

# Marketing Analysis: Antiemetic Drugs on the Pharmaceutical Market of Uzbekistan

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## Research Article

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# Abstract

In this study, we analysed, with the help of the “State Register of Medicines, Medical Devices and Medical Equipment Permitted for Use in Medical Practice of the Republic of Uzbekistan”, the number, dosage forms and cost of registered antiemetic drugs in 2016-2020 based on the DRUG AUDIT program, which offers a database of information from 2016 to 2020.

## Introduction

According to Article 4 of Law No. LRU-399 of the Republic of Uzbekistan, dated January 4, 2016, “On Medicines and Pharmaceutical Activities”, the state guarantees the availability of essential medicines as well as medical devices and their quality, includes antiemetic drugs in the list of essential medicines in the Republic of Uzbekistan and notes that their production and availability at accessible prices are especially important for the country’s population [4, 12, 13].

In accordance with Decree No. -5229 of the President of the Republic of Uzbekistan, dated November 7, 2017, “On Measures to Radically Improve the Pharmaceutical Industry Management System”, to improve conditions for the development of pharmaceutical activities, increase the provision of affordable, high-quality medicines, medical products and medical equipment for the population and health care institutions, and introduce a unified coordination system for the production, import and sale of these items, a market analysis was carried out [11, 14].

Antiemetic drugs can treat conditions such as nausea and vomiting that commonly occur with other drugs, such as drugs given for anaesthesia during surgery or chemotherapy for cancer. They can also be used independently to treat vomiting caused by several medical conditions, including chemotherapy, motion sickness, gastroenteritis, general anaesthetics, opioid analgesics, dizziness, pregnancy, food poisoning, emotional stress, and others. Chemotherapy is leading segment of use, as the number of cancer patients is increasing daily. In the case of pregnant women, these drugs bring significant relief to women suffering from morning sickness or nausea in early pregnancy. For some women, morning sickness lasts much longer, and antiemetic drugs are extremely helpful in these situations. Antiemetic drugs are usually taken by the mouth and sometimes by injection [1, 2, 8, 9, 15–18].

Demand for antiemetic drugs is mainly fuelled by the rapidly growing geriatric population around the world, which is highly susceptible to diseases such as cancer that are mostly treated with chemotherapy, leading to side effects such as vomiting. In addition, the growing number of patients with gastroenteritis also contributes to the increase in demand [1, 2, 6–9, 19, 20].

The market for antiemetics, which has shown strong growth thus far, is likely to expand further, albeit at a slow pace, in the coming years due to the drying up of clinical supplies. The cost of research and development is high, which holds back the development of new drugs. As a result, many experienced companies are carefully considering the possibility of new research projects in the field of molecules or drugs [1, 6, 7].

Purpose of the study. To further improve the provision of the population with high-quality, effective and safe pharmaceutical products, expand production volumes, increase the scientific, technical and export potential of domestic manufacturers, and attract foreign direct investment, a five-year analysis was carried out to accompany further plans to improve the identified situation [3].

This article analyses the number of packages and costs associated with the production of domestic products and the supply of antiemetic drugs from CIS and foreign countries to the pharmaceutical market of the Republic of Uzbekistan.

## Materials And Methods

To carry out this analysis, we used the data provided in the “State Register of Medicines, Medical Devices and Medical Equipment Permitted for Use in Medical Practice of the Republic of Uzbekistan” for 2016-2020 [3], the “List of Essential Medicines” of the Republic of Uzbekistan, approved by Order No. 41 of the Ministry of Health, dated July 20, 2018, and registered by the Ministry of Justice of the Republic of Uzbekistan on July 27, 2018, with Registration No. 3045 [5], and information from the DRUG AUDIT program from 2016 to 2020. We analysed dosage forms, numbers of imports, and costs of produced and imported antiemetic drugs in the Republic of Uzbekistan for 2016-2020.

## Results And Discussions

Based on the “State Register of Medicines, Medical Devices and Medical Equipment Permitted for Use in Medical Practice of the Republic of Uzbekistan” for 2016-2020 and the “DRUG AUDIT” program from 2016-2020, the numbers of domestically produced packages of antiemetic drugs in all dosage forms of antiemetic drugs of domestic production were counted, as were the numbers manufacturers of in the CIS countries and foreign manufacturers countries.

As can be seen from the data in Table 1, the share number of antiemetic drugs produced in the CIS countries accounted for from 73,851 to 259,458 the number of imports at its peak in 2017 but, which by 2020 had decreased to 73,851, the. The share of Fforeign manufacturesmanufacturers of antiemetic drugs accounted for from 92,841 to 266,363 imports, which peaking in 2018 at was almost more than 2 times moretwice the number in each of the two previous years. The share number from of domestic producers, in contrast to the numbers the from CIS and foreign suppliers, was significantly increased from 144,372 to 876,989 (2017) (Fig. 1).

Table 1

Information on the total number of antiemetic drugs registered in the Republic of Uzbekistan for 2016-2020

Nº	Manufacturer / year	Domestic medicines	Medicines produced in CIS countries	Foreign medicines	Total number of packages, pcs
1	2016	144,372	163,450	94,388	402,210
2	2017	876,989	259,458	92,841	1,229,288
3	2018	758,141	180,910	266,363	1,205,414
4	2019	461,670	139,350	105,325	706,345
5	2020	361,548	73,851	163,886	599,285

During the study period, the volume of imports of antiemetic drugs from the CIS countries increased by 3.5 times, that from foreign countries by 2.9 times, and that from domestic manufacturers by 6 times.

The results show that antiemetic drugs in all dosage forms and registered and produced by domestic manufacturers for the five years account for an average of 62% of the total, with the remaining 38% (20% of the production of CIS countries and 18% of foreign countries) imported into the country for consumption for foreign currency accounts (Fig. 2).

Table 2 shows the numbers of antiemetic drugs in the form of tablets registered in the Republic of Uzbekistan for 2016-2020. Among the total imports of antiemetic drugs, the production of CIS countries began at 76211 and peaked at 202358 imports but by 2020 had decreased to 73851. The number from foreign manufacturers of antiemetic drugs ranges from 3300 to 35316 imports, with no imports in 2016. The number of domestically produced antiemetic drugs ranges from 24500 to 67689, but this drug was not domestically produced in the form of tablets over the last 3 years.

Table 2

Information on the number of antiemetic drugs in the form of tablets registered in the Republic of Uzbekistan for 2016-2020

Nº	Manufacturer / year	Domestic medicines	Medicines produced in CIS countries	Foreign medicines	Total number of packages, pcs
1	2016	24,500	76,211	0	100,711
2	2017	67,689	202,358	3,300	273,347
3	2018	0	179,830	24,710	204,540
4	2019	0	139,350	35,316	174,666
5	2020	0	73,851	34,380	108,231

The numbers of antiemetic drugs in the form of ampoules registered in the Republic of Uzbekistan for 2016-2020 are shown in Table 3. Within this category of antiemetic drugs, there were no imports from CIS

countries and no production by domestic manufacturers, and foreign produced antiemetic drugs accounted for 12,065 to 25,740 imports, with no imports in 2017 or 2019.

Table 3

Information on the number of antiemetic drugs in the form of ampoules registered in the Republic of Uzbekistan for 2016-2020

Nº	Manufacturer / year	Domestic medicines	Medicines produced in CIS countries	Foreign medicines	Total number of packages, pcs
1	2016	0	0	25,740	25,740
2	2017	0	0	0	0
3	2018	0	0	18,570	18,570
4	2019	0	0	0	0
5	2020	0	0	12,065	12,065

Regarding the number of antiemetic drugs in the form of solutions registered in the Republic of Uzbekistan for 2016-2020, among the total imports of antiemetic drugs, the production of CIS countries ranged from 1,080 to 87,239, with no imports in 2019-2020, and the number of foreign produced antiemetic drugs ranged from 68,648 to 223,083 imports. The numbers produced by domestic manufacturers ranged from 119,872 to 809,300.

Table 4

Information on the number of antiemetic drugs in the form of solutions registered in the Republic of Uzbekistan for 2016-2020

Nº	Manufacturer / year	Domestic medicines	Medicines produced in CIS countries	Foreign medicines	Total number of packages, pcs
1	2016	119,872	87,239	68,648	275,759
2	2017	809,300	57,100	212,113	1,078,513
3	2018	758,141	1,080	223,083	982,304
4	2019	461,670	0	70,009	531,679
5	2020	361,548	0	106,710	468,258

Regarding the number of antiemetic drugs in the form of solution ampoules registered in the Republic of Uzbekistan for 2016-2020, information on the total imports of antiemetic drugs and the number produced by CIS countries and domestic manufacturers was not available; for foreign manufacturers, there were no imports from 2016 to 2019, while in 2020, 10,731 drugs were imported (Table 5).

Table 5

Information on the number of antiemetic drugs in the form of solution ampoules registered in the Republic of Uzbekistan for 2016-2020

Nº	Manufacturer / year	Domestic medicines	Medicines produced in CIS countries	Foreign medicines	Total number of packages, pcs
1	2016	0	0	0	0
2	2017	0	0	0	0
3	2018	0	0	0	0
4	2019	0	0	0	0
5	2020	0	0	10,731	10,731

The aim of this work was to study the domestic production of different dosage forms of antiemetic drugs registered in the Republic of Uzbekistan, depending on their manufacturers [11].

As seen from the data in Table 6, the analysis of domestically produced dosage forms of antiemetic drugs, based on information from the DRUG AUDIT program for 2016-2020, shows that 2,602,720 packages were produced by local manufacturers; of this total, a significant number were produced by Merrimed Farm, Uzbekistan (2,010,770 packages or 77%), all of them preparations in the form of solutions.

Table 6

The number of domestically produced medicinal products registered in the Republic of Uzbekistan for 2016 - 2020 by country and manufacturing firm

Nº	Company manufacturer	Dosage form / quantity, pcs				Total amount
		Tablets	Ampoules	Solutions	Solution ampoules	
1	Merrimed Farm, Uzbekistan	0	0	2,040,770	0	2,010,770
2	Radiks, Uzbekistan	0	0	469,761	0	469,761
3	Gufik-Avitsenna, Uzbekistan	92,189	0	0	0	92,189
The total number of packages, pcs		92,189	0	2,510,531	0	2,602,720

Figure 3 shows the numbers of domestically produced antiemetic drugs produced in various dosage forms. As seen from Figure 3, a total of 2,602,720 packages were produced, of which 92,189 packages

were in the form of tablets, 2,510,531 in the form of solutions, and none in the form of ampoules or ampoule solutions.

As seen from the data in Table 7, the analysis of dosage forms of antiemetic drugs produced in CIS countries, according to the DRUG AUDIT program for 2016-2020, shows that 2,602,720 packages were imported from manufacturers in CIS countries; a significant number of this total were produced by Borisovskiy, Belarus (659,609 packages or 97%), in the form of tablets and solutions.

Table 7

The number of medicines produced in CIS countries registered in the Republic of Uzbekistan for 2016 - 2020 by country and manufacturing firm

№	Company manufacturer	Dosage form / quantity, pcs				Total
		Tablets	Ampoules	Solutions	Solution ampoules	
1	Yuria-Farm, Ukraine	0	0	1,260	0	1,260
2	Darnitsya, Ukraine	0	0	15,000		15,000
3	Borshagovskiy, Ukraine	0	0	1,800	0	1,800
4	Borisovskiy, Belarus	532,250	0	127,359	0	659,609
Total number of packages, pcs		532,250	0	145,419	0	677,669

Figure 4 shows the number of antiemetic drugs produced in CIS countries in various dosage forms. As seen from Figure 4, a total of 677,669 packages were produced, of which 532,250 packages were in the form of tablets and 145,419 in the form of solutions, while drugs in the form of ampoules and solution ampoules were not produced.

**Table 8** The number of medicines produced in foreign countries registered in the Republic of Uzbekistan from 2016 to 2020 by country and manufacturing firm

№	Company manufacturer	Dosage form / quantity, pcs				Total
		Tablets	Ampoules	Solutions	Solution ampoules	
1	Serena Healthcare, India	83,734	0	69,600	0	153,334
2	Cadila, India	13,972	0	41,659	0	55,631
3	Agio, India	0	56,375	0	0	56,375
4	Dr. Reddy's, India	0	0	190,008	0	190,008
5	Baxter Pharmaceuticals, India	0	0	40,256	0	40,256
6	Zieva Farm, India	0	0	25,000	0	25,000
7	Samarth Life Sciences, India	0	0	16,000	0	16,000
8	Mefar Ilac Sanayii, Turkey	0	0	1,000	0	1,000
9	Karan Healthcare, India	0	0	32,314	0	32,314
10	Claris, India	0	0	10,448	0	10,448
11	Elda International DMCC, India	0	0	2,179	0	2,179
12	Ultra Laboratories, India	0	0	31,931	0	31,931
13	LN Pharma, India	0	0	19,436	0	19,436
14	Mankind Pharma, India	0	0	28,000	0	28,000
15	Hebei Tiancheng Pharm, China	0	0	30,480	0	30,480
16	Zhangjiakou Kaiwei Pharmaceutical, China	0	0	19,680	0	19,680
17	Demo, Greece	0	0	0	10,731	10,731
Total number of packages, pcs		97,706	56,375	557,991	10,731	722,803

Figure 5 shows the number of antiemetic drugs produced abroad in various dosage forms. A total of 722,803 packages were produced, of which 97,706 packages were in the form of tablets, 56,375 in the form of ampoules, 557,991 in the form of solutions, and 10,731 in the form of solution ampoules.

Regarding the prices of antiemetic drugs produced by domestic manufacturers in 2016-2020, the value for tablets amounted to 93,249 USD and for solutions to 1,478,945 USD, while ampoules and solution ampoules were not produced (Table 9) [2].

**Table 9** Prices of domestically produced medicines registered in the Republic of Uzbekistan for 2016-2020

№	Company manufacturer	Dosage form / price (\$)			
		Tablets	Ampoules	Solutions	Solution ampoules
1	Merrimed Farm, Uzbekistan	0	0	1,124,274	0
2	Radiks, Uzbekistan	0	0	354,671	0
3	Gufik-Avitsenna, Uzbekistan	93,249	0	0	0
Total cost (\$)		93,249	0	1,478,945	0

Regarding the prices of manufactured antiemetic drugs in CIS countries imported for 2016-2020, the value of drugs in the form of tablets was 342,704 USD and of solutions 259,977 USD, while ampoules and solution ampoules were not produced (Table 10) [2].

**Table 10** Prices of medicines produced in CIS countries registered in the Republic of Uzbekistan for 2016-2020

№	Company manufacturer	Dosage form / price (\$)			
		Tablets	Ampoules	Solutions	Solution ampoules
1	Yuria-Farm, Ukraine	0	0	6,762	0
2	Darnitsya, Ukraine	0	0	27,900	
3	Borshagovskiy, Ukraine	0	0	2,970	0
4	Borisovskiy, Belarus	342,704	0	222,345	0
Total cost (\$)		342,704	0	259,977	0

Regarding the prices of antiemetic drugs manufactured in foreign countries for 2016-2020, the value of drugs in the form of tablets amounted to 265,996 USD, of ampoules to 507,187 USD, of solutions to 1,478,945 USD and of solution ampoules to 52,434 USD (Table 11) [2].

**Table 11** Prices of medicines produced in foreign countries registered in the Republic of Uzbekistan for 2016-2020

№	Company manufacturer	Dosage form / price (\$)			
		Tablets	Ampoules	Solutions	Solution ampoules
1	Serena Healthcare, India	189,438	0	174,000	0
2	Cadila, India	76,558	0	260,913	0
3	Agio, India	0	507,187	0	0
4	Dr. Reddy's, India	0	0	1,244,180	0
5	Baxter Pharmaceuticals, India	0	0	328,662	0
6	Zieva Farm, India	0	0	112,500	0
7	Samarth Life Sciences, India	0	0	85,980	0
8	Mefar Ilac Sanayii, Turkey	0	0	21,300	0
9	Karan Healthcare, India	0	0	412,496	0
10	Claris, India	0	0	583,639	0
11	Elda International DMCC, India	0	0	152,530	0
12	Ultra Laboratories, India	0	0	127,972	0
13	LN Pharma, India	0	0	118,124	0
14	Mankind Pharma, India	0	0	151,200	0
15	Hebei Tiancheng Pharm, China	0	0	27,432	0
16	Zhangjiakou Kaiwei Pharmaceutical, China	0	0	17,712	0
17	Demo, Greece	0	0	0	52,434
Total cost (\$)		265,996	507,187	3,818,640	52,434

A comparison of the prices for 2016-2020 of medicines produced by domestic manufacturers and manufacturers in CIS and foreign countries registered in the Republic of Uzbekistan can be seen in Figure 7.

## Conclusion

This analysis of the dosage forms, volume of imports, prices and number of registered antiemetic drugs for the period from 2016 to 2020 shows that antiemetic drugs in dosage forms such as gel, drops, capsules, ointments, suppositories and suspensions have not yet been imported or manufactured by domestic manufacturers. Tablets, ampoules and solution ampoules are smaller and are the primary dosage form registered in the Republic of Uzbekistan. Today, demand for tablet and solution dosage

forms among the population remains important for our further research and for the choice of which drug forms to import.

Antiemetic drugs are produced in sufficient quantities in the form of solutions, but the price of imported products from foreign countries is quite expensive. This shows that it is necessary to pay great attention to the production of domestic drugs that are not inferior to those produced by foreign manufacturers—both in terms of prices and the availability of dosage forms.

Considering that the share of antiemetic drugs in the form of solutions is significant in comparison to the shares of other dosage forms, we consider it expedient to produce this drug form on the basis of demand from the population of the Republic of Uzbekistan.

## Declarations

## Acknowledgements

The authors have contributed equally to the analysis of antiemetic drugs in the Republic of Uzbekistan.

No competing interests were declared.

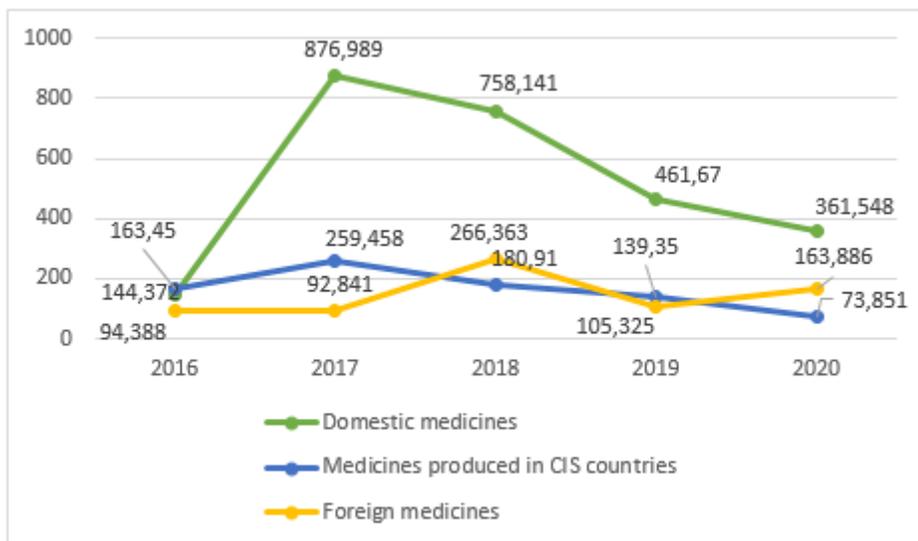
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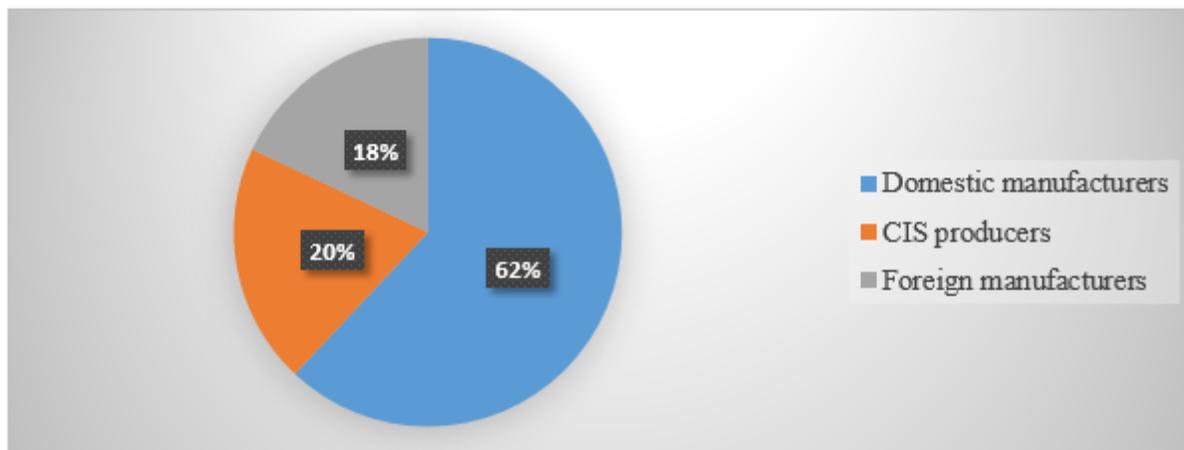
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## Figures



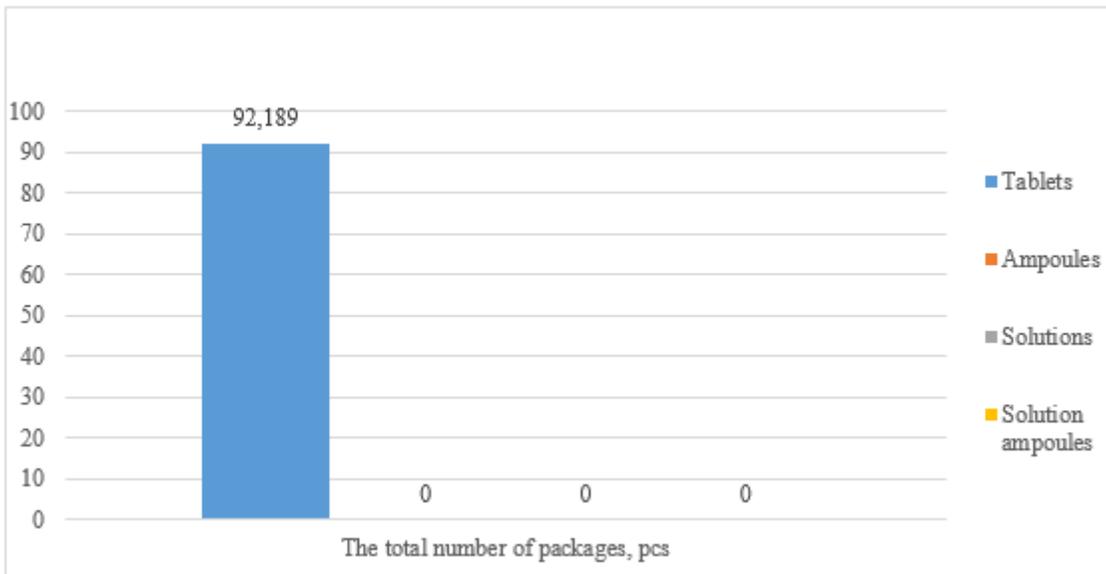
**Figure 1**

The volume of imports of all registered dosage forms of antiemetic drugs from domestic, CIS and foreign manufacturers to the Republic of Uzbekistan



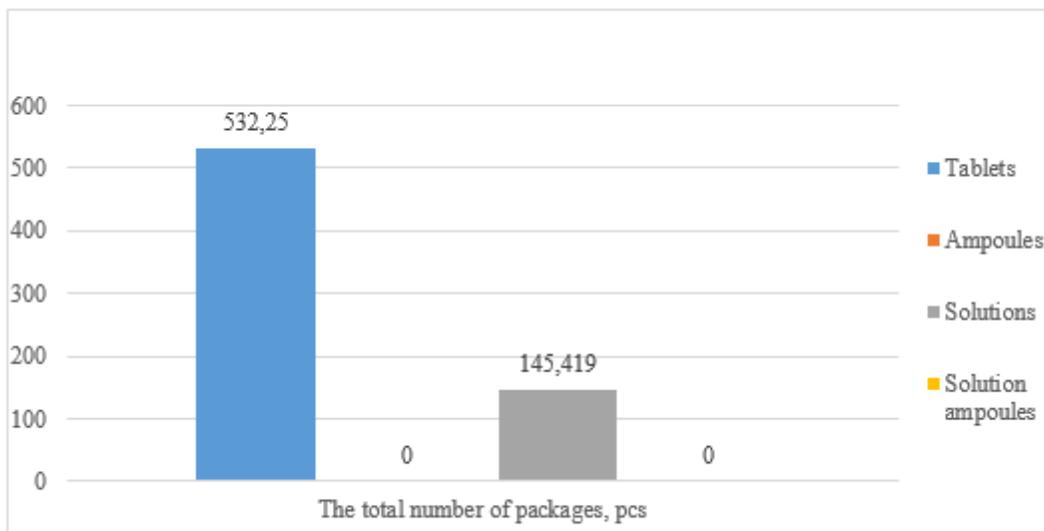
**Figure 2**

Shares of all registered dosage forms of antiemetic drugs by country (2016-2020)



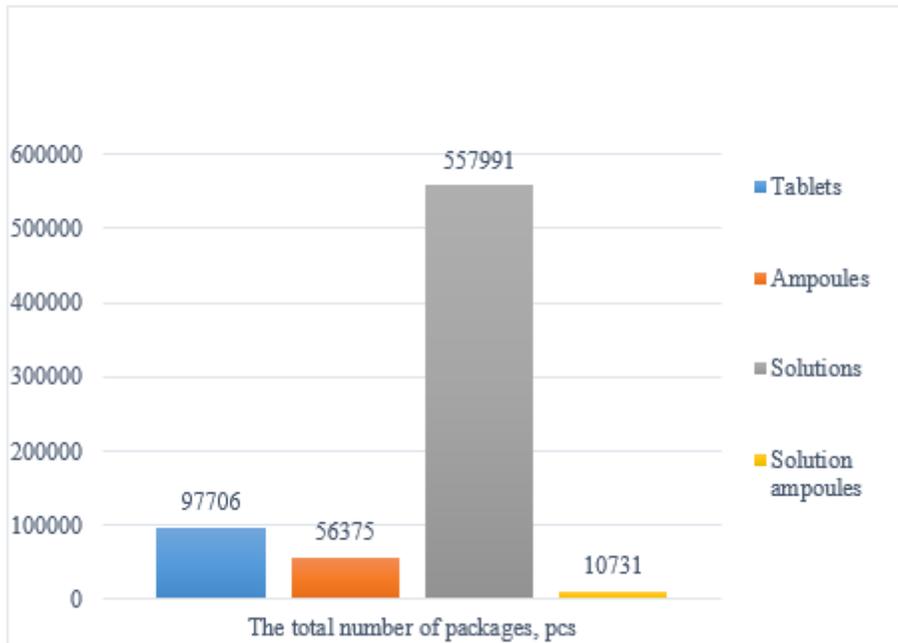
**Figure 3**

Domestically produced antiemetic drugs in various dosage forms



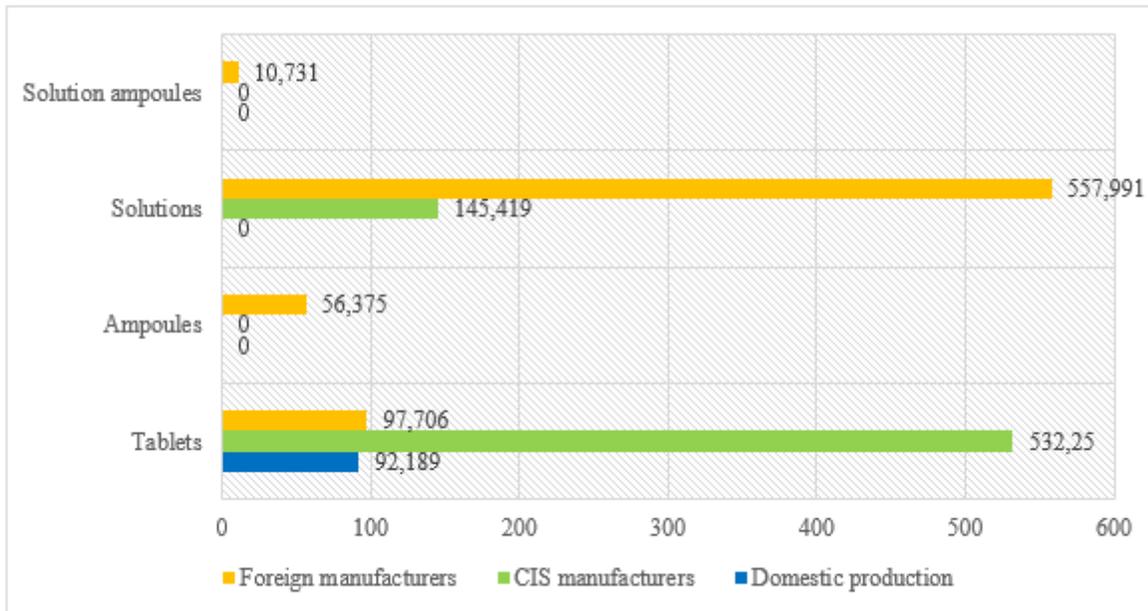
**Figure 4**

Number of antiemetic drugs produced in CIS countries in various dosage forms



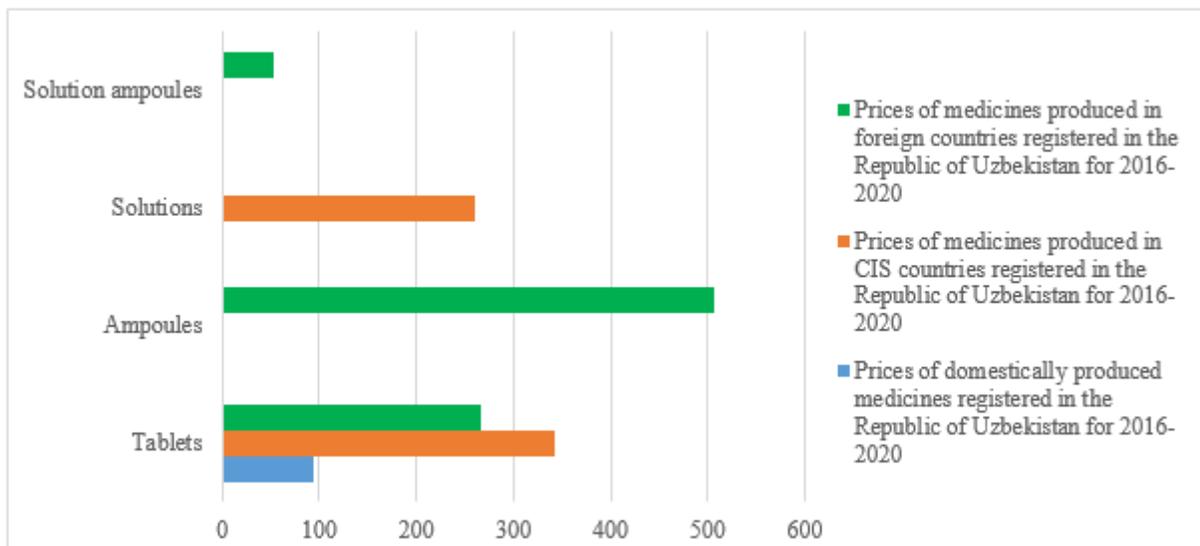
**Figure 5**

Number of antiemetic drugs produced in foreign countries, and produced in various dosage forms



**Figure 6**

Number of drugs registered in the Republic of Uzbekistan for 2016-2020 and produced domestically, by manufacturers in CIS countries and foreign manufacturers



**Figure 7**

Cost of medicines registered in the Republic of Uzbekistan (2016-2020) from domestic manufacturers and manufacturers in CIS and foreign countries