

# Supplementary Material 2: International trade flows of selected groups of medicines

This document presents material that supplements:

Chapman, S, Dedet, G, and Lopert, R (2022), "Shortages of medicines in OECD countries", *OECD Health Working Papers*, No. 137, OECD Publishing, Paris, <https://doi.org/10.1787/b5d9e15d-en>.

As presented in Section 4.2.1 of the paper, *Shortages of medicines in OECD countries*, measuring international trade flows can offer some insights into the extent of cross-national interdependence in medicines' supply, however they do not necessarily provide a comprehensive picture of international trade. Trade statistics include data on four types of merchandise flows: imports, exports, re-imports and re-exports.<sup>1</sup> Box 1 below provides additional information on trade flows by value and volume as cited in the paper.

The analysis presented in the paper focuses on imports as reported by countries. The identification of relevant product flows followed a two-step process.

1. Identification of all "chemical or biological" products likely to enter in the production of pharmaceuticals and of pharmaceuticals themselves in the Harmonized Commodity Description and Coding Systems (HS) (version 5, 2017).<sup>2</sup> This classification categorises products, according to 6-digit codes. For the purpose of this work, two broad categories of products were initially considered:
  - Chapter 29, which includes "Organic chemicals", some of which are used in the production of pharmaceuticals.
  - Chapter 30, which includes "Pharmaceutical products". This includes both products that are used in the manufacture of vaccines and medicines produced for human or veterinary use (categories 3001, 3002, 3003) and finished products prepared for retail sales (3004).

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<sup>1</sup> Exports of a country include both exports of domestic goods and exports of foreign goods in the same state as previously imported (referred to as re-exports). Imports include both imports from foreign countries, as well as goods imported in the same state as previously exported (or re-imports goods). Re-imports and re-exports, however, are not reported consistently by all countries. See <https://unstats.un.org/unsd/tradekb/Knowledgebase/Reexports-and-Reimports>, accessed 9 May 2020.

<sup>2</sup> World Customs Organization's classification of the Harmonized System (HS) available at <http://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx> (accessed May 2020).

2. Selection, within Chapter 29 and 30, included all products considered to be an input to the production process of the pharmaceutical industry or a finished product of this industry in the OECD Bilateral Trade Database by Industry and End-Use (BTDIxE). This selection was operated thanks to a conversion table established by the OECD for this database, which makes a link between products HS codes and the International Standard Industrial Classification (ISIC Version 4), which classifies industries. Category 21 is labelled “Basic pharmaceutical products and pharmaceutical preparations”. Categories of end-use for pharmaceuticals formally include: intermediate goods (IND); packed medicines (XMEDIC); Household consumption (CONS); and “miscellaneous” (XMISC). In reality, products are almost all classified in the two first categories. For the purpose of this study:
  - All products of HS categories 29, 3001, 3002, 3003 were considered as intermediate goods for the pharmaceutical sector (D21).
  - Finished pharmaceutical products of HS category 3004, which are all considered as products of industry D21, have been included.

The UN Trade database also enables analysis of flows for specific categories of products at the HS classification 6-digit level. Focusing on one class of antibiotics for example, in Table 1, trade flows can be observed for:

- Category 294110: Antibiotics; penicillins and their derivatives with a penicillanic acid structure; salts thereof, which are used as intermediate goods in the production process;
- Category 300310: Medicaments; containing penicillins, streptomycins or their derivatives, for therapeutic or prophylactic uses, (not in measured doses, not packaged for retail sale); and
- Category 300410: Medicaments; containing penicillins, streptomycins or their derivatives, for therapeutic or prophylactic uses, packaged for retail sale.

## Box 1. Trade statistics

### Trade flows in value (in US dollars)

The OECD Bilateral Trade Database by Industry and End-Use (BTDIxE)<sup>1</sup> provides information enabling analysis of the international supply chain of medicines. The database includes data on trade for finished pharmaceutical products, as well as for ingredients entering in the manufacture of medicines, such as Active Pharmaceutical Ingredients (APIs) for instance. The classification of imported products as “intermediate goods” (i.e. goods used as an input in the production of medicines) or “packed medicines” (used for final consumption) provides useful information on the role played by countries in the value chain of the industry. Trade estimates in value will be biased by the price differentiation between types of products imported by countries.

### Trade flows in volume (quantities in kilograms)

Trade flows in quantities are based on data from the United Nations (UN) Comtrade database<sup>2</sup>. With 171 reporting economies (the geographical entity reporting the import of a given product) and 247 partner economies (the origin of the import), the database covers the largest part of world trade and is considered the most comprehensive trade database available. Products are registered on a six-digit Harmonized System (HS) basis<sup>3</sup>, and can then be aggregated. In this section, trade flows have been considered in quantities, i.e. in kilograms of merchandise. Trade statistics include data on four types of flows of merchandise: imports, exports, re-imports and re-exports. The analysis focuses on quantities imported, as reported by importing countries. Trade estimates in volume will be biased by the weight of the products imported by countries and how heavy they are; tons of liquid medicines are aggregated with tons of medicines and vaccines. It is also possible that some chemicals at the HS-6 digit level are used by other industries, not only pharmaceuticals.

While measuring international trade flows can give a glimpse into the degree of inter-country dependency, they do not necessarily provide a comprehensive picture of international trade. For example, the value of production from other contributors may not be reflected in the data as the “country of origin” recorded for imports represents only the last country in the production chain<sup>4</sup>

To ensure consistency between the different parts of this section, **data are presented for 2018**, the most recent year for which data have been consolidated in the various databases at the time of analysis.

Source: 1. See OECD Bilateral Trade Database by Industry and End-Use (BTDIxE) here <https://www.oecd.org/sti/ind/bilateraltradeingoodsbyindustryandend-usecategory.htm> (accessed May 2020)

2. See UN Comtrade Database here <https://comtrade.un.org/data> (accessed May 2020)

3. See the World Customs Organization’s classification of the Harmonized System (HS) here <http://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx> (accessed May 2020).

4. See the trilateral study by the World Health Organization (WHO), World Intellectual Property Organization (WIPO) and World Trade Organization (WTO) on *Promoting Access to Medical Technologies and Innovation: Intersections between public health, intellectual property and trade*; 2<sup>nd</sup> edition, July 2020 available at [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_628\\_2020.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_628_2020.pdf) (last accessed 30 November 2021).

**Table 1. Top 10 importers for each category of products containing penicillins, in 2018**

HS Categories 294110, 300310, and 300410, quantities in kg and cumulative share of reporting country imports for top 5 partner countries

Chemicals used in the production of penicillins and their derivatives (HS category 294110)							
Ranking	Country	Total quantities imported	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5
1	India	World	China	Austria	United Kingdom	Slovakia	Korea
		19,954,684	95.90%	97.10%	97.70%	98.30%	98.60%
2	Italy	World	Ireland	Netherlands	China	France	Belgium
		3,771,847	63.30%	72.70%	79.50%	85.90%	89.80%
3	Thailand	World	China	India	Spain	Austria	USA
		2,190,346	58.40%	83.70%	99.80%	100.00%	100.00%
4	United Kingdom	World	Singapore	Italy	China	Austria	France
		2,009,652	74.00%	84.80%	92.80%	96.20%	97.10%
5	Brazil	World	China	Mexico	India	Spain	United Kingdom
		1,697,473	46.10%	89.10%	98.50%	99.60%	99.80%
6	Indonesia	World	China	India	Spain	Japan	Austria
		1,681,323	89.20%	97.00%	98.00%	98.60%	99.10%
7	France	World	Singapore	China	Austria	Spain	Italy
		1,545,846	50.80%	69.80%	76.40%	82.30%	87.50%
8	USA	World	China	Mexico	Bulgaria	India	Italy
		1,267,968	37.50%	65.90%	91.00%	94.90%	98.80%
9	Spain	World	China	Austria	Italy	Netherlands	Germany
		1,242,381	75.20%	85.10%	91.80%	95.70%	97.00%
10	Vietnam	World	China	India	Spain	Slovenia	Austria
		1,008,457	52.90%	84.00%	90.70%	94.00%	96.90%
Medicines containing penicillins, streptomycins or their derivatives (not in measured doses, not packaged for retail sale) (HS category 300310)							
Ranking	Country	Total quantities imported	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5
1	Indonesia	World	Bulgaria	Brazil	China	USA	Slovenia
		906,032	49.90%	84.40%	92.80%	98.90%	99.60%
2	Myanmar	World	Thailand	Netherlands	Spain	Vietnam	Singapore
		426,043	62.60%	74.40%	84.40%	91.30%	98.10%
3	Turkey	World	UK	India	China	Spain	
		299,965	84.50%	93.80%	99.60%	100.00%	
4	Austria	World	China	Spain	Bulgaria	France	Germany
		242,163	56.60%	95.30%	97.50%	99.40%	99.70%
5	Belgium	World	Germany	Japan	Austria	Luxembourg	Italy
		223,080	72.70%	95.30%	98.40%	99.20%	99.90%
6	USA	World	China	Italy	Austria	India	France
		206,198	81.80%	90.80%	98.40%	100.00%	100.00%
7	Thailand	World	China	Spain	Austria	Netherlands	Italy
		205,529	73.80%	96.30%	99.70%	100.00%	100.00%
8	Brazil	World	China	Italy	Slovenia	Mexico	India
		144,931	77.20%	88.50%	94.30%	97.70%	100.00%
9	France	World	UK	Austria	Spain	France	Germany
		84,827	79.10%	90.40%	95.40%	99.60%	99.80%
10	Vietnam	World	Thailand	Italy	China	Hungary	France
		83,156	85.60%	96.80%	99.40%	99.90%	100.00%

Medicines containing penicillins, streptomycins or their derivatives, packaged for retail sale (HS category 300410)							
Ranking	Country	Total quantities imported	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5
1	USA	World	Canada	India	Italy	Portugal	Slovenia
		8,347,761	21.60%	37.50%	51.30%	61.20%	70.30%
2	Myanmar	World	China	Netherlands	Thailand	Korea	USA
		4,984,751	25.90%	43.60%	59.80%	74.90%	88.60%
3	Germany	World	Austria	Italy	Portugal	India	China
		4,570,031	27.20%	53.90%	77.50%	82.90%	87.90%
4	Spain	World	Germany	Austria	Italy	France	Netherlands
		2,993,198	39.10%	63.20%	79.20%	94.30%	96.80%
5	Russia	World	Slovenia	UK	Spain	Serbia	Netherlands
		2,776,165	26.40%	43.20%	59.50%	69.90%	78.40%
6	UK	World	Italy	India	Ireland	Germany	France
		2,503,187	32.00%	51.70%	66.10%	77.20%	88.10%
7	France	World	Austria	Italy	UK	Germany	India
		2,377,227	46.80%	62.30%	70.90%	79.40%	83.70%
8	Brazil	World	Austria	UK	Italy	Slovenia	India
		2,328,394	43.00%	58.90%	74.10%	84.50%	93.90%
9	China	World	Hong Kong (China)	Italy	Argentina	France	India
		2,250,273	60.90%	86.10%	91.40%	93.30%	95.10%
10	Slovenia	World	Austria	India	Italy	Argentina	France
		2,236,639	92.30%	95.80%	97.90%	98.70%	99.10%

Source: UN Comtrade Database, Data extracted between February and May 2020