamol)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Nonsteroidal anti-inflammatory drugs (ibuprofen)	100.00%	93.33%	100.00%	100.00%	100.00%	100.00%	100.00%	99.05%
Gastroesophageal reflux disorder (omeprazole)	100.00%	100.00%	93.33%	100.00%	100.00%	100.00%	100.00%	99.05%
Calcium channel blockers (amlodipine)	100.00%	93.33%	100.00%	100.00%	100.00%	100.00%	100.00%	99.05%
Antiallergy drugs (dexamethasone, prednisolone)	100.00%	100.00%	100.00%	100.00%	91.67%	100.00%	100.00%	98.81%
Angiotensin-converting enzyme inhibitor (enalapril)	100.00%	100.00%	100.00%	91.67%	100.00%	100.00%	100.00%	98.81%
Antiprotozoals (fluconazole)	100.00%	86.67%	100.00%	91.67%	100.00%	100.00%	100.00%	96.90%
Cephalosporins (ceftriaxone)	100.00%	80.00%	93.33%	100.00%	100.00%	100.00%	100.00%	96.19%
Beta-2 agonist (salbutamol)	100.00%	100.00%	86.67%	83.33%	100.00%	100.00%	100.00%	95.71%
Betablockers (atenolol)	88.89%	93.33%	86.67%	91.67%	100.00%	100.00%	100.00%	94.37%
Anticonvulsants	100.00%	93.33%	73.33%	100.00%	91.67%	100.00%	100.00%	94.05%
Biguanides (metformin)	100.00%	80.00%	93.33%	66.67%	100.00%	100.00%	100.00%	91.43%
Cardiac glycoside (digoxin)	100.00%	93.33%	86.67%	66.67%	83.33%	100.00%	100.00%	90.00%
Oxytocin	88.89%	100.00%	73.33%	75.00%	91.67%	100.00%	83.33%	87.46%
Hypothyroidism (levothyroxine)	55.56%	100.00%	80.00%	75.00%	91.67%	100.00%	100.00%	86.03%
MCH (folic acid)	88.89%	80.00%	66.67%	66.67%	100.00%	100.00%	100.00%	86.03%
Antithrombotic agents (acetylsalicylic acid)	77.78%	60.00%	80.00%	83.33%	100.00%	100.00%	100.00%	85.87%
Penicillins (amoxicillin)	88.89%	80.00%	80.00%	75.00%	75.00%	100.00%	100.00%	85.56%
Nitrates (isosorbide dinitrate)	77.78%	86.67%	66.67%	91.67%	75.00%	100.00%	100.00%	85.40%
Sulfonylureas (gliclazide; glibenclamide)	88.89%	66.67%	80.00%	50.00%	66.67%	100.00%	100.00%	78.89%
Aminoglycoside (gentamicin)	88.89%	13.33%	66.67%	83.33%	83.33%	100.00%	91.67%	75.32%
Statin (simvastatin)	66.67%	53.33%	66.67%	58.33%	58.33%	100.00%	100.00%	71.90%
Oral rehydration salts	88.89%	0.00%	40.00%	91.67%	91.67%	83.33%	100.00%	70.79%
Antidepressants	88.89%	86.67%	66.67%	50.00%	50.00%	66.67%	83.33%	70.32%
Oral contraceptives	77.78%	40.00%	26.67%	25.00%	41.67%	100.00%	58.33%	52.78%
Corticosteroid inhalers	55.56%	0.00%	26.67%	50.00%	33.33%	83.33%	50.00%	42.70%
Antipsychotics	33.33%	6.67%	46.67%	25.00%	16.67%	66.67%	83.33%	39.76%
Insulin	11.11%	0.00%	33.33%	33.33%	8.33%	33.33%	16.67%	19.44%
Opioids (morphine in ampule or tablet)	0.00%	0.00%	13.33%	25.00%	0.00%	33.33%	8.33%	11.43%
Average	82.22%	69.56%	74.22%	75.00%	78.33%	92.22%	89.17%	**80.10%**

Note: Availability that is 80% and greater is in green; availability that is 50% and lower is in red.

Annex 7.
Availability of medicines by medicine category

Medicine category	Availability of medicines	Number of facilities with available medicine
Angiotensin-converting enzyme inhibitor (enalapril)	100.00%	81
Antiallergy drugs (dexamethasone, prednisolone)	100.00%	81
Basic pain drugs (paracetamol)	100.00%	81
Diuretics (hydrochlorothiazide, spironolactone, furosemide)	100.00%	81
Calcium channel blockers (amlodipine)	98.77%	80
Gastroesophageal reflux disorder (omeprazole)	98.77%	80
Nonsteroidal anti-inflammatory drugs (ibuprofen)	98.77%	80
Antiprotozoals (fluconazole)	97.53%	79
Beta-2 Agonist in management of asthma (salbutamol)	95.06%	77
Betablocker (atenolol)	95.06%	77
Cephalosporins (ceftriaxone)	95.06%	77
Anticonvulsant (carbamazepine; magnesium sulfate; trihexyphenidyl; valproate sodium)	93.83%	76
Hypothyroidism (levothyroxine)	91.36%	74
Biguanides (metformin)	90.12%	73
Cardiac Glycoside (digoxin)	90.12%	73
Antithrombotic agent (acetylsalicylic acid)	87.65%	71
Penicillins (amoxicillin)	87.65%	71
Nitrate (isosorbide dinitrate; glyceryltrinitrate)	86.42%	70
Oxytocin	86.42%	70
Maternal and child health (folic acid)	85.19%	69
Antidepressants (paroxetine, amitriptyline)	80.25%	65
Sulfonylureas (gliclazide; glibenclamide)	80.25%	65
Oral rehydration salts	72.84%	59
Aminoglycoside (gentamicin)	71.60%	58
Statin (simvastatin)	71.60%	58
Contraceptives (levonorgestrel/ethinylestradiol)	50.62%	41
Corticosteroid inhaler (beclometasone; budesonide)	43.21%	35
Antipsychotic (chlorpromazine)	38.27%	31
Insulin	20.99%	17
Opioid (morphine)	12.35%	10

Annex 8.

Price distribution across medicine categories and regions

Medicine category	Chernihiv	Ivano-Frankivsk	Kharkiv	Kherson	Kyiv city	Luhansk	Volyn	Average
Angiotensin-converting enzyme inhibitors (enalapril)	0.58	0.55	0.59	0.49	1.18	1.77	0.72	0.84
Aminoglycoside (gentamicin)	1.81	N/A	1.76	1.79	1.86	1.69	1.95	1.81
Antiallergy drugs (dexamethasone, prednisolone)	2.66	6.71	2.73	2.61	6.26	7.40	6.70	5.01
Anticonvulsant (carbamazepine; MgSO4)	0.76	0.96	0.76	0.78	0.74	0.76	0.72	0.78
Antidepressants (paroxetine, amitriptyline)	6.17	6.89	6.78	7.11	7.04	7.06	6.08	6.73
Antiprotozoals (fluconazole)	5.13	3.40	3.55	3.72	6.39	3.62	3.57	4.20
Antipsychotic (chlorpromazine)	1.95	N/A	1.91	1.95	2.42	1.59	1.84	1.94
Antithrombotic agent (aspirin)	1.81	2.06	2.21	2.11	2.22	1.81	2.10	2.05
Basic pain drugs (paracetamol)	1.57	1.46	1.60	1.65	1.96	1.59	1.59	1.63
Beta-2 agonist (salbutamol)	0.31	0.32	0.34	0.33	0.32	0.34	0.34	0.33
Betablocker (atenolol)	0.45	0.45	0.45	0.49	0.47	0.45	0.45	0.46
Biguanides (metformin)	0.78	0.84	0.87	0.83	2.16	2.28	0.83	1.23
Calcium channel blocker (amlodipine)	0.43	0.55	0.49	0.43	0.46	0.47	0.52	0.48
Cardiac glycoside (digoxin)	0.19	0.20	0.20	0.20	0.19	0.21	0.19	0.20
Cephalosporins (ceftriaxone)	19.20	18.50	85.55	32.32	51.25	75.56	79.21	51.65
Oral contraceptives (levonorgestrel/ ethinylestradiol)	4.33	N/A	4.55	5.85	5.35	7.74	6.70	5.75
Corticosteroid inhaler (beclometasone; budesonide)	0.92	N/A	1.17	0.96	1.00	1.10	1.01	1.03
Diuretics (hydrochlorothiazide; furosemide)	1.20	1.17	1.64	1.27	1.86	1.73	1.19	1.44
GERD (omeprazole)	2.05	1.70	1.81	1.87	1.98	2.86	2.21	2.07
Insulin	N/A	N/A	79.83	45.27	58.43	123.32	85.81	78.53
Nitrate (isosorbide dinitrate; glyceryltrinitrate)	1.07	0.20	1.29	1.16	1.14	2.26	1.17	1.19
Nonsteroidal anti-inflammatory drugs (ibuprofen)	4.74	0.79	5.45	4.49	5.42	0.75	5.25	3.84
Opioid (morphine in tab)	N/A	N/A	N/A	N/A	N/A	3.20	N/A	3.20
Ors (Oral rehydration salts)	10.90	N/A	10.54	11.69	11.12	11.53	11.42	11.20
Oxytocin	11.50	12.83	13.56	12.00	11.90	14.47	13.40	12.81
Penicillins (amoxicillin in cap)	4.55	N/A	6.33	4.40	6.72	5.93	6.96	5.81
Statin (simvastatin)	1.67	1.43	1.67	1.39	1.58	1.70	1.61	1.58
Sulfonylureas (glibenclamide, gliclazide)	1.58	1.57	1.57	1.56	1.55	1.65	1.57	1.58
Hypothyroidism (levothyroxine)	1.49	1.60	1.54	1.42	1.48	1.56	1.53	1.52
MCH (folic acid)	0.25	0.25	0.17	0.18	0.22	0.17	0.20	0.21

Notes: the price is calculated as the MUP per category, in hryvnia. Prices that are 15% higher than the average across Ukraine are in red;
N/A means that the medicine was not available on the day of data collection, so price analysis was not done for this medicine category.

Annex 9.
Mean medicine prices by manufacturer

Table A9.1 sets out the medicine prices per manufacturer and the median price per INN. The MUP is computed as the central point of a data set of average prices of represented brands); the average price for each brand (manufacturer) is computed as the arithmetic mean of all reported prices in all facilities surveyed. The manufacturer of the original medicine is given in red.

Table A9.1. Medicine prices by manufacturer and MUPs

Medicinal product	MUP (hryvnia)
Acetylsalicylic acid 100 mg cap tab	1.76
Bayer Bitterfeld	2.41
Darnitsa, Ukraine	0.79
Dr Pfleger Arzneimittel	0.93
G L Pharma	2.74
Microhim, Ukraine	1.16
Pharmex Group, Ukraine	1.57
Technolog, Ukraine	2.30
Vertex	1.96
Amitriptyline 25 mg cap tab	0.49
Gncls Experimental Plant, Ukraine	0.44
Lundbeck	2.30
Technolog, Ukraine	0.43
Zdorovye, Ukraine	0.49
Amlodipine 5 mg cap tab	0.55
Acino Pharma, Ukraine	1.17
Astrapharm, Ukraine	0.49
Darnitsa, Ukraine	0.41
Emcure Pharmaceuticals	3.70
Farmak, Ukraine	0.38
Fitofarm, Ukraine	0.25
Krka Novo Mesto	2.71
Kyevmedpreparat, Ukraine	0.38
Kyiv Vitamin Plant, Ukraine	0.44
Lek	1.02
Technolog, Ukraine	0.35
Teva	0.61
Unique Pharmaceutical Laboratories	0.68
Zdorovye, Ukraine	0.37
Zentiva	2.01
Amoxicillin 500 mg cap tab	5.68
Astellas Pharma Europe	7.23
Astrapharm, Ukraine	3.43
Kyevmedpreparat, Ukraine	4.14
Sandoz	8.18
Atenolol 50 mg cap tab	0.43
Astrapharm, Ukraine	0.43
Monfarm, Ukraine	0.36
Zdorovye, Ukraine	0.50
Beclometasone 250 mcg dose inhaler	1.07
Glaxo Wellcome Production	0.91
Teva	1.23
Budesonide 100 mcg dose inhaler	1.08
Laboratorio Aldo-Union	1.08
Carbamazepine 200 mg cap tab	1.08
Astrapharm, Ukraine	1.08
Darnitsa, Ukraine	1.05
Kusum Health care, Ukraine	1.13
Pharma Start, Ukraine	0.94
Sun Pharmaceutical Industries	1.77
Technolog, Ukraine	0.92
Teva	8.78
Zdorovye, Ukraine	1.08
Ceftriaxone 1 g vial injection	91.83
Antibiotice	76.40
Astral Steritech	93.10
Avant	102.72
Borshchahivskiy, Ukraine	17.19
Cens Laboratories	95.14
Darnitsa, Ukraine	17.81
Exir Pharmaceutical	78.77
Kyevmedpreparat, Ukraine	19.25
Laboratorio Reig Jofre	141.35
Lekhim-Kharkiv, Ukraine	18.00
Medokemi	30.26
Ncpc Hebei Huamin Pharmaceutical	15.79
Nectar Lifesciences	113.61
Rotapharm Ilaclari	113.44
Steril-Gene Life Sciences	101.74
Swiss Parenterals	91.83
Venus Remedies	100.01
Zeiss Pharmaceuticals	98.36
Chlorpromazine 25 mg/ml injection	1.91

Medicinal product	MUP (hryvnia)
Halychfarm, Ukraine	2.05
Zdorovye, Ukraine	1.77
Dexamethasone 4 mg/ml injection	**3.05**
Darnitsa, Ukraine	3.05
Farmak, Ukraine	3.68
Gncls Experimental Plant, Ukraine	2.46
Krka Novo Mesto	12.31
Lekhim-Kharkiv, Ukraine	2.67
Digoxin 250 mcg cap tab	**0.20**
Borshchahivskiy, Ukraine	0.19
Zdorovye, Ukraine	0.20
Enalapril 10 mg cap tab	**0.57**
Astrapharm, Ukraine	0.41
Berlin-Chemie	1.87
Chervona Zirka, Ukraine	0.48
Darnitsa, Ukraine	0.40
Dr Reddys Laboratories	1.31
Farmak, Ukraine	0.67
Krka Novo Mesto	2.01
Kyevmedpreparat, Ukraine	0.57
Lekhim-Kharkiv, Ukraine	0.26
Lubnyfarm, Ukraine	0.33
Merck	0.94
Teva	1.20
Zdorovye, Ukraine	0.52
Fluconazole 50 mg cap tab	**6.47**
Astrapharm, Ukraine	2.75
Chervona Zirka, Ukraine	2.31
Darnitsa, Ukraine	3.38
Fareva Amboise	**101.47**
Fdc	10.51
Krka Novo Mesto	30.90
Kusum Health care, Ukraine	6.98
Kyevmedpreparat, Ukraine	7.05
Medokemi	53.18
Technolog, Ukraine	2.09
Teva	5.96
Zdorovye, Ukraine	3.47
Folic Acid 1 mg cap tab	**0.27**
Kyiv Vitamin Plant, Ukraine	0.26
Technolog, Ukraine	0.31
Furosemide 40 mg cap tab	**0.17**
Borshchahivskiy, Ukraine	0.17
Darnitsa, Ukraine	0.17
Gncls Experimental Plant, Ukraine	0.16
Kyevmedpreparat, Ukraine	0.26
Sanofi	**1.04**
Sopharma	0.65
Gentamicin 40 mg/ml injection	**1.92**
Darnitsa, Ukraine	1.92
Halychfarm, Ukraine	1.98
Zdorovye, Ukraine	1.66

Medicinal product	MUP (hryvnia)
Glibenclamide 5 mg cap tab	**0.32**
Berlin-Chemie	0.71
Farmak, Ukraine	0.32
Technolog, Ukraine	0.32
Zdorovye, Ukraine	0.32
Gliclazide 60 mg cap tab	**2.65**
Farmak, Ukraine	2.65
Krka Novo Mesto	2.18
Les Laboratoires Servier Industrie	3.29
Glyceryltrinitrate 0.5 mg cap tab	**0.20**
Microhim, Ukraine	0.20
Technolog, Ukraine	0.20
Zdorovye, Ukraine	0.27
Hydrochlorothiazide 25 mg cap tab	**1.27**
Agropharm	1.27
Borshchahivskiy, Ukraine	1.24
Chinoin	2.68
Ibuprofen 200 mg cap tab	**3.07**
Alkaloid	9.39
Borshchahivskiy, Ukraine	0.74
Darnitsa, Ukraine, Ukraine	0.80
Kyiv Vitamin Plant, Ukraine	0.68
Marksans Pharma	5.94
Medana Pharma	6.10
Mega Lifesciences	4.29
Reckitt Benckiser Healthcare	**6.04**
Technolog, Ukraine	0.60
Us Pharmacia	6.93
Zdorovye, Ukraine	1.84
Insulin glargine 100 IU/ml injection	**91.87**
Farmak, Ukraine	85.78
Sanofi	**97.96**
Insulin glargine/lixisenatide 100 IU/ml injection	**235.38**
Sanofi	**235.38**
Insulin human intermediate acting 100 IU/ml injection	**27.46**
Bioton	16.95
Farmak, Ukraine	31.73
Indar, Ukraine	26.79
Novo Nordisk	**42.06**
Sanofi	**27.46**
Insulin human mixed 100 IU/ml injection	**27.53**
Bioton	23.99
Farmak, Ukraine	23.22
Indar, Ukraine	27.53
Novo Nordisk	**36.47**
Sanofi	**31.15**
Insulin human regular 100 IU/ml injection	**26.76**
Bioton	23.75
Farmak, Ukraine	22.04

Medicinal product	MUP (hryvnia)
Indar, Ukraine	26.76
Novo Nordisk	69.35
Sanofi	33.74
Isosorbide Mononitrate 20 mg cap tab	2.29
Promedcs	2.29
Levonorgestrel/ethinylestradiol 150 mcg/30 mcg cap tab	6.93
Gideon Richter	8.66
Mibe Arzneimittel	5.21
Levothyroxine 50 mcg cap tab	1.47
Berlin-Chemie	1.61
Farmak, Ukraine	1.27
Merck	1.47
Magnesium sulfate 250 mg/ml solution	0.41
Darnitsa, Ukraine, Ukraine	0.43
Halychfarm, Ukraine	0.38
Lekhim-Kharkiv, Ukraine	0.40
Yuria Pharm, Ukraine	0.44
Metformin 1 g cap tab	3.03
Berlin-Chemie	4.53
Teva	1.52
Metformin 500 mg cap tab	1.12
Astrapharm, Ukraine	0.76
Berlin-Chemie	2.63
Dragenopharm Apotheker	1.69
Farmak, Ukraine	0.88
Indoco Remedies	1.95
Kusum Pharm, Ukraine	1.12
Kyevmedpreparat, Ukraine	0.79
Lek	3.28
Merck	3.20
Indar, Ukraine	0.49
Teva	0.80
Usv	2.00
Zentiva	0.77
Morphine 10 mg cap tab	3.20
Zdorovye, Ukraine	3.20
Morphine 10 mg/ml injection	59.06
Kalcex	59.06
Omeprazole 20 mg cap tab	1.79
Astrapharm, Ukraine	1.58
Brufarmexport Sprl	7.16
Darnitsa, Ukraine	1.69
Dr Reddys Laboratories	2.79
Farmak, Ukraine	1.63
Flamingo Pharmaceuticals	1.79
Kopran	1.81
Kyevmedpreparat, Ukraine	1.56
Teva	2.37

Medicinal product	MUP (hryvnia)
Oral rehydration salts 1 litre sachet	10.94
Euro Lifecare	12.25
Interchim, Ukraine	10.29
Orion Corporation	11.58
Zdorovye, Ukraine	9.00
Oxytocin 5 IU/ml injection	10.09
Biopharma, Ukraine	10.09
Gideon Richter	13.24
Pharmstandard, Ukraine	3.18
Paracetamol 500 mg cap tab	1.56
Darnitsa, Ukraine	1.56
Glaxosmithkline	2.56
Kusum Pharm, Ukraine	1.35
Upsa	5.26
Zdorovye, Ukraine	1.40
Paroxetine 20 mg cap tab	14.72
Gideon Richter	15.15
Glaxosmithkline	17.15
Medokemi	14.28
Pharma Start, Ukraine	11.40
Prednisolone 5 mg cap tab	2.18
Darnitsa, Ukraine	2.18
Salbutamol 100 cg dose inhaler	0.31
Aeropharm	0.32
Glaxo Wellcome Production	0.34
Laboratorio Aldo-Union	0.31
Microfarm, Ukraine	0.30
Multisprei	0.30
Simvastatin 20 mg cap tab	1.43
Alkaloid	1.34
Hemofarm	1.35
Krka Novo Mesto	1.86
Marksans Pharma	1.52
Merck	8.35
Sandoz	1.29
Teva	1.24
Zdorovye, Ukraine	2.03
Spironolactone 50 mg cap tab	3.31
Gideon Richter	4.02
Salutas Pharma	2.19
World Medicine	3.31
Trihexyphenidyl 2 mg cap tab	0.75
Borshchahivskiy, Ukraine	0.75

Notes: the manufacturer of the originator medicine is in red; cap tab = capsule or tablet.

Annex 10.

MUPs for the cheapest available brand within INN at the facility level

INN	MUP among all brands at the national level (hryvnia)	MUP among the cheapest brands at the facility level (hryvnia)
Acetylsalicylic acid 100 mg cap tab	1.76	**1.33**
Amitriptyline 25 mg cap tab	0.49	**0.43**
Amlodipine 5 mg cap tab	0.55	**0.30**
Amoxicillin 500 mg cap tab	5.68	**4.18**
Atenolol 50 mg cap tab	0.43	**0.45**
Beclometasone 250 mcg dose inhaler	1.07	**0.97**
Budesonide 100 mcg dose inhaler	1.08	**1.08**
Carbamazepine 200 mg cap tab	1.08	**0.97**
Ceftriaxone 1 g vial injection	91.83	**17.95**
Chlorpromazine 25 mg/ml injection	1.91	**1.89**
Dexamethasone 4 mg/ml injection	3.05	**2.96**
Digoxin 250 mcg cap tab	0.20	**0.19**
Enalapril 10 mg cap tab	0.57	**0.45**
Fluconazole 50 mg cap tab	6.47	**3.10**
Folic Acid 1 mg cap tab	0.26	**0.22**
Furosemide 40 mg cap tab	0.17	**0.16**
Gentamicin 40 mg/ml injection	1.92	**1.75**
Glibenclamide 5 mg cap tab	0.32	**0.32**
Gliclazide 60 mg cap tab	2.65	**2.71**
Glyceryltrinitrate 0.5 mg cap tab	0.20	**0.20**
Hydrochlorothiazide 25 mg cap tab	1.27	**1.20**
Ibuprofen 200 mg cap tab	3.07	**0.75**
Insulin glargine 100 IU/ml injection	91.87	**91.83**
Insulin human intermediate acting 100 IU/ml injection	27.46	**23.42**
Insulin human mixed 100 IU/ml injection	27.53	**16.35**
Insulin human regular 100 IU/ml injection	26.76	30.44
Isosorbide mononitrate 20 mg cap tab	2.29	**2.14**
Levonorgestrel/ethinylestradiol 150 mcg/30 mcg cap	6.93	**6.04**
Levothyroxine 50 mcg cap tab	1.47	**1.47**
Magnesium sulfate 250 mg/ml solution	0.41	**0.38**
Metformin 1 g cap tab	3.03	**3.03**
Metformin 500 mg cap tab	1.12	**0.55**
Morphine 10 mg cap tab	3.20	**3.20**
Morphine 10 mg/ml injection	59.06	**54.17**
Omeprazole 20 mg cap tab	1.79	**1.59**
Oral rehydration salts 1 litre sachet	10.94	**10.99**
Oxytocin 5 IU/ml injection	10.09	12.67
Paracetamol 500 mg cap tab	1.56	**1.42**
Paroxetine 20 mg cap tab	14.72	**11.80**
Prednisolone 5 mg cap tab	2.18	**2.21**
Salbutamol 100 mcg dose inhaler	0.31	**0.32**
Simvastatin 20 mg cap tab	1.43	**1.39**
Spironolactone 50 mg cap tab	3.31	**2.19**
Trihexyphenidyl 2 mg cap tab	0.75	**0.75**

Note: cap tab = capsule or tablet; when the median price of the cheapest generics at the facility level is higher than the median price of all brands at the national level, it is displayed in red.

Annex 11.
MUPs and MPRs on medicine level

Tables A11.1 and A11.2 set out prices of medicines by INN in a specific dosage relative to IRPs and national reference prices as MUPs and MPRs. For products whose MUP is higher than the reference price, the MPR is higher than mean 1.

Table A11.1. Prices per medicine (INN) relative to IRPs

Medicine name	MUP (hryvnia)	MPR	Minimum MPR	Maximum MPR
Amitriptyline 25 mg cap tab	0.4448	0.0078	0.0047	0.0420
Amlodipine 5 mg cap tab	0.4788	0.0387	0.0000	0.6963
Amoxicillin 500 mg cap tab	6.2900	0.1038	0.0468	0.2460
Amoxicillin 250 mg/5 ml suspension	2.4800	0.1570	0.1125	0.2056
Atenolol 50 mg cap tab	0.4545	0.0380	0.0065	0.0523
Beclometasone 250 mcg dose inhaler	1.0115	0.0335	0.0000	0.0462
Carbamazepine 200 mg cap tab	1.1050	0.0270	0.0188	0.2824
Ceftriaxone 1 g vial injection	72.6250	0.0843	0.0017	0.2213
Chlorpromazine 25 mg ml injection	1.9050	0.0079	0.0005	0.0119
Dexamethasone 4 mg ml injection	3.2615	0.0068	0.0020	0.0315
Digoxin 25 mcg cap tab	0.1948	0.0057	0.0050	0.0064
Fluconazole 50 mg cap tab	3.6700	0.0401	0.0195	3.5617
Folic acid 1 mg cap tab	0.2205	0.0039	0.0026	0.0337
Furosemide 40 mg cap tab	0.1700	0.0135	0.0000	3.5966
Gentamicin 40 mg ml injection	1.8025	0.0144	0.0087	0.0177
Glibenclamide 5 mg cap tab	0.3360	0.0313	0.0143	0.0816
Hydrochlorothiazide 25 mg cap tab	1.3018	0.0271	0.0211	0.0605
Ibuprofen 200 mg cap tab	5.0333	0.3599	0.0322	0.7936
Insulin human mixed 100 IU/ml injection	31.5165	0.0626	0.0000	0.0942
Insulin human regular 100 IU/ml injection	35.3505	0.0308	0.0000	0.3284
Isosorbide mononitrate 20 mg cap tab	2.1413	0.0066	0.0051	0.0134
Levonorgestrel/ethinylestradiol 150 mcg/30 mcg tab	6.0381	0.0179	0.0128	0.0257
Levothyroxine 50 mcg cap tab	1.5196	0.0099	0.0059	0.0175
Metformin 500 mg cap tab	0.8879	0.0270	0.0000	0.1616
Morphine 10 mg cap tab	3.2000	0.0120	0.0120	0.0120
Morphine 10 mg ml injection	54.1700	0.1861	0.0011	0.2199
Omeprazole 20 mg cap tab	1.8400	0.0589	0.0407	0.2292
Oral rehydration salts 1 litre sachet	11.2425	0.0989	0.0043	0.1385
Oxytocin 5 IU/ml injection	12.9600	0.0145	0.0025	0.0185
Paracetamol 500 mg cap tab	1.5975	0.1359	0.0071	0.6627
Prednisolone 5 mg cap tab	2.2144	0.1012	0.0495	0.1222
Salbutamol 100 mcg dose inhaler	0.3272	0.0278	0.0231	0.0374
Simvastatin 20 mg cap tab	1.6018	0.0485	0.0113	0.3542
Trihexyphenidyl 2 mg cap tab	0.7500	0.0168	0.0129	0.0235

Table A11.2. Prices per medicine relative to the national reference prices

Medicine name	National reference price (reimbursement per unit, hryvnia)	MUP (hryvnia)	MPR (national)	MPR (25th percentile)	MPR (75th percentile)
Amlodipine 5 mg cap tab	0.2707	0.4788	1.77	1.1175	2.5379
Atenolol 50 mg cap tab	0.4873	0.4545	0.93	0.8824	1.0132
Hydrochlorothiazide 25 mg cap tab	1.3021	1.3018	1.00	0.9028	2.0677
Digoxin 25 mcg cap tab	0.2066	0.1948	0.94	0.9197	0.9874
Enalapril 10 mg cap tab	0.2545	0.6310	2.48	1.8075	7.0596
Glyceryltrinitrate 0.5 mg cap tab	0.2132	0.2000	0.94	0.9067	1.0553
Simvastatin 20 mg cap tab	1.4438	1.6018	1.11	0.9307	1.2458
Spironolactone 50 mg cap tab	1.8805	2.2342	1.19	1.1501	1.9662
Furosemide 40 mg cap tab	0.1719	0.1700	0.99	0.9151	1.6341
Glibenclamide 5 mg cap tab	0.3384	0.3360	0.99	0.9338	1.8642
Gliclazide 30 mg cap tab	0.6113	1.6110	2.64	2.6354	2.6354
Gliclazide 60 mg cap tab	1.2226	2.8123	2.30	2.0694	2.6037
Metformin 500 mg cap tab	0.5459	0.8879	1.63	1.3685	4.6094
Metformin 1 g cap tab	1.0919	3.0273	2.77	2.0838	3.4612
Beclometasone 250 mcg dose inhaler	1.0624	1.0115	0.95	0.8895	1.1871
Salbutamol 100 mcg dose inhaler	0.3249	0.3272	1.01	0.9561	1.0761

Note: MPRs higher than mean 1 are in red.

Annex 12.
Low cost at the medicine level

Medicine name	Low cost (WHO/HAI)	EDW (WHO)	Low cost (WHO)
Acetylsalicylic acid 100 mg cap tab	0.0155	0.4863	Low cost
Amitriptyline 25 mg cap tab	0.0001	0.4857	Low cost
Amlodipine 5 mg cap tab	0.0034	0.4859	Low cost
Amoxicillin 500 mg cap tab	0.0317	0.4868	Low cost
Amoxicillin 50 mg/ml suspension	0.0070	0.4860	Low cost
Atenolol 50 mg cap tab	0.0049	0.4859	Low cost
Beclometasone 250 mcg dose inhaler	0.0145	0.4862	Low cost
Budesonide 100 mcg dose inhaler	0.0156	0.4863	Low cost
Carbamazepine 200 mg cap tab	0.0397	0.4870	Low cost
Ceftriaxone 1 g vial injection	0.0174	0.4863	Low cost
Chlorpromazine 25 mg/ml injection	0.0005	0.4858	Low cost
Dexamethasone 4 mg/ml injection	0.0008	0.4858	Low cost
Digoxin 250 mcg cap tab	0.0000	0.4857	Low cost
Digoxin 25 mcg cap tab	0.0000	0.4857	Low cost
Enalapril 10 mg cap tab	0.0045	0.4859	Low cost
Fluconazole 50 mg cap tab	0.0246	0.4866	Low cost
Folic Acid 1 mg cap tab	0.0016	0.4858	Low cost
Furosemide 40 mg cap tab	0.0012	0.4858	Low cost
Gentamicin 40 mg/ml injection	0.0065	0.4860	Low cost
Glibenclamide 5 mg cap tab	0.0048	0.4859	Low cost
Gliclazide 30 mg cap tab	0.0116	0.4861	Low cost
Gliclazide 60 mg cap tab	0.0202	0.4864	Low cost
Glyceryltrinitrate 0.5 mg cap tab	0.0000	0.4857	Low cost
Hydrochlorothiazide 25 mg cap tab	0.0094	0.4860	Low cost
Ibuprofen 200 mg cap tab	0.0724	0.4881	Low cost
Insulin glargine 100 IU/ml injection	0.0220	0.4865	Low cost
Insulin glargine/lixisenatide 100 IU/ml injection	0.0564	0.4876	Low cost
Insulin human intermediate acting 100 IU/ml injection	0.0085	0.4860	Low cost
Insulin human mixed 100 IU/ml injection	0.6797	0.5081	Low cost
Insulin human regular 100 IU/ml injection	0.7624	0.5108	Low cost
Isosorbide mononitrate 20 mg cap tab	0.0005	0.4858	Low cost
Levonorgestrel/ethinylestradiol 150 mcg/30 mcg tab	0.0304	0.4867	Low cost
Levothyroxine 50 mcg cap tab	0.0218	0.4865	Low cost
Magnesium sulfate 250 mg/ml solution	0.0002	0.4857	Low cost
Metformin 1 g cap tab	0.0653	0.4879	Low cost
Metformin 500 mg cap tab	0.0191	0.4864	Low cost
Morphine 10 mg cap tab	0.1380	0.4903	Low cost
Morphine 10 mg/ml injection	0.0130	0.4862	Low cost
Omeprazole 20 mg cap tab	0.0004	0.4858	Low cost
Oral rehydration salts 1 litre sachet	0.0081	0.4860	Low cost
Oxytocin 5 IU/ml injection	0.0031	0.4858	Low cost
Paracetamol 500 mg cap tab	0.0689	0.4880	Low cost
Paroxetine 20 mg cap tab	0.0927	0.4888	Low cost
Prednisolone 5 mg cap tab	0.0005	0.4858	Low cost
Salbutamol 100 mcg dose inhaler	0.0024	0.4858	Low cost
Simvastatin 20 mg cap tab	0.0115	0.4861	Low cost
Spironolactone 50 mg cap tab	0.0005	0.4858	Low cost
Trihexyphenidyl 2 mg cap tab	0.0002	0.4857	Low cost

Annex 13.

Weighted access to medicines at the facility level

Region	Median percentage of medicines available at low cost in a facility
Chernihiv	**79.00**
HFID_unlisted_Nizhynsky	99.92
HFID10-42502360	79.00
HFID13-42502360	78.69
HFID2-24837286	89.43
HFID7-36655448	100.00
HFID8-30041795	66.35
HFID9-41964638	46.20
Ivano-Frankivsk	**43.88**
HFID100-	41.31
HFID101-	43.88
HFID83-20534407	54.10
HFID84-38971509	44.00
HFID85-	13.22
HFID86-37409086	26.58
HFID87-34078368	22.72
HFID88-34903875	60.21
HFID89-32606067	45.36
HFID92-35677565	46.86
HFID93-22172300	44.37
HFID94-	20.23
HFID95-19369268	26.58
HFID96-22195858	24.45
HFID98-31789804	44.37
Kharkiv	**76.70**
HFID_unlisted_Balakliysky	74.26
HFID_unlisted_Izumsky	28.47
HFID_unlisted_Kharkivsky1	74.91
HFID_unlisted_Kharkivsky2	76.72
HFID_unlisted_Krasnokutsky	74.41
HFID_unlisted_ Velikoburlutsky	76.70
HFID_unlisted_Vovchansky	71.66
HFID103-22678794	96.79
HFID40-37763205	95.43
HFID41-21195568	77.97
HFID42-23761894	63.47
HFID44-30883122	92.25
HFID48-25180279	99.21
HFID49-31439339	54.03
HFID50-22654831	80.55
Kherson	**79.73**
HFID14-01333643	81.49
HFID15-38199357	99.92
HFID16-37542024	19.28
HFID17-01333643	77.96
HFID18-	39.23
HFID19-37744156	32.20
HFID20-31759963	98.39
HFID21-	99.85

Region	Median percentage of medicines available at low cost in a facility
HFID22-39393339	66.05
Kherson	**79.73**
HFID24-36400821	81.49
HFID25-37557072	100.00
HFID26-21285975	76.63
Kyiv city	**75.02**
HFID_unlisted_Kievsky1	73.28
HFID_unlisted_Kievsky2	55.45
HFID_unlisted_Kievsky3	48.31
HFID104-21526737	53.15
HFID70-37226619	78.18
HFID72-32772863	79.06
HFID73-37606171	53.10
HFID74-32248361	72.03
HFID75-38182652	76.76
HFID78-39196410	79.00
HFID79-36439904	79.06
HFID81-16280214	78.21
Luhansk	**79.06**
HFID_unlisted_ Severodonetsky1	79.06
HFID_unlisted_ Severodonetsky2	99.92
HFID28-40045927	68.50
HFID37-40045927	49.87
HFID38-23262004	99.48
Volyn	**78.15**
HFID57-20120864	78.89
HFID59-24482251	78.57
HFID60-31442745	78.07
HFID61-21738610	72.69
HFID62-20148147	53.15
HFID63-01975330	79.00
HFID64-34078368	78.12
HFID65-21738610	78.18
HFID66-40520168	79.00
HFID67-	44.33
HFID68-21742651	78.18
HFID69-	60.83


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