USAID
FROM THE AMERICAN PEOPLE

QUANTIFYING THE DEMAND OF HIV COMMODITIES RELATED TO VENEZUELAN MIGRANTS LIVING WITH HIV IN PERU

Local Health System Sustainability Project
Task Order 1, USAID Integrated Health Systems IDIQ

Local Health System Sustainability Project

The Local Health System Sustainability Project (LHSS) under the USAID Integrated Health Systems IDIQ helps low- and middle-income countries transition to sustainable, self-financed health systems as a means to support access to universal health coverage. The project works with partner countries and local stakeholders to reduce financial barriers to care and treatment, ensure equitable access to essential health services for all people, and improve the quality of health services. Led by Abt Associates, the five-year, $209 million project will build local capacity to sustain strong health system performance, supporting countries on their journey to self-reliance and prosperity.

Submitted to: Scott Stewart, Task Order Contracting Officer's Representative, Office of Health Systems, Bureau for Global Health

Jaime Chang, Public Health Specialist, Venezuela Regional Migration Programs Office, USAID/Peru

USAID Contract No: 7200AA18D00023 / 7200AA19F00014

Recommended Citation: The Local Health System Sustainability Project (LHSS) under the USAID Integrated Health Systems IDIQ. June 2021. Quantifying the demand of HIV commodities related to Venezuelan migrants living with HIV in Peru. MD: Abt Associates.

This report was made possible by the support of the American people through the United States Agency for International Development (USAID). The contents are the sole responsibility of the authors and do not necessarily reflect the views of USAID or the United States government.

Contents

List of Tables

List of Figures

Acronyms

ART	Antiretroviral Therapy
ARV	Antiretroviral
CENARES	National Center for the Supply of Strategic Resources
DIGEMID	General Directorate of Medicines, Supplies and Drugs
DPVIH	Directorate for the Prevention and Control of HIV-AIDS
HIV	Human Immunodeficiency Virus
LHSS	Local Health System Sustainability Project
MOH	Ministry of Health
MSM	Men who have Sex with Men
SEACE	Electronic System of State Procurement
USAID	United States Agency for International Development

1. Introduction

The objective of the Local Health System Sustainability Project (LHSS) in Peru is to strengthen the capacity of the Ministry of Health (MOH) to provide equitable, affordable, and acceptable access to quality prevention, testing, treatment, and care services for migrants living with HIV.

Under the Year 1 Workplan, Objective 2 aims to strengthen MOH capacity to ensure availability of HIV commodities (ARVs and medical devices) for the Venezuelan migrant population in Peru. As part of this effort, LHSS estimated the demand for HIV commodities related to this population, including details such as type, quantity, and timing[1].

This report presents the LHSS estimates. Following the Section 1 introduction, Section 2 presents a summary of the results of the quantification of demand for HIV commodities. Section 3 describes the capabilities and limitations of the quantification model, its approach to quantification, and the sources used. Section 4 provides a preview of the user technical guide (in Spanish) to assist with the maintenance and navigation of the tool by the MOH and other relevant stakeholders.

[1] This refers to the frequency at which commodities are consumed as per medical guide. For example, 1 tablet per day.

2. Summary of Results

2.1 Overview of scenarios and outputs

The tool developed to quantify the demand for HIV commodities by the Venezuelan migrant population living with HIV in Peru addresses three planning scenarios developed in the report "Population size estimation report for Venezuelan migrants living with HIV in Peru." HIV commodities considered in the estimation include 40 ARVs and medical devices. An HIV epidemiology funnel was used to calculate the number of Venezuelan migrants with HIV living in Peru, and the three planning scenarios used for forecasting are as follows:

- Scenario 1 covers 3,409 cases as the 2021 baseline of Venezuelan migrants accessing antiretroviral therapy (ART).
- Scenario 2 covers 4,886 cases (includes 3,409 cases from the baseline plus 1,477 new cases), which assumes a low prevalence (0.6%) and an improvement in both diagnosis and treatment rates to meet national levels (78% and 87%, respectively).
- Scenario 3 covers 7,581 cases (includes 3.409 cases from the baseline plus 4,172 new cases), which assumes a high prevalence (0.7%) as well as achieving a 95% level performance in both diagnosis and treatment in line with the 2030 country goal.

The quantification tool delivers four outputs for each scenario to guide the MOH in its planning efforts:

1. Total annual demand expressed as the number of units of antiretrovirals (ARVs) and medical devices.
2. Total annual financial need expressed as the amount in soles (S/. or Peruvian local currency) required to procure ARVs and medical devices.
3. Annual volume (units) and value (S/.) of HIV commodities (ARVs and medical devices) mobilized through the national supply chain per patient accessing ART.
4. Breakdown of total annual volume (units) and value (S/.) by commodity.

2.2 Total demand and financial need per scenario

The approach to quantifying commodity demand is two-fold. First, the annual volume of commodities (ARVs and medical devices) needed to provide ART to the Venezuelan migrant population living with HIV for one calendar year is calculated. Second, the volume of commodities needed for diagnosis and prevention efforts targeting the Venezuelan migrant population at large is calculated. For each scenario described in section 2.1, four commodity demand outputs were obtained, each of which built in a15% buffer estimate:

- Volume of ARV units needed.
- Volume of medical device (viral load test, CD4 count test, male and female condoms) units needed for treatment.
- Total volume of medical devices (rapid test for HIV 1-2 and Syphilis used for identification of potential cases, HIV rapid test 4th generation used for confirmation of a positive case, male and female condoms) needed for diagnosis and prevention.

The results of commodity demand quantification per scenario are as follows:

Scenario 1. To provide ART to 3,409 Venezuelan migrants currently accessing ART, 2.027 million units[2] of ARVs and 2.946 million units[1] of medical devices[3] are needed. The demand for medical devices[2] linked to diagnosis and prevention efforts is 0 in this scenario, because it does not consider any new HIV cases (baseline are patients already diagnosed and receiving ART).

Scenario 2. To provide ART to 4,886 Venezuelan migrants, 2.905 million units[1] of ARVs and 4.222 million units[1] of medical devices[2] are needed. This scenario estimates the demand for medical devices[2] linked to diagnosis and prevention efforts to be 10.245 million units[1], based on the 1,477 new cases assumed.

Scenario 3. To provide ART to 7,581 Venezuelan migrants, 4.507 million units[1] of ARVs and 6.551 million units[1] of medical devices[2] are needed. This scenario estimates the demand for medical devices linked to diagnosis and prevention efforts to be 28.939 million units[1], based on the 4,172 new cases assumed.

The approach for quantifying the financial resources needed to meet demand is also two-fold. First, the annual cost of ARVS and medical devices (viral load test, CD4 recount test, male and female condoms) needed to provide ART to Venezuelan migrant populations living with HIV is calculated. Second, the cost of medical devices needed for diagnosis and prevention efforts targeting the Venezuelan migrant population at large. For each scenario, five results were obtained, building in an estimate that 15% buffer stock is needed:

- Value of ARVs needed in S/.
- Value of medical devices (viral load test, CD4 recount test, male and female condoms) needed for treatment in S/.
- Total value of ART and medical devices needed in S/.
- Total value of ART and medical devices needed for Venezuelan population expressed as a percentage of CENARES' 2019 total spending on ARVs and similar medical devices (S/. 43.3 million) for roughly 53,000 patients receiving ART in an MOH health facility.
- Total value of medical devices (rapid test for HIV 1-2 and Syphilis used for identification of potential cases, HIV rapid test 4th generation used for confirmation of a positive case, male and female condoms) needed for prevention or diagnostic efforts in S/.

The results of demand costing per scenario are as follows:

Scenario 1. To provide ART to 3,409 Venezuelan migrants, S/. 1.517 million is needed to procure ARVs and S/. 0.957 million is needed to procure medical devices[2]. These figures aggregate to a total of S/. 2.474 million needed to procure HIV commodities (ARVs and medical devices[2]) for ART. This value is 6% of 2019 total spending by the National Center for the Supply of Strategic Resources (CENARES) on ARVs and medical devices[2] (S/. 43.3 million). Because the assumed demand for medical devices[2] linked to diagnosis and prevention efforts is 0 in this scenario, it does not consider any costs for those commodities.

Scenario 2. To provide ART to 4,886 Venezuelan migrants, S/. 2.174 million is needed to procure ARVs and S/. 1.372 million is needed to procure medical devices[2]. These figures aggregate to a total of S/. 3.546 million to procure HIV commodities (ARVs and medical devices[2]) for ART. This value is 8% of CENARES' 2019 total spending on ARV and medical devices (S/. 43.3 million). In addition, the cost of medical devices[2] linked to diagnosis and

---

2 Units are described in Tables 1 through 5 in the next section
3 Medical devices are listed in Tables 1 through 5 in the next section

prevention efforts is S/. 2.043 million, which estimates the amount needed to identify the 1,477 new cases assumed in this scenario.

Scenario 3. To provide ART to 7,581 Venezuelan migrants, S/. 3.373 million is needed to procure ARVs and S/. 2.139 million is needed to procure medical devices[2]. These figures aggregate to a total of S/. 5.502 million needed to procure HIV commodities (ARVs and medical devices[2]) for ART. This value is 13% of CENARES' 2019 total spending on ARV and medical devices (S/. 43.3 million). In addition, the cost of medical devices[2] linked to diagnosis and prevention efforts is S/. 5.771 million, the estimated amount needed to identify the 4,172 new cases assumed in this scenario.

3. In Depth Review of Results

3.1 Annual volume and value per commodity per scenario

This section presents model outputs disaggregated for each of the three scenarios, maintaining the assumption of a 15% buffer for procurement. Details on the approach for selecting or prioritizing commodities in these scenarios can be found in section x: Quantification Model Overview.

First, for each scenario, the model provides the annual volume per commodity (ARVs and medical devices) needed to provide ART to the Venezuelan migrant population living with HIV for one calendar year, including the unit of the commodity used for procurement (provided by the Directorate for the Prevention and Control of HIV/AIDS (DPVIH)) and the corresponding monetary value in S/. and USD.

Second, in the scenarios where it is applies, the model provides the volume of commodities needed for diagnosis and prevention efforts targeting the Venezuelan migrant population at large, including the unit of the commodity used for procurement (provided by the DPVIH) and the monetary value in S/. and USD.[4]

Scenario 1. To provide treatment to 3,409 Venezuelan migrants accessing ART, 2,902,999 tablets, 171 test kits, 761 oral solutions, 872 syrups; and 221,787 condoms are needed. Table 1 provides a detailed breakdown of the volume and monetary value in S/. and USD for each commodity. Diagnosis and prevention services are not considered in this scenario.

Table 1. Demand for ART Commodities in Scenario 1

Commodity	Unit	Volume	Monetary Value in S/.	Monetary Value in USD
Abacavir + Lamivudine 600 mg + 300 mg	Tablet	130,787	147,789	36,383
Dolutegravir + Lamivudine + Tenofovir 50 mg + 300 mg + 300 mg	Tablet	99,163	75,505	18,588
Efavirenz + Lamivudine + Tenofovir 400 mg + 300 mg + 300 mg	Tablet	1,123,564	865,145	212,985
Efavirenz 600 mg	Tablet	75,696	23,466	5,777
Emtricitabine + Tenofovir 200 mg + 300 mg	Tablet	70,831	44,269	10,898
Female condoms	Unit	14,166	28,147	6,929
Kit for Lymphocyte, CD4, CD8, CD3 count	Kit (50 determinations)	78	470,132	115,739

[4] To convert S/. into USD we are using the Peruvian Central Bank's average exchange rate at the end of November of S/. 4.062.

Commodity	Unit	Volume	Monetary Value in S/.	Monetary Value in USD
Lamivudine + Zidovudine 150 mg + 300 mg	Tablet	3,434	1,339	330
Lamivudine 10 mg/ml x 240 ml	Solution (240 ml)	405	7,136	1,757
Lopinavir + Ritonavir 200 mg + 50 mg	Tablet	522,002	318,421	78,390
Lopinavir + Ritonavir 400 mg + 100 mg/5 ml	Solution (160 ml)	125	19,085	4,698
Male condoms	Unit	2,931,456	454,376	111,860
Real time HIV Viral Load Kit (includes components)	Kit (96 determinations)	41	4,723	1,163
Zidovudine 50 mg/5 ml	Syrup (240ml)	608	14,757	3,633
TOTAL		**4,972,359**	**2,474,290**	**609,131**

Scenario 2. To provide ART to 4,886 Venezuelan migrants, 3,386,833 tablets, 200 test kits, 887 units of oral solution, 1,017 units of syrup; and 4,925419 condoms are needed. Table 2 provides a detailed breakdown of the volume and monetary value in S/. and USD for each ART commodity. To provide the necessary diagnosis and prevention services to identify 1,477 new cases assumed in this scenario, 10,235,697 condoms and 8,041 rapid tests are needed. Table 3 provides a more detailed breakdown of the volume and monetary value in S/. and USD for each diagnostic and prevention effort commodity.

Table 2. Demand for ART Commodities in Scenario 2

Commodity	Unit	Volume	Monetary Value in S/.	Monetary Value in USD
Abacavir + Lamivudine 600 mg + 300 mg	Tablet	187,449	211,817	52,146
Dolutegravir + Lamivudine + Tenofovir 50 mg + 300 mg + 300 mg	Tablet	142,125	108,217	26,641
Efavirenz + Lamivudine + Tenofovir 400 mg + 300 mg + 300 mg	Tablet	1,610,339	1,239,961	305,259
Efavirenz 600 mg	Tablet	108,491	33,632	8,280
Emtricitabine + Tenofovir 200 mg + 300 mg	Tablet	101,518	63,449	15,620
Female condoms	Unit	20,304	40,341	9,931
Kit for Lymphocyte, CD4, CD8, CD3 count	Kit (50 tests)	112	673,813	165,882

Commodity	Unit	Volume	Monetary Value in S/.	Monetary Value in USD
Lamivudine + Zidovudine 150 mg + 300 mg	Tablet	4,922	1,920	473
Lamivudine 10 mg/ml x 240 ml	Solution (240 ml)	581	10,227	2,518
Lopinavir + Ritonavir 200 mg + 50 mg	Tablet	748,156	456,375	112,352
Lopinavir + Ritonavir 400 mg + 100 mg/5 ml	Solution (160 ml)	179	27,354	6,734
Male condoms	Unit	4,201,484	651,230	160,323
Real time HIV Viral Load Kit (includes components)	Kit (96 determinations)	59	6,769	1,666
Zidovudine 50 mg/5 ml	Syrup (240ml)	872	21,150	5,207
TOTAL		**7,126,590**	**3,546,254**	**873,032**

Table 3. Demand for Diagnosis and Prevention Efforts Commodities in Scenario 2

Commodity	Unit	Volume	Monetary Value in S/.	Monetary Value in USD
Female condoms	Unit	49,231	97,816	24,081
HIV I-II Immunochromatographic Rapid Test for Antigen and Antibody detection	Kit	1,477	6,794	1,673
Male condoms	Unit	10,187,466	1,579,057	388,739
Rapid test for HIV 1-2 and Syphilis	Kit (25 determinations)	6,564	359,384	88,475
TOTAL		**10,244,738**	**2,043,051**	**502,967**

Scenario 3. To provide ART to 7,581 Venezuelan migrants, 4,504,298 tablets, 266 test kits, 1,180 units of oral solution, 1,352 units of syrup; and 6,550,531 condoms are needed. Table 4 provides a detailed breakdown of the volume and monetary value in S/. and USD for each ART commodity. To provide the necessary diagnosis and prevention services to identify 4,172 new cases assumed in this scenario, 28,916,596 condoms and 22,714 rapid tests are needed. Table 5 provides a more detailed breakdown of the volume and monetary value in S/. and USD for each diagnostic and prevention commodity.

Table 4. Demand for ART Commodities in Scenario 3

Commodity	Unit	Volume	Monetary Value in S/.	Monetary Value in USD
Abacavir + Lamivudine 600 mg + 300 mg	Tablet	290,846	328,656	80,910
Dolutegravir + Lamivudine + Tenofovir 50 mg + 300 mg + 300 mg	Tablet	220,521	167,910	41,337
Efavirenz + Lamivudine + Tenofovir 400 mg + 300 mg + 300 mg	Tablet	2,498,604	1,923,925	473,640
Efavirenz 600 mg	Tablet	168,334	52,184	12,847
Emtricitabine + Tenofovir 200 mg + 300 mg	Tablet	157,515	98,447	24,236
Female condoms	Unit	31,503	62,593	15,409
Kit for Lymphocyte, CD4, CD8, CD3 count	Kit (50 determinations)	174	1,045,489	257,383
Lamivudine + Zidovudine 150 mg + 300 mg	Tablet	7,637	2,978	733
Lamivudine 10 mg/ml x 240 ml	Solution (240 ml)	902	15,868	3,906
Lopinavir + Ritonavir 200 mg + 50 mg	Tablet	1,160,839	708,112	174,326
Lopinavir + Ritonavir 400 mg + 100 mg/5 ml	Solution (160 ml)	278	42,442	10,449
Male condoms	Unit	6,519,028	1,010,449	248,757
Real time HIV Viral Load Kit (includes components)	Kit (96 determinations)	92	10,502	2,585
Zidovudine 50 mg/5 ml	Syrup (240ml)	1,352	32,816	8,079
TOTAL		**11,057,627**	**5,502,373**	**1,354,597**

Table 5. Demand for Diagnosis and Prevention Efforts Commodities in Scenario 3

Commodity	Unit	Volume	Monetary Value in S/.	Monetary Value in USD
Female condoms	Unit	139,067	276,310	68,023
HIV I-II Immunochromatographic Rapid Test for Antigen and Antibody detection	Kit	4,172	19,191	4,725
Male condoms	Unit	28,777,529	4,460,517	1,098,109

Commodity	Unit	Volume	Monetary Value in S/.	Monetary Value in USD
Rapid test for HIV 1-2 and Syphilis	Kit (25 determinations)	18,542	1,015,187	249,923
TOTAL		**28,939,310**	**5,771,205**	**1,420,779**

3.2 Annual volume and cost per patient

The total volume and financial need calculated in the previous section allows for estimating annual volume and cost of HIV commodities per patient for ART. HIV rapid tests and condoms delivered during prevention activities to the broader migrant population are not considered

About 1,459 product units are mobilized through the national supply chain to provide ART care to one patient, considering a 15% buffer stock. Taking Scenario 1 as an example, the annual per patient quantity results from dividing 4.973 million units of HIV commodities by the number of cases covered, which is 3,409.

About S/. 726 are needed to procure commodities to provide ART to one patient, considering a 15% buffer stock. Taking Scenario 1 as an example again, the per patient cost results from dividing S/. 2.474 million needed to procure the necessary HIV commodities for the whole scenario per year by the number of cases covered, which is 3,409. To pressure test this value, we divided CENARES' 2019 total spending on ARV and medical devices (S/. 43.3 million) by the number of ART patients (53,764) in MOH establishments, obtaining a per patient cost of S/. 805. The overall close match between the per patient cost for Venezuelan migrants and a Peruvian ART patient signals the robustness of the model. Small differences between both values could be due to commodity price variations between 2019 and 2021 and changes in the ART regimens used, among others.

3.3 Volume and value breakdown by key commodity

The model approach, as explained in the next section, makes it possible to identify the aggregate volume (units) and cost (S/.) per commodity or product for ART. For example, Figure 1 presents the top 10 commodities by cost, which illustrates that from a volume perspective, male condoms represent roughly 60% of all units moved in a year. Yet, from a cost perspective, male condoms represent only 20% of the annual financial need because of their relatively low average unit price (S/. 0.2). Efavirenz + Lamivudine + Tenofovir 400mg + 300mg + 300mg is the second highest commodity in terms of volume (22.6% of total units mobilized), yet in terms of value it represents 35% of the total financial need.

Figure 1: Breakdown of Commodity Volume and Financial Demand

Breakdown of high-volume products sourcing the HIV supply chain

Scenario 1: ART Baseline 2020 (considering a 15% security stock)

Top 10 products by volume	Volume '000 units, % of total	Value '000 units, % of total	Unit price S/., average
Male condoms	2.931 (58,96%)	454 (18,36%)	0.2
Efavirenz + Lamivudine + Tenofovir 400 mg + 300 mg + 300 mg	1.124 (22,60%)	865 (34,97%)	0.8
Lopinavir + Ritonavir 200 mg + 50 mg	522 (10,50%)	318 (12,87%)	2.0
Abacavir + Lamividune 600 mg + 300 mg	131 (2,63%)	148 (5,97%)	0.6
Dolutegravir + Lamividune + Tenofovir 50 mg + 300 mg + 300 mg	99 (1,99%)	76 (3,05%)	1.1
Efavirenz 600 mg	76 (1,52%)	23 (0,95%)	0.8
Emtricitabina + Tenofovir 200 mg + 300 mg	71 (1,42%)	44 (1,79%)	0.3
Female condoms	14 (0,28%)	28 (1,14%)	0.6
Lamivudine + Zidovudine 150 mg + 300 mg	3 (0,07%)	1 (0,05%)	0.4
Zidovudine 50 mg/5 ml	1 (0,01%)	15 (0,60%)	24.3
Others	1 (0,01%)	501 (20,25%)	
Total	4,973 (100,00%)	2,474 (100,00%)	

5

4. Potential Applications of Results

An initial assessment has identified 5 potential applications for the results of the model moving forward.

1. **Build a deeper understanding of the HIV supply chain using results at commodity level**

- **Context**: Currently, the estimation exercise for HIV commodities procurement is based on number of expected ART cases at provider level which are then aggregated at local, regional, and national levels. As a result, stakeholders rarely have visibility over volume and types of commodities to be procured and delivered each year.
- **Added value**: A bottom-up approach providing volume and value per commodity allows stakeholders to flag and prevent any potential risks to the supply chain to reduce or avoid stock-outs.
- **Examples of how to use the results**: By knowing the volume of a specific commodity, stakeholders could assess where the existing transportation and warehousing capacity are sufficient to handle these flows or additional arrangements need to be made. By knowing the financial need of a specific commodity, stakeholders could start working to resolve potential budget gaps and avoiding causing delays in the procurement process that depends on having secure funding to start a bidding process.

2. **Strengthen capability building for supply chain stakeholders using results as reference material**

- **Context**: Procurement of HIV commodities occurs on an annual basis and stakeholders from local, regional, and national levels participate. They have various levels of expertise, knowledge, and resources to complete a demand estimation (e.g., number of cases) and limited visibility of the procurement process (e.g., prices, volume of commodities). At times, these knowledge gaps could hinder the accuracy of procurement and result in stock-outs.
- **Added value**: Both aggregate and commodity-level results could be key learning tools at the beginning of every annual procurement process and serve as a refresher for new and experienced stakeholders.
- **Examples of how to use the results**: By knowing which ARTs were prioritized by the DPVIH for the quantification, stakeholders could gain a better grasp of the potential implications of introducing new ARTs on procurement planning. By introducing the concept of a buffer percentage volume, the DPVIH could get feedback and standardize usage. By having aggregate results of volume and financial need, stakeholders could gain a better understanding of the size and characteristics of their own supply chain at a macro level particularly for high-level budget discussions.

3. **Incorporate an analytical assessment of the volume and financial needs to achieve the 95-95-95 goals**

- **Context**: By 2030, Peru aims to achieve 95% of all people living with HIV know their status, 95% of those diagnosed on ART, and 95% of those on ART virally suppressed. Yet, assessments of the supply chain and budgetary impact of scaling-up to achieve these goals have been limited. This quantification exercise addresses the first two targets.

- **Added value**: The scenarios used in the analysis provide a quick assessment of the current baseline of ART patients covered as well as the new cases and HIV commodities need to reach the 2030 country goal for diagnosis and treatment
- **Examples of how to use the results**: By knowing the additional commodities needed to diagnose and treat new HIV cases, stakeholders could identify any necessary investments in supply chain infrastructure (e.g., warehousing space, cold chain requirements) and capabilities (e.g., staffing needed, trainings for specialization) to continue operating a growing HIV supply chain and reduce stock-outs. By knowing the aggregate financial need, stakeholders could better analyze annual budget allocations and identify and address potential financial gaps to achieve the country goals.

4. **Assess the resilience of the HIV supply chain against stock-out issues to plan for contingency measures**

- **Context**: Stock-out reports are currently provided at commodity and provider levels with staff reporting number of months a commodity will be available based on available stock and average consumption. However, while number of reports is a valuable metric to size the problem; understanding whether stock-outs are impacting 10% or 90% of the commodities in the supply chain is a valuable perspective to add.
- **Added value:** The model provides a good understanding of the structure of the supply chain as commodities can be arranged by volume and by value size. This helps stakeholders calculate or analyze where the supply chain is resilient with no or low stock-out issues and where it is not. For example, if stock-out reports are mainly on Efavirenz + Lamivudine + Tenofovir, stakeholders would be able to know that stock-outs are impacting 23% of the volume been moved across the supply chain.
- **Examples of how to use the results**: By assessing the resilience of the HIV supply chain, stakeholders could have a better understanding of the size of the problem and better tailor contingency measures. For example, if the supply chain is largely resilient, meaning the large bulk of the commodities are not experiencing substantial stock-out risk, then stakeholders could focus on smaller-volume commodities perhaps by analyzing if defining and procuring replacements ahead of time could help reduce stock-outs.

5. **Expand or narrow the results for the HIV population at large or for a specific segment beyond migrants in Peru**

- **Context**: The current quantification effort is designed to address the HIV supply chain for migrants in Peru. However, the DPVIH has established that the methodological approach for migrants and general population should be the same, as the ARTs used in the model apply to both groups.
- **Added value:** The tool incorporates a fourth scenario that give the user the flexibility to run results for any amount of HIV cases. A user could opt to input the total HIV prevalence in the model or the number of cases for a single provider obtaining volume and value of commodities for both cases. Also, the tool provides the user with the option to modify the distribution of cases between ARTs.
- **Examples of how to use the results**: By having the capacity to input any number of HIV cases to cover, a region could use these results to pressure test the ones obtained in the annual procurement process. Similarly, a hospital, which currently only provides expected number of cases into the procurement process, could have access to a detailed volume and value for all commodities that they estimate need to be procured or have in stock; and even have the ability to modify the distribution of cases between ART regimens to tailor the model to its local circumstances.

5. Overview of quantification model

The quantification model facilitates determination of HIV commodities needed to provide ART to the Venezuelan migrant population living with HIV in Peru, as well as the HIV commodities needed for diagnosis and prevention efforts for the Venezuelan migrant population at large.

The quantification model and tool offer five valuable benefits:

1. Quantify the commodities needed to provide health services to the Venezuelan migrant population living with HIV in Peru.
2. Generate demand estimates that complement those that already exist or are calculated at local and regional level.
3. Facilitate testing scenarios and estimating projections that can be adjusted by the user, for example, to calculate the cost of a technology change or to calculate multi-year budgets.
4. Generate the solid analytical base needed to implement a resource mobilization strategy for this population, leveraging the international community.
5. Provide budgetary transparency in the provision of care to Venezuelan migrant population living with HIV in Peru.

Even though the model was prepared with a focus on Venezuelan migrants, its methodology and approach allow it to be used to calculate HIV commodities for all the people living with HIV in Peru.

5.1 Capabilities and limitations of the model

The main objective of the model is to quantify the demand for the approximately 40 pharmaceutical supplies and medical devices procured by the DPVIH. The model also facilitates the determination of the financial implications of this demand and provides a detailed perspective on volume and value by product. A full list of the model's functionality is presented below:

- The model quantifies the demand for roughly 40 pharmaceuticals (ARVs) and medical devices based on estimates of incidence (percentage of cases) by ART regime for three planning scenarios of ART coverage for Venezuelan migrant population living with HIV in Peru.
- The model quantifies the demand for HIV rapid tests, male and female condoms for the general Venezuelan migrant population linked to diagnostic and prevention efforts required in each scenario.
- The model estimates the monetary value of the demand based on unit prices from recent CENARES contracts, from unit prices published by the General Directorate of Medicines, Supplies and Drugs (DIGEMID), and from international benchmarks.
- The model breaks down volume and value by product, by function (e.g., treatment, diagnosis), by ART regime, and by care group (adults, children and teenagers, vulnerable adults such as men who have sex with men (MSM) and transgender women).

Limitations of the model that need to be considered are described below:

- The model does not cover all ART regimens currently in use. Of the over 100 ART regimens currently in use in Peru, 7 ART adult regimens and 7 ART children and adolescent regimens were selected, which are estimated to cover around 50% of cases in children and

adolescents and around 90% of adult cases. This selection was made following DPVIH guidance. Details on ART regimes used in the model are discussed in the next subsection.
- The model considers historical prices of the products, therefore annual variations are possible and need to be analyzed, particularly in situations like COVID-19, which create pressures in the global supply chain of HIV commodities.
- The model assumes the maximum recommended dose per commodity in situations where dosage varies by weight.
- The model uses quantities per case recommended for the second year of ART for medical devices. For example, during the first year of treatment, the number of tests is higher for the patient receiving ART to evaluate his or her response to treatment. In the second year and onwards, the quantities tend to be lower and more consistent.

It is important to note that the current procurement process relies on stakeholders at the regional level to provide the estimated number of cases to be covered the next year, in many instances relying on estimates at the local level. This input is entered in a web tool that automatically provides the volume of commodities needed, by relying on DPVIH's predetermined distribution of cases by ART, commodity type and amount needed per case, and other key assumptions.

The proposed model and tool intend to be a complementary resource to the current process briefly described in the previous paragraph (A more detailed description of the annual procurement for HIV commodities can be found in document 'Report on forecast tracking systems'). It attempts to provide users a means to pressure test process results and / or further tailor the model to their own context (e.g., modify distribution of cases among ARTs).

5.2 Overview of key model estimates

The model intends to be as adaptable as possible to user needs, thus all 25 estimates in the model can and should be reviewed and regularly updated. Below is a full list of variables or estimates included in the model to quantify demand of HIV commodities for different planning scenarios. These are organized in five categories as follows:

Estimation of the population. These are the main demographics and epidemiological variables used:

1. Total Venezuelan migrant population: 1,200,000, based on latest estimation provided by DPVIH.
2. HIV prevalence rate in the Venezuelan migrant population (low and high range): 0.6 to 0.7%, based on the LHSS report titled "Population size estimation report for Venezuelan migrants living with HIV in Peru."
3. HIV diagnosis rate of the Venezuelan migrant population: 62%, based on the LHSS report titled "Population size estimation report for Venezuelan migrants living with HIV in Peru."
4. Number of migrants receiving ART: 3,409, based on numbers provided by DPVIH.
5. HIV diagnosis rate of the Peruvian population living with HIV: 78%, based on numbers provided by DPVIH.
6. HIV treatment rate of the Peruvian population living with HIV: 87%, based on numbers provided by DPVIH.
7. HIV target diagnosis rate of the Peruvian population living with HIV in 2030: 95%, based on numbers provided by DPVIH.
8. HIV target treatment rate of the Peruvian population living with HIV in 2030: 95%, based on numbers provided by DPVIH.

9. Estimated percentage of population receiving ART that are adults: 99%, based on numbers provided by DPVIH.
10. Estimated percentage of population receiving ART that are children or teenagers: 1%, based on numbers provided by DPVIH.
11. Estimated percentage of the population of MSM, and transgender women population receiving ART out of total Venezuelan migrant population receiving ART: 53.4%, estimated based on DPVIH's most recent epidemiological report for general population receiving ART.

Requirements by regimen. These are the ART regimen distribution variables used:

1. Distribution rate by selected ART regimen: 0 to 100% of cases that are receiving a specific ART regimen (see Figure 2 for details on percentages per regimen). We have set the usage of two regimes at 0%, per instruction of the DPVIH, to enable preloading of two additional regimens in the tool.
2. Applicability of HIV commodities in each selected ART regimen: indicates whether a specific supply is required or not per regimen.

Product details. These are daily dosage or quantities needed per case per regimen used:

1. Daily dosage per case of pharmaceutical products (e.g., 1 tablet per day).
2. Estimated daily quantities per case of medical devices (e.g., 10 female condoms in a month, for the purpose of the model, translates into 0.33 female condoms per day).

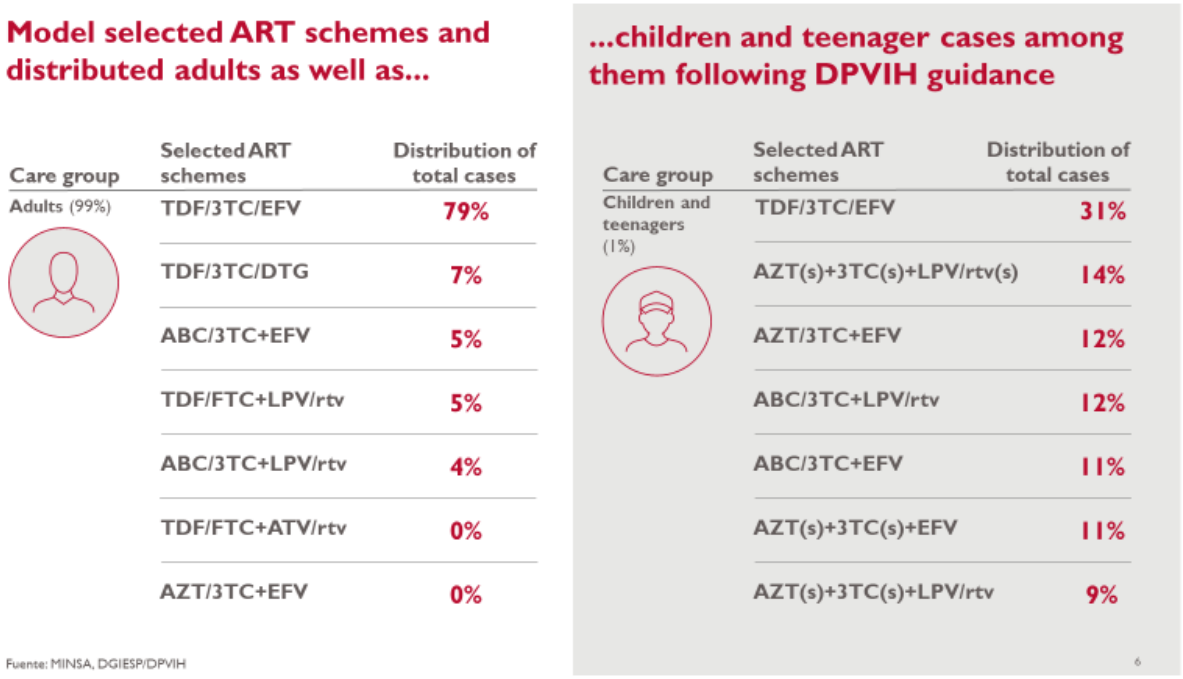
Procurement details. These are mainly average unit costs used:

1. Average unit cost per product: price varies per product, and it is based on recent contracts by CENARES, DIGEMID monthly reports on availability, international benchmarks.

Other variables. These are other variables used in the model:

1. Buffer stock level: 15%, based on observed practices in Peru.
2. Global HIV positivity rate: 0.90%, based on international benchmarks and used to estimate required diagnosis effort, i.e., how many people need to be tested to confirm an HIV positive.
3. Minimum quantity of male condoms provided to general population linked to a diagnosis and prevention effort: 20, based on existing technical norms.
4. Minimum quantity of female condoms provided to general population linked to a diagnosis and prevention effort: 10, based on existing technical norms.
5. Minimum quantity of male condoms provided to the population of MSM, and transgender women linked to a diagnosis effort: 100, based on existing technical norms.

Figure 2: Estimates Applied on Incidence Rate by ART Regimens



5.3 Quantification approach of HIV commodities for ART

To quantify volume, and value of HIV commodities (ARVs and medical devices) for ART, the model follows four key steps applicable to all planning scenarios:

1. Determine the number of total cases receiving ART and disaggregate by treatment group.
2. Calculate the number of cases per ART regimen.
3. Quantify HIV commodities (ARVs and medical devices) needed per regimen.
4. Estimate total volume and value of HIV commodities for all cases across all regimens.

Estimate the number and segment cases receiving ART. The step uses an HIV epidemiological funnel which includes prevalence, diagnosis, and treatment rates as well as a population baseline. The output is number of adults, children and adolescents, and vulnerable adults that will be receiving or are estimated to receive ART. Alternatively, there is an option to input a total number of target population when epidemiological variables are not available. There are three activities needed to accomplish this:

- Identify a baseline (i.e., number of Venezuelan migrants in Peru).
- Build scenario-based estimates of prevalence, diagnosis, and treatment rates.
- Segment population by treatment groups: adults, non-adults (children and adolescents), MSM, and transgender women.

Distribute cases per ART regimen. The input required in this step is the percentage of cases per ART regimen applicable for Venezuelan migrants. The output is the number of adult and children and adolescents' cases per ART regime. There are three activities needed to accomplish this:

- Evaluate ART regimens applicable for the migrant population in each treatment group (adult and non-adult).

- Define percentage of cases receiving a specific ART regimen (i.e., AZT/3TC + EFV) for each treatment group (adult and non-adult).
- Convert percentage rate into number of cases under each regimen.

Quantify HIV commodities needed per regime. The input required for this step is dosage and quantity per ARV or medical device per case per day in each ART regime. The output that will be obtained is total volume of commodities (ARVs and medical devices) required per ART regimen. There are three activities needed to accomplish this:

- Validate list of HIV commodities (ARVs and medical devices) under each selected ART regime.
- Identify dosage or quantity per commodity per case per day (i.e., 1 tablet of DTG daily).
- Calculate total HIV commodities (ARVs and medical devices) needed per regime.

Estimate total volume and value of HIV commodities for all cases across all regimes. The input required in this step is average unit cost per ARV or medical device. The output that will be obtained is total volume and value of HIV commodities (ARVs and medical devices) required for the total target population. There are three activities needed to accomplish this:

- Aggregate volume of each commodity across all ART regimes.
- Define whether the volume will consider a buffer stock.
- Cost volume-based needs to estimate a financial need by multiplying total product volume by average unit costs.

5.4 Quantification approach of medical devices for diagnosis and prevention

The approach the model follows to quantify volume, and value of medical devices needed to cover the diagnosis and prevention efforts based on the estimated number of new cases follows three key steps:

1. Estimate demand of HIV rapid tests (rapid test for HIV 1-2 and syphilis used for identification of potential cases, HIV rapid test 4th generation used for confirmation of a positive case, male and female condoms).
2. Estimate demand of male and female condoms to be provided.
3. Estimate total volume and value of the medical devices for the diagnosis and prevention effort.

Estimate demand of HIV rapid tests. The input required in this step is an HIV positivity rate of reference. The output that will be obtained is the total number of rapid tests needed to identify a target number of new cases. There are two activities needed to accomplish this:

- Calculate the number of people that need to be tested to add the target new cases in each scenario leveraging an HIV positivity rate of reference.
- Consider that according to the technical norm to confirm cases, two tests are needed thus the most common identification and confirmation rapid tests are used for the estimation.

Estimate demand of male and female condoms to be provided as part of the prevention effort. The input required in this step is the minimum quantity of condoms per population segment. The output that will be obtained is the total number of male and female condoms needed. There are two activities needed to accomplish this:

- Based on the estimated number of people to be tested, calculate the number of people that are expected to belong to each segment: male, female, MSM, and transgender women.
- Calculate the quantity of condoms to be provided based on the minimum quantities established in the technical guideline considering that these are different population segment.

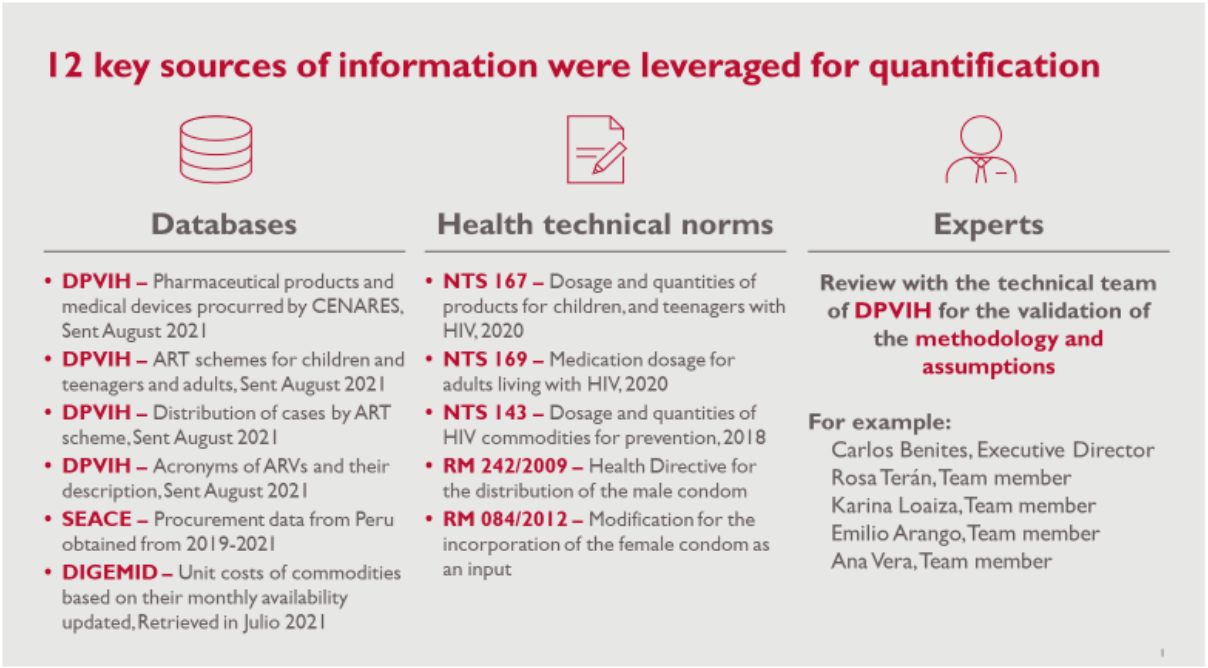
Estimate total volume and value of the medical devices for the diagnosis and prevention effort. The input required in this step is average unit cost per medical device. The output that will be obtained is total volume and value of medical devices required for the total target population. There are three activities needed to accomplish this:

- Estimate the total cost by multiplying total medical device volume by average unit costs.
- Aggregate volume and value of each medical device.

5.5 Sources used in the model

Twelve key sources were leveraged to create the model and input key estimates (see Figure 3). These include databases, technical health standards, or expert interviews. Four of the 6 databases used were provided by DPVIH, mostly related to information on usage of pharmaceuticals and medical devices, ART regimens, and incidence. Data from SEACE and DIGEMID were used to identify unit prices. Five technical health guidelines (listed in Figure 3 below) were used to understand doses and quantities of products for each population group considered by the model. To validate the gathered data and estimates, revisions were held with experts within DPVIH (See ANNEX 1).

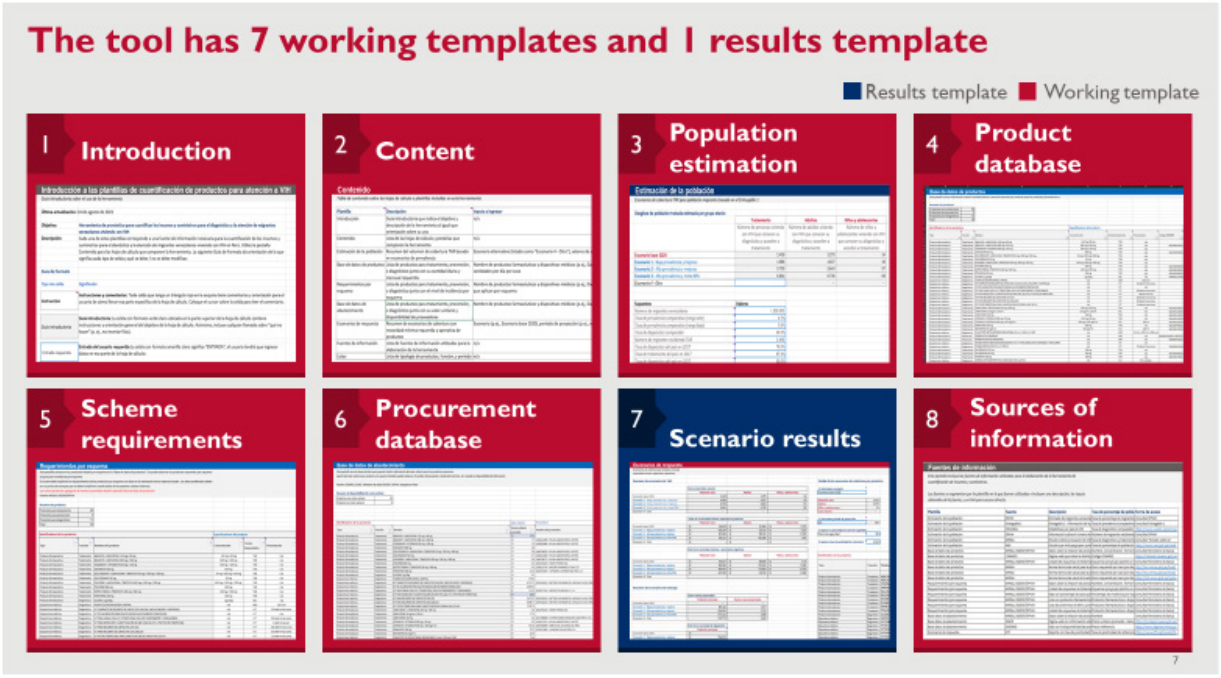
Figure 3: Overview of Types of Sources Leveraged



Annex I: Overview of User Technical Guide for the Quantification Tool

The quantification tool has a total of eight templates: seven working templates and one scenario results template (see Figure 4).

Figure 4: Overview of the Structure of the Excel Quantification Tool



A technical user guide was created to provide detail on the necessary steps to maintain or navigate five of the eight templates. The five templates included in the technical guide are:

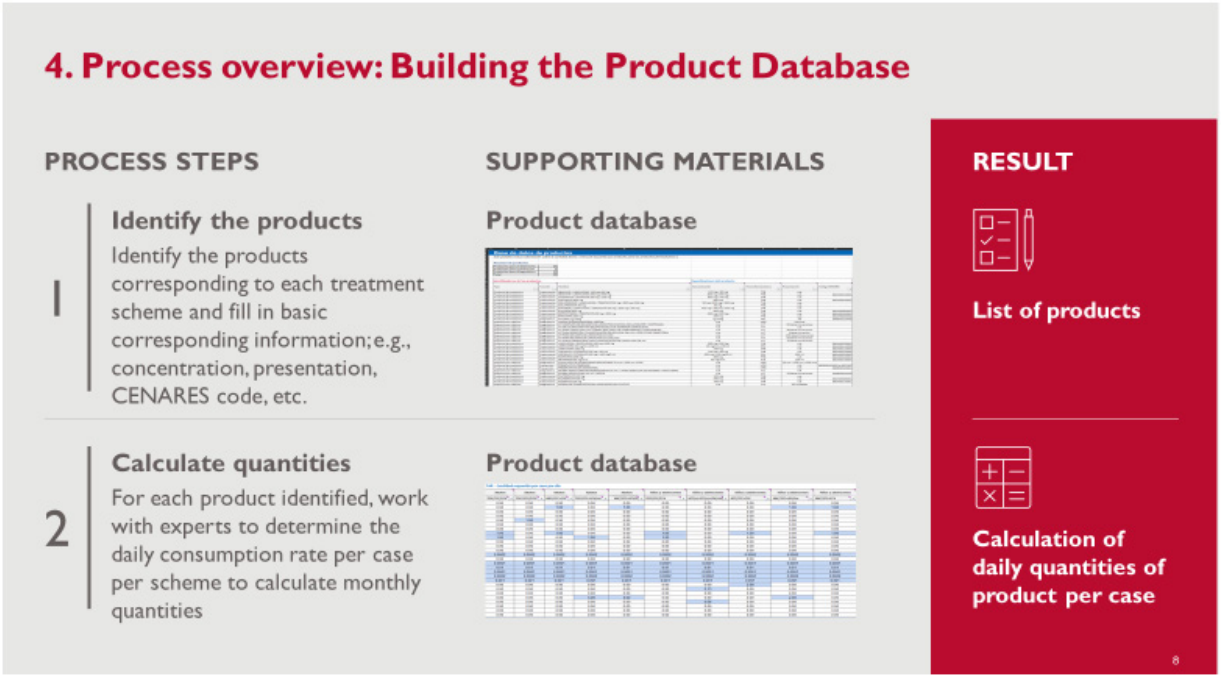
1. Population estimation;
2. Product database;

3. Regime requirements;
4. Procurement database; and
5. Scenario results.

The guide provides a deep dive that includes a summary of the steps that should be taken in the process to update or navigate each template. For each step, a dedicated page explains all the sub-steps to be implemented, such as selecting a buffer stock, verifying pricing information, among others. Along with each sub-step, an image of the tool is presented with a callout of exactly where the sub-step should be performed within the tool. A complete technical guide in Spanish is available as a PowerPoint attachment “Herramienta de Cuantificación: Guía Técnica del Usuario.”

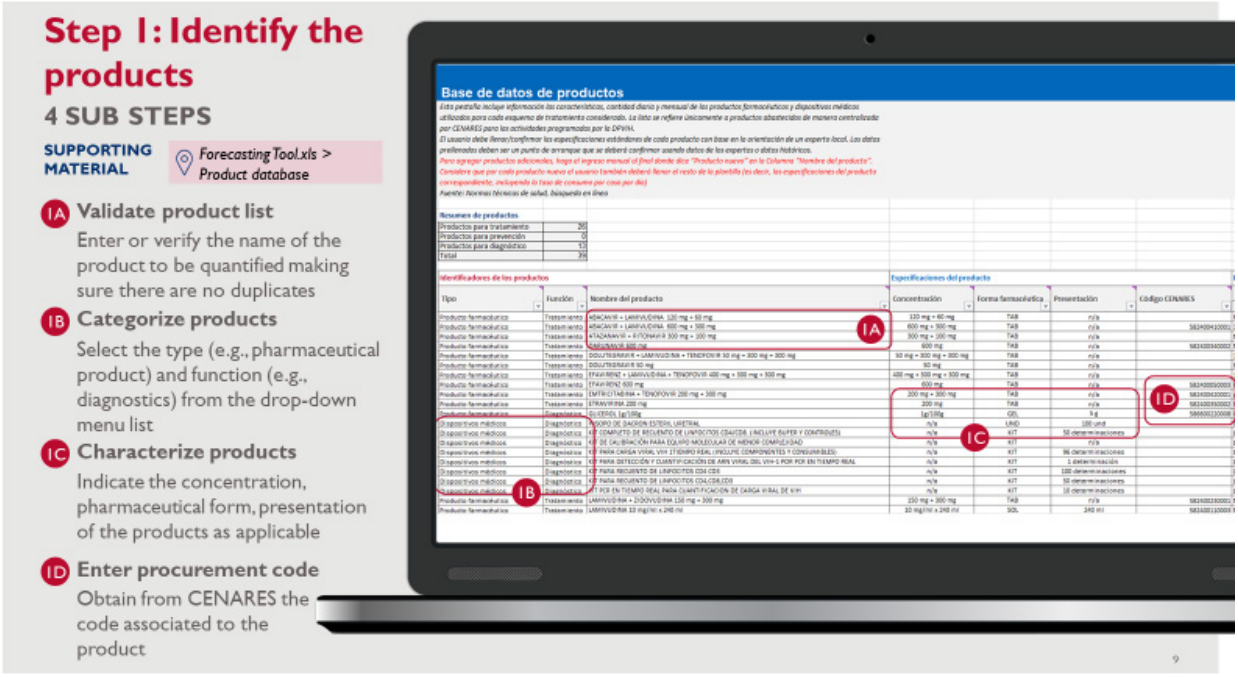
The deep dive on the product database template is presented below as an example. The deep dive shows the process summary to build the product database and provides a brief overview of the steps in the process, along with an image of the template and the expected result at each step. In this case, for the product database, the two key steps to follow are to identify the products and calculate quantities (see Figure 5).

Figure 5: Example of Details Provided on High-Level Process Steps



A double-click on each step is available to identify cells where inputs can be modified to further customize the tool or to have a better understanding on how to read results. For example, to complete Step 1, 4 sub-steps must be taken: (IA) validate list of products (i.e., name), (1B) categorize products (i.e., type: pharmaceutical product, function: treatment), (1C) characterize products (i.e., concentration, presentation), (1D) introduce CENARES procurement code (see Figure 6).

Figure 6: Example of Available Details on Process Steps



Annex II: Evidence of Validation Meeting with DPVIH

Figure 7: Screenshot of DPVIH Meeting Participants