Council on Geostrategy

COALITION for a PROSPEROUS AMERICA

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Foreign control of antibiotic supply:

American and European import reliance and systemic vulnerabilities

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Contents

Forewords 1

Executive summary 4

1.0 Introduction: Why antibiotics are strategic infrastructure 8

1.1 Capturing the two-country global system: The PRC (APIs) and India (FDFs) 10

2.0 Analytical purpose, research questions, and methodology 11

2.1 Methodology, scope, and Harmonised Tariff Schedule (HTS) framework 11

3.0 US antibiotic dependence 14

3.1 American API imports: The PRC as the upstream bottleneck 14

3.2 American FDF antibiotic imports: India's downstream dominance 17

3.3 Long-term import trends: Evidence of domestic erosion 19

4.0 EU+EFTA antibiotic dependence 24

4.1 EU+EFTA API imports: Upstream dependence on the PRC 24

4.2 EU+EFTA API and FDF import breakdown 26

4.3 EU+EFTA FDF imports: India and the PRC's downstream control 27

5.0 Company-level supply concentration 30

5.1 US FDF suppliers: Dominance by Indian firms 30

5.2 EU+EFTA FDF suppliers: Heavily concentrated from India 32

5.3 Firm-level dynamics as the hidden source of systemic fragility 33

6.0 Upstream control: India's reliance on Chinese APIs 35

6.1 India's API imports: Over 90% dependence on the PRC 37

6.2 India's Chinese API suppliers: A small group 39

7.0 Case study: Penicillin and amoxicillin 42

8.0 Policy recommendations 47

8.1 Use targeted tariff-rate quotas to stabilise the market and counter low-cost foreign pricing 47

8.2 Deploy targeted financial incentives to restart and expand antibiotic manufacturing capacity 48

8.3 Strengthen oversight and quality assurance for imported antibiotics 48

8.4 Align procurement with supply-security goals 49

8.5 Integrate antibiotic supply security into North Atlantic Treaty Organisation (NATO) and allied force readiness planning 50
8.6 Build coordinated US-EU+EFTA antibiotic manufacturing and supply networks 51
9.0 Conclusion 52
10.0 Annexes 54
Annex 1: Methodological transparency 54
Annex 2: Glossary of technical terms 55
Annex 3: Figures and tables 56
About the authors 71
Acknowledgements 72
About the Council on Geostrategy 73
Notes 74

Foreword

In this increasingly volatile era of geopolitics, the United Kingdom's (UK) national security extends far beyond munitions, energy, and cyber defence: it is fundamentally intertwined with medical resilience. The foundation of modern healthcare – and by extension, the operational readiness of the British Armed Forces – relies on a precarious supply chain stretching thousands of miles.

As this Report demonstrates, the UK, alongside our Euro-Atlantic allies, has sleepwalked into an acute strategic vulnerability. We now rely on a global system in which 90% of core ingredients are controlled by a single nation: the People's Republic of China (PRC). Furthermore, while India dominates the downstream formulation of finished medicines, its operations remain functionally entirely dependent on Chinese upstream inputs. What initially appears as a diversified global market is, in truth, a single, potentially catastrophic, chokepoint.

This is not merely a failure of market economics. Rather, it is a profound geostrategic threat to free and open nations. A localised industrial failure, a sudden export restriction, or a shift in adversaries' posture could paralyse the healthcare of Britain and its allies and partners across the Euro-Atlantic area within just a few weeks.

As noted by His Majesty's (HM) Government, rebuilding our sovereign and allied manufacturing base is a non-negotiable imperative. By integrating antibiotic supply security into North Atlantic Treaty Organisation (NATO) readiness planning, reforming our public procurement to reward reliability over the lowest cost, and building coordinated manufacturing corridors with our transatlantic partners, the UK can break this dependency.

I commend this study not only to policymakers across Westminster and Whitehall, but also their counterparts in allied nations. It is time we treat essential medicines not as cheap commodities, but as critical national infrastructure. The health of our citizens, the resilience of the National Health Service, and the true independence of our foreign policy depend upon our willingness to act today.

Luke Akehurst MP
Member of Parliament for North Durham

Foreword

A nation that cannot control the foundations of its own economy, cannot feed its people, and cannot deliver the healthcare they need – especially in a crisis – has already surrendered a part of its independence without a shot being fired.

Unless we build genuine resilience into our supply chains and protect ourselves from dangerous dependence on the Chinese Communist Party (CCP), the word 'sovereign' is nothing more than a catchphrase. The risks of over-reliance on the PRC are not unknown. In 2022, as Chair of the Foreign Affairs Committee, we published a report setting out clearly that 'The more reliant we are on others, the less resilient we are as a nation.' The Council on Geostrategy too has long raised the alarm, and this Report, and the suggestions it brings forward, are another vital piece of work making the case for the urgent need to bolster our national resilience in an often-overlooked area: healthcare.

We have become overwhelmingly dependent on a fragile, highly-concentrated supply chain for antibiotics, on which everything from routine surgery to cancer treatment relies. This dependence is not merely a matter of geography. It is a systemic chokepoint. As this Report shows, the PRC now controls the upstream source code of antibiotic production, accounting for an estimated 80%-90% of global active pharmaceutical ingredients. Without these Chinese-made molecules, the downstream formulation hubs in India, upon which we heavily rely for finished medicines, would simply cease to function.

For too long, a 'lowest price' procurement model has hollowed out our domestic industrial base, prioritising short-term savings over long-term resilience. We now face a reality where a single contamination event or geopolitical decision in a foreign and potentially hostile state could trigger catastrophic shortages across the UK and wider North Atlantic area.

HM Government must do more to protect the strengths of our pharmaceutical industry. Failing to do so would allow world-class research, manufacturing capability, and clinical trial infrastructure to wither, leaving so many other strategic sectors exposed. It would surrender yet another pillar of our national resilience and strategic independence.

Crucially, this Report offers a roadmap for recovery, setting out a clear direction for how we can rebuild our sovereign manufacturing capacity. Antibiotic security is vital, and should be built into allied readiness planning. We cannot afford to wait for the next crisis, and must proactively prepare now to secure the foundations of our national health.

Alicia Kearns MP
Member of Parliament for Rutland and Stamford
Shadow Minister for Home Affairs
Chair, Foreign Affairs Committee, House of Commons (2022-2024)

Executive summary

CONTEXT

- The United States (US) and countries in Europe now depend overwhelmingly on foreign suppliers for the antibiotics that modern medicine requires. Nowhere is this dependence more acute than in the upstream stage of production: both the US and European nations rely almost entirely on the People's Republic of China (PRC) for the Active Pharmaceutical Ingredients (APIs) that form the molecular foundation of all antibiotics. Without these inputs, no Finished-Dosage Form (FDF) antibiotics can be manufactured – whether in India, Europe, or the US. This extreme upstream reliance means the stability of American and European health systems is tied directly to the continuity of Chinese industrial operations, regulatory decisions, and geopolitical posture.

- This vulnerability is amplified by the architecture of the global supply chain: The PRC controls the upstream API stage; India formulates the downstream FDF antibiotics; and the US and European countries import the result. What appears to be a multi-country supply network is, in practice, a single chokepoint with minimal redundancy and heavy firm-level concentration. This system operates through four reinforcing layers of vulnerability:

    - **Layer 1:** The US and European states rely on India and the PRC for FDF antibiotics.
    - **Layer 2:** Downstream supply is concentrated among a small number of Indian manufacturers.
    - **Layer 3:** These manufacturers depend almost entirely on the PRC for upstream antibiotic APIs.
    - **Layer 4:** Within the PRC, production itself is concentrated among a limited set of firms responsible for the majority of global API output.

- Each layer compounds the risk, leaving the global antibiotic supply chain highly concentrated and fragile. A shutdown, contamination event, or export interruption at even a small number of Chinese API facilities could disrupt entire antibiotic classes worldwide. Downstream disruptions in India would compound the impact. The US and European countries are thus exposed not only to changes in foreign output, but also to the potentially unforeseen regulatory and industrial shifts of a handful of companies thousands of miles away. This exposure includes drug quality and safety risks, as US Food and Drug Administration (FDA) enforcement actions have shown that major exporters have supplied adulterated or improperly tested medicines into US and European markets, including the Ranbaxy case discussed in this Report.

- Despite this fragility, America and European countries still retain critical industrial footholds – particularly a small number of facilities capable of fermentation, chemical synthesis, and sterile-injectable production. This includes the last major fully vertically integrated production site for penicillin-class antibiotics in Europe; that is, a facility that performs the complete production chain from fermentation of Penicillin G through to conversion to 6-aminopenicillanic acid (6-APA), synthesis of finished APIs, and formulation and packaging of FDF antibiotics.

- These remaining assets are strategically irreplaceable. They form the industrial core from which upstream antibiotic sovereignty can be rebuilt. With the right policies and market signals, these facilities can anchor renewed API capacity, restore domestic production, and expand downstream formulation capabilities. The US and European nations face a profound strategic vulnerability, but also a clear opportunity to rebuild leadership in the essential stages of antibiotic manufacturing.

- Addressing this vulnerability requires a coordinated policy framework that strengthens domestic and allied producers, corrects distorted market dynamics, and ensures US and European manufacturers can operate viably at scale. This includes targeted trade tools to counter persistent price suppression, procurement reforms that reward reliability over lowest cost, stronger oversight and transparency requirements for foreign supply, and joint

US-European Union (EU) investment in fermentation, synthesis, and formulation infrastructure. Fermentation underpins the production of core antibiotic APIs and intermediates, and is both capital-intensive and highly concentrated. As this study demonstrates, approximately 90% of global 6-APA production capacity is located in the PRC, making this stage the primary upstream chokepoint in the modern antibiotic supply chain. Together, this coordinated policy framework would restore the upstream resilience that both the US and several European countries have lost and reduce their structural dependence on foreign-controlled supply.

- American and European reliance on the PRC for antibiotic APIs is the product of past decisions, but this can be corrected. Rebuilding API capacity within allied jurisdictions is both possible and necessary. This requires preserving strategic penicillin manufacturing, particularly the Sandoz Kundl plant in Austria – the last remaining large-scale vertically integrated penicillin production site in Europe and the foundation for rebuilding secure antibiotic API capacity. By capitalising on the capabilities that remain, the US and European countries can regain control of the antibiotic supply chain, and secure the foundations of modern medicine and national security.

KEY FINDINGS

- The PRC accounts for an estimated 80-90% of global antibiotic API production, reflecting dominance in large-scale, fermentation-based upstream manufacturing.

- The PRC accounts for 87% of US antibiotic API imports, and 67% for the EU and European Free Trade Association (EFTA).

- Approximately 90% of global 6-APA production capacity is located in the PRC, making penicillin-class antibiotics uniquely exposed to upstream conditions.

- Only seven 6-APA manufacturing sites exist worldwide, five of which are located in the PRC, creating a severe, facility-level

chokepoint in the global penicillin supply chain.

- India and the PRC together supply 77% of all FDF antibiotics imports into the EU+EFTA, and nearly 40% of US imports.
- The PRC supplies 91.3% of all antibiotic APIs imported into India, tying global FDF antibiotic production to Chinese upstream inputs.
- Upstream dependence is further concentrated at the firm level: the top four Chinese API suppliers – North China Pharma, Sinobright Pharma, MS, and Centrient Pharma – account for 54% of India's antibiotic API imports, leaving global supply dependent on a small number of individual companies.
- Downstream supply is likewise concentrated, with Aurobindo Pharma supplying 32% of all FDF antibiotics imported into the US. Aurobindo (27.2%) and Micro Labs (25.4%) together supply 52.6% of FDF antibiotics imported into the EU+EFTA.

RECOMMENDATIONS

To reduce dependence on foreign-controlled antibiotics supply chains, free and open nations' governments in the US and Europe should:

1. Use targeted tariff-rate quotas to stabilise the market and counter low-cost foreign pricing;
2. Deploy targeted financial incentives to restart and expand antibiotic manufacturing capacity;
3. Strengthen oversight and quality assurance for imported antibiotics;
4. Align procurement with supply-security goals;
5. Integrate antibiotic supply security into North Atlantic Treaty Organisation (NATO) and allied force readiness planning;
6. Build coordinated US-EU+EFTA antibiotic manufacturing and supply networks.

1.0

Introduction: Why antibiotics are strategic infrastructure

Antibiotics are essential medical infrastructure. They make surgeries safe, protect immunocompromised patients, enable cancer treatment, and prevent routine infections from becoming life-threatening. When their supply is unstable, entire health systems are at risk.

Over the last two decades, American and European antibiotic manufacturing has contracted – not because the United States (US) and European countries lack technical capability, but because global price distortions and foreign industrial consolidation shifted production abroad. The People's Republic of China (PRC) now dominates upstream production of Active Pharmaceutical Ingredients (APIs), and India formulates much of the world's Finished-Dosage Form (FDF) antibiotics.

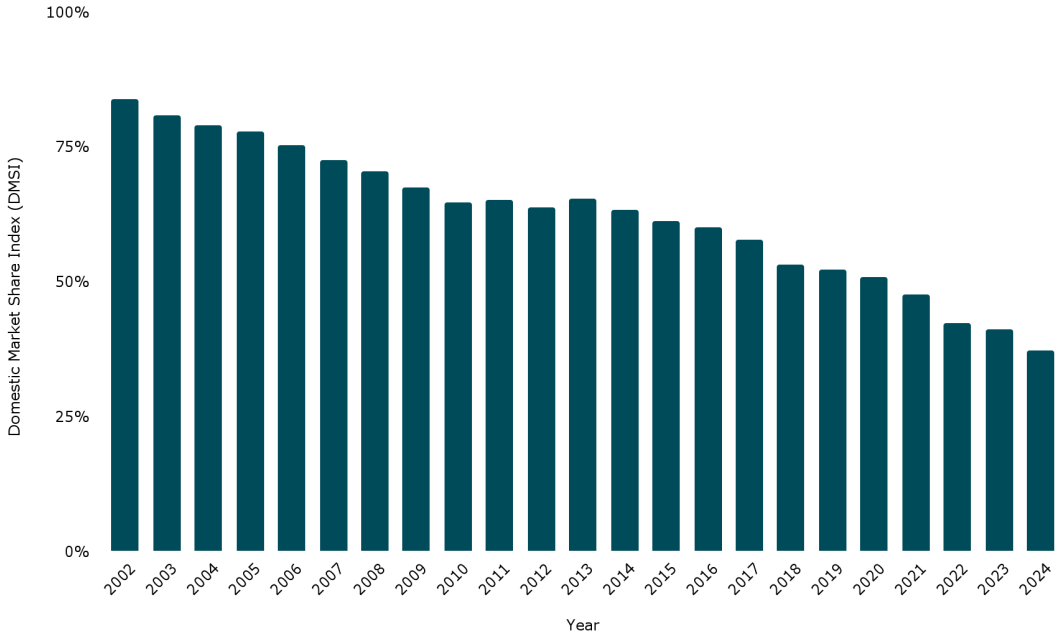
Nearly 70% of manufacturing sites for a representative set of antibiotic APIs are located in the PRC and India, reflecting geographic consolidation at the facility level.[1] This concentration is not incidental; it reflects decades of foreign industrial scaling and American and European divestment from fermentation and chemical-synthesis capacity. This structure has left the US and many European countries dependent on a narrow set of foreign suppliers for medicines central to inpatient and outpatient care.

[1] Misti Ushio and Barry C. Buckland, 'Revitalising US Biomanufacturing to Strengthen the Global Supply and Security of Antibiotics', *Digitalis Research*, 16/06/2025, https://www.digitalisresearch.com/ (checked: 25/03/2026).

This Report maps that dependence with country- and firm-level precision. It identifies where the US and the European Union (EU) and European Free Trade Association (EFTA) rely on foreign APIs and finished drugs, which companies control these flows, and where single-source exposure creates systemic vulnerability.

The collapse in American and European antibiotic manufacturing occurred within a much broader contraction of the pharmaceutical industrial base. Figure 1 illustrates how domestic producers today supply only 37% of total US pharmaceutical demand – an unprecedented decline that leaves even basic generic drugs increasingly foreign-controlled. The US market share has eroded steadily since the early 2000s, reflecting the global price dynamics and foreign consolidation that hollowed out antibiotic production.

FIGURE 1: DOMESTIC US PHARMACEUTICAL MARKET SHARE[2]



Across both the US and European nations, the antibiotic supply chain is now overwhelmingly import-dependent and anchored in Asia.

[2] DMSI is calculated as: =100*(1-(imports/(output+imports-exports)). Data retrieved from the Bureau of Labour Statistics (Sectoral output) and the US Census Bureau (import/export value). Date range: 2002-2024.

This reflects the large scale of Chinese fermentation-based production and its dominance in upstream API manufacturing. According to recent analyses in *JAMA Health Forum*, nearly all US supplies of penicillin-class active ingredients are sourced from the PRC.[3] Furthermore, European health authorities estimate that the PRC contributes to 80-90% of global antibiotic API production.[4] These conditions translate directly into systemic vulnerability for the US and many European countries, reflected in import exposure, supplier concentration, and the geographic dominance of a small set of Asian producers.

1.1 Capturing the two-country global system: The PRC (APIs) and India (FDFs)

The modern antibiotic supply chain is built on a highly concentrated two-country structure: the PRC produces the APIs, and India converts these inputs into FDF antibiotics. Nearly every major antibiotic class now moves through this sequence.

Over decades, global fermentation capacity – the foundational step for producing intermediates such as 6-aminopenicillanic acid (6-APA) – collapsed across the US and European nations, leaving only a handful of surviving facilities. The PRC now anchors the upstream stage with large-scale fermentation and chemical-synthesis capability, making it the dominant source of antibiotic ingredients worldwide. The only remaining large-scale producer in either Europe or the US is Sandoz's Kundl facility in Austria, which maintains a fully vertically integrated penicillin-production base.

India, for its part, controls much of the downstream formulation stage through export-oriented plants that supply both hospital and outpatient antibiotics. However, India's strength depends almost entirely on uninterrupted access to Chinese APIs; without Chinese upstream inputs, Indian FDF production cannot operate at scale.

In practice, the system functions as a single linear chain: the PRC manufactures the inputs; India manufactures the finished products; and America and Europe import them. This is not a diversified network; it is a concentrated structure with minimal redundancy and high systemic risk.

[3] Mariana P. Socal et al., 'US Antibiotic Importation and Supply Chain Vulnerabilities', *Jama Health Forum*, 6:10 (2025).
[4] 'Can the EU have a sustainable antibiotic supply chain?', *Health Care Without Harm Europe*, 11/06/2024, https://europe.noharm.org/ (checked: 25/03/2026).

2.0

Analytical purpose, research questions, and methodology

This study examines the structure and resilience of the American and European antibiotic supply chains by identifying where production, processing, and critical intermediates are geographically and firm-level concentrated. The analysis asks how dependence differs across manufacturing stages – including both upstream API production and downstream FDF antibiotics manufacturing – and which origin countries, firms, and facilities could constitute single points of failure with systemic implications. These questions are addressed using harmonised US-EU+EFTA trade data, firm-level shipment records, and molecule-specific analysis consistent with established pharmaceutical supply-chain and health-economics methodologies.

2.1 Methodology, scope, and Harmonised Tariff Schedule (HTS) framework

This analysis isolates antibiotic-specific trade flows to distinguish upstream dependence on APIs from downstream dependence on FDF antibiotics.

2.1.1 ANTIBIOTIC CLASSES INCLUDED

The study covers the major therapeutic classes used in US and EU+EFTA clinical settings, including penicillins, cephalosporins, tetracyclines, macrolides, fluoroquinolones, carbapenems, glycopeptides, β-lactam/β-lactamase inhibitor combinations, and key adjunct agents (e.g., clindamycin, linezolid, and metronidazole). These capture both high-volume outpatient drugs and hospital-critical sterile injectables.

2.1.2 HTS CODES

The following HTS codes cleanly correspond to antibiotic APIs and FDFs, enabling clear separation of manufacturing stages:

- **2941.10, 2941.20, 2941.30, 2941.40, 2941.50, 2941.90** – Antibiotic APIs (bulk powders); and
- **3004.10, 3004.20** – FDF antibiotics (tablets, capsules, sterile vials).

This structure allows consistent comparison across US Census, Eurostat, and bill of lading datasets.

TABLE 1: ANTIBIOTIC HTS CODES AND MOLECULE CLASSES

HTS code	Description	Stage	Antibiotic classes included	Representative molecules
2941.10	Penicillins and derivatives (bulk pharmaceuticals)	API	Penicillins (β-lactams)	Amoxicillin, Ampicillin, Penicillin G/V; inputs for Amoxicillin-Clavulanate and Ampicillin-Sulbactam
2941.20	Streptomycins and derivatives (bulk pharmaceuticals)	API	Aminoglycosides (streptomycin class)	Streptomycin, Dihydrostreptomycin
2941.30	Tetracyclines and derivatives (bulk pharmaceuticals)	API	Tetracyclines	Tetracycline, Doxycycline
2941.40	Chloramphenicol and derivatives (bulk pharmaceuticals)	API	Amphenicols	Chloramphenicol, Thiamphenicol, Florfenicol

2941.50	Cephalosporins and derivatives (bulk pharmaceuticals)	API	Cephalosporins (β-lactams)	Ceftriaxone, Cefazolin, Cefuroxime, Cefotaxime, Ceftazidime
2941.90	Other antibiotics (bulk pharmaceuticals)	API	Macrolides, Carbapenems, Glycopeptides, Lincosamides, others	Azithromycin, Clarithromycin, Vancomycin, Clindamycin, Meropenem, Imipenem; components used in combination antibiotics
3004.10	Medicaments containing penicillins or derivatives, in measured doses	FDF	Penicillins and combinations	Amoxicillin tablets/ capsules, Amoxicillin-Clavulanate, Ampicillin products
3004.20	Medicaments containing other antibiotics, in measured doses	FDF	Cephalosporins, Carbapenems, Macrolides, Glycopeptides, Tetracyclines, others	Ceftriaxone vials, Cefazolin vials, Meropenem vials, Vancomycin vials, Azithromycin tablets, Doxycycline, Piperacillin-Tazobactam

2.1.3 DATA SOURCES

The following data sources are used in this Report:

- **US Census Bureau (USA Trade Online):** US imports of APIs and FDFs;
- **Eurostat:** EU and EFTA imports under identical HTS classifications;
- **Bill of lading and customs shipment records:** Company-level supply patterns; and,
- **Indian Directorate General of Commercial Intelligence.**

Different estimates of antibiotic dependence measure different layers of the supply chain. Import shares reflect where finished APIs are shipped from; production-share estimates reflect where APIs are manufactured globally; facility counts measure site location rather than output volume; and molecule-specific data capture dependence on critical upstream intermediates. These metrics are complementary, not contradictory – import statistics alone understate true systemic dependence when upstream production and key intermediates are highly concentrated.

3.0

US antibiotic dependence

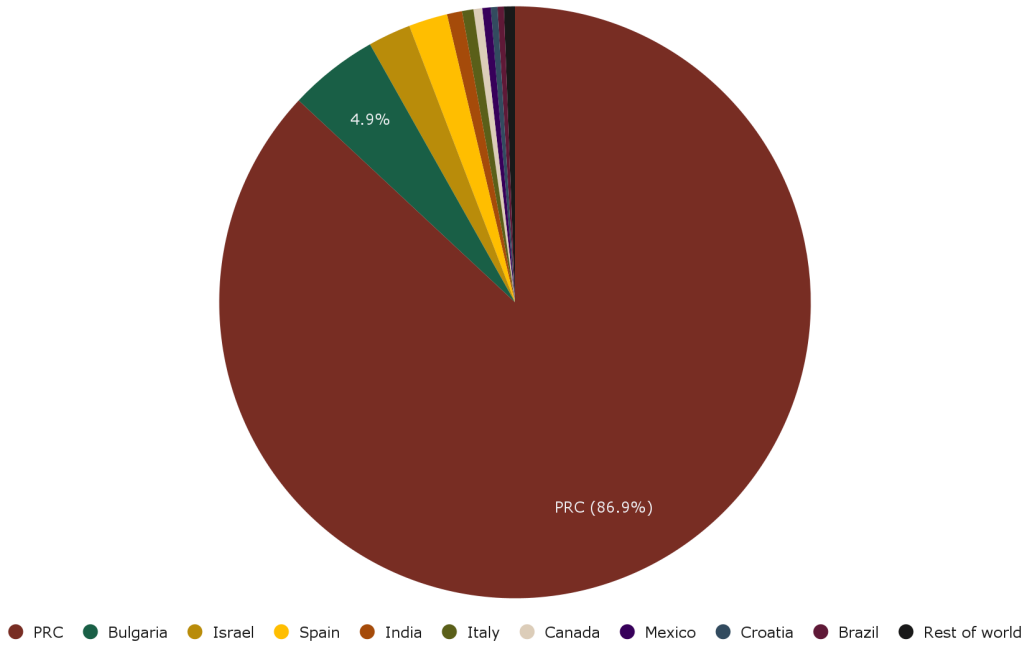
The US retains some fill-and-finish antibiotic production, including USAntibiotics' facility in Bristol, Tennessee, which manufactures amoxicillin finished-dose products.[5] However, the US no longer has API or 6-APA production capability.[6] As a result, domestic finished-dose production remains important but incomplete. Although USAntibiotics sources its upstream API from European nations, the broader American antibiotic supply remains overwhelmingly reliant on Chinese API.

3.1 American API imports: The PRC as the upstream bottleneck

The API stage is where supply-chain fragility is deepest. APIs determine whether antibiotics can be produced at all, and the US is overwhelmingly dependent on the PRC for these critical ingredients. Figure 2 illustrates the distribution of the US' antibiotic API imports by country.

[5] Misti Ushio and Barry C. Buckland, 'Revitalising US Biomanufacturing to Strengthen the Global Supply and Security of Antibiotics', *Digitalis Research*, 16/06/2025, https://www.digitalisresearch.com/ (checked: 25/03/2026).
[6] Ibid.

FIGURE 2: US IMPORT OF ANTIBIOTIC APIS BY COUNTRY[7]



The PRC supplies about 87% of all US antibiotic API imports – effectively controlling the upstream import supply of critical antibiotic input. The next highest country, Bulgaria, supplies less than 5% of all US antibiotic API imports. This means that the PRC dominates the APIs for the antibiotic classes most essential to hospitals: cephalosporins (e.g., ceftriaxone and cefazolin), macrolides (azithromycin), tetracyclines (doxycycline), and carbapenems (meropenem). These drugs are cornerstones of inpatient care, and their availability hinges on uninterrupted Chinese production.

Even antibiotics manufactured in the US rely on these Chinese APIs. Domestic FDF manufacturing only partially mitigates dependence when the foundational inputs still come from abroad – and from the PRC; an adversarial country. This means that America lacks true manufacturing sovereignty over its antibiotic supply. A production slowdown, export restriction, environmental crackdown, or contamination event at even a handful of Chinese plants could disrupt American hospitals quickly. Table 2 provides a detailed breakdown of US API and FDF import shares.

[7] Data retrieved from the US Census Bureau. HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

TABLE 2: US ANTIBIOTIC IMPORTS BY COUNTRY (API AND FDF)[8]

Country	Antibiotic API imports (MT)	API import share	Country	FDF imports (MT)	Final drug import share
PRC	29,610	86.9%	India	11,903	27.1%
Bulgaria	1,670	4.9%	PRC	4,809	11.0%
Israel	797	2.3%	Italy	4,794	10.9%
Spain	722	2.1%	Jordan	4,433	10.1%
India	281	0.8%	Switzerland	4,395	10.0%
Italy	213	0.6%	Canada	3,498	8.0%
Canada	162	0.5%	Austria	2,144	4.9%
Mexico	157	0.5%	Portugal	1,944	4.4%
Croatia	125	0.4%	Ireland	1,131	2.6%
Brazil	117	0.3%	Spain	1,043	2.4%
Rest of world	205	0.6%	Rest of world	3,785	8.6%

At 29,610 tonnes, the PRC supplies over six times the volume of all other import sources combined. Bulgaria, Israel, and Spain contribute minor shares. India supplies only 0.8% of US APIs, underscoring its own reliance on imported ingredients even as it supplies large volumes of finished drugs.

Limited US-EU+EFTA trade in antibiotic active pharmaceutical ingredients reflects specialisation in particular molecules and production processes, not surplus or interchangeable upstream capacity. Due to their unique reliance on imports for high-volume APIs from the PRC, bilateral transatlantic API flows do not indicate resilience at scale, instead reflecting a narrow but real base of remaining American and European production that could be expanded through coordinated US-EU industrial policy as part of a broader effort to diversify away from dominant Asian

[8] Data retrieved from the US Census Bureau. HTS codes used for FDF antibiotics: 3004.10 and 3004.20. HTS codes used for antibiotic APIs: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

suppliers. This concentration means the US has little diversified fallback strategy for API sourcing.

Europe offers the next best import diversification with trusted suppliers in countries such as Bulgaria, Spain, Italy, and Croatia, but these countries also cannot compete with the market dominance of the PRC without drastic policy changes. When a system depends so heavily on one upstream producer, the entire downstream market – domestic or imported – becomes a point of vulnerability.

3.2 American FDF antibiotic imports: India's downstream dominance

FDFs include tablets, capsules, suspensions, and sterile injectables. The US relies on foreign FDF antibiotics not because it cannot formulate drugs, but because protracted low-cost competition has driven domestic prices to unsustainable levels. India has gained a dominant share of American FDF imports through an optimised cost-efficiency model supported by leveraging subsidies, low production costs, and greater access to Chinese APIs.

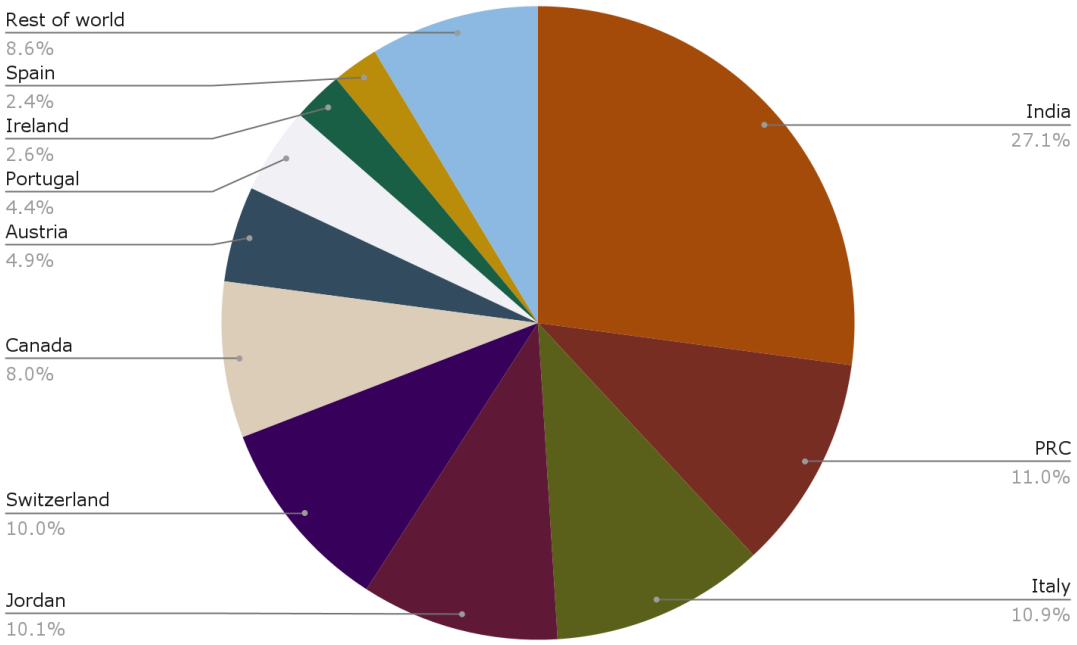
In parallel, generic purchasing and reimbursement structures have driven prices to unsustainable levels, particularly sterile injectables, pushing manufacturers out of the market and magnifying reliance on a handful of foreign suppliers. The US Food and Drug Administration (FDA) has identified this dynamic as a core driver of drug shortages, with a 2020 report noting:

> **Root Cause 1: Lack of Incentives to Produce Less Profitable Drugs**. When market conditions limit manufacturers' profitability, they reduce a firm's motivation to maintain a presence in, or enter the market for older prescription drugs, and to invest in manufacturing quality and redundant capacity. Manufacturers of older generic drugs, in particular, face intense price competition, uncertain revenue streams, and high investment requirements, all of which limit potential returns. Current contracting practices contribute to a 'race to the bottom' in pricing.[9]

Figure 3 shows the top supplier countries for US FDF antibiotics.

[9] 'Drug Shortages: Root Causes and Potential Solutions', US Food and Drug Administration, 21/03/2020, https://www.fda.gov/ (checked: 25/03/2026).

FIGURE 3: US IMPORT OF ANTIBIOTIC FDFS BY COUNTRY[10]



India supplies 27% of all US FDF antibiotic imports; by far the largest share. Combined with the PRC's 11% share, nearly 40% of the US market is anchored in this two-country pipeline. European countries, by contrast, appear at first to offer another option: suppliers in Italy, Switzerland, Austria, Portugal, Spain, and the Republic of Ireland contribute a meaningful share of US imports (35%) and still maintain credible antibiotic formulation capacity.

However, nearly all these producers are increasingly confined to niche or higher-value formulations. They no longer participate meaningfully in the lowest-cost, highest-volume products, most notably amoxicillin, which has become one of the most vulnerable molecules in the antibiotic supply chain precisely because neither the US nor European nations can compete with Chinese API price suppression or India's high-volume, low-cost manufacturing base.

Sustained price suppression from Chinese intermediates and Indian mass-production platforms has undercut the viability of American and European producers' cost structures for more than a decade. As a

[10] Data retrieved from Eurostat. HTS codes used: 3004.10 and 3004.20. Date range: January 2024-December 2025.

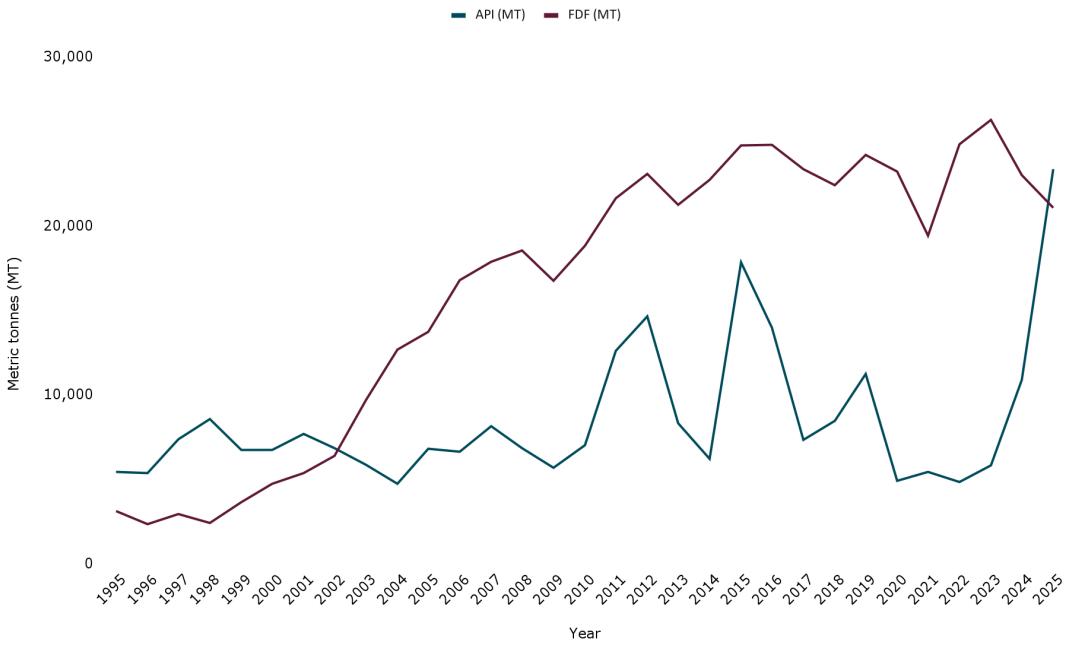
result, remaining upstream European capabilities survive, but they no longer shape – or stabilise – the broader US antibiotic market. Since the Covid-19 pandemic, Indian suppliers have further expanded their share of the US' amoxicillin and amoxicillin-clavulanate supply,[11] intensifying price pressure on remaining US FDF producers and deepening downstream dependence. Additionally, because nearly all Indian manufacturers and most American and European formulators outside the Sandoz Kundl network in Austria rely on Chinese APIs, the US market is functionally tied to a single upstream source regardless of where final dosage production occurs.

3.3 Long-term import trends: Evidence of domestic erosion

The deeper pattern underlying the API and FDF data is the long-term erosion of US formulation capacity. As foreign competitors – benefiting from lower costs and state-backed industrial strategy – gained market share, US-based formulation lines were forced to downscale or shut down. Figure 4 illustrates the long-running trend in American FDF and API antibiotic imports.

[11] Sairaj Patil, Mitali Chougule, and Shravani Gosavi, 'Amoxicillin-Clavulanate in India: Market Trends, Competitive Landscape, and Public Health Implications', *International Journal of Pharmaceutical Sciences*, 4:1 (2026).

FIGURE 4: US ANTIBIOTIC API AND FDF IMPORTS OVER TIME[12]



The trendline shows a marked and persistent rise in FDF imports over time, with the steepest increases occurring post-2002 after the PRC received permanent Most Favoured Nation trade status in 2001, granting it access to the lowest general US tariff rates and accelerating its integration into the American market. Lower tariff rates accelerated the PRC's industrial rise and unleashed a wave of low-priced antibiotic imports into global markets. This shift intensified foreign price competition and expedited the PRC's consolidation of antibiotic production.

A key feature of this pattern is how US API imports did not rise in parallel with FDF imports at first. API volumes remained comparatively flat, as pharmaceutical manufacturers in countries such as the PRC and India initially focused on the technologically less complex stage of FDF manufacturing. However, over the past two years, the PRC in particular has consolidated its dominance in global antibiotic API production, and US API import dependence has increased sharply.

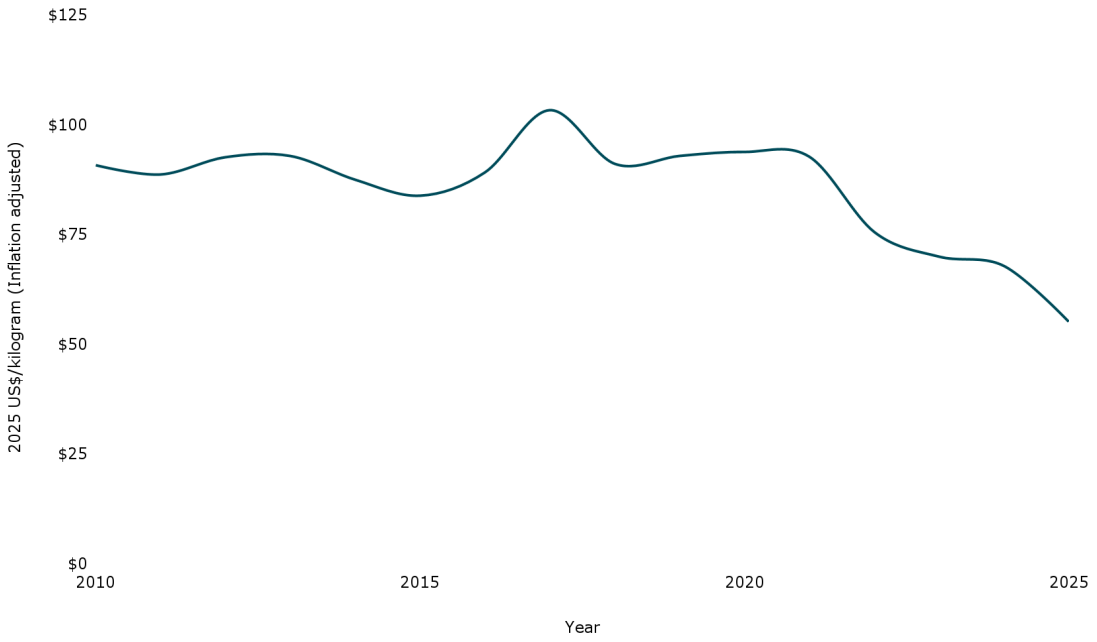
[12] Data retrieved from the US Census Bureau. Antibiotic FDF HTS codes used: 3004.10 and 3004.20. Antibiotic API HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: 1995-2025.

This collapse of American FDF and API manufacturing and the surge in import reliance is visible in real production losses. For example, the Bristol-Myers Squibb antibiotic fermentation plant in East Syracuse (later acquired by Pfizer) – the last industrial-scale US penicillin producer at the time – shut down penicillin production in 2004, leaving the US entirely dependent on foreign-made penicillin thereafter.[13] Similarly, other widely used antibiotics, such as doxycycline, are no longer produced domestically, reflecting how essential generic medicines have migrated entirely offshore.

As FDF imports surged, domestic formulation facilities either reduced output or exited entirely as margins collapsed. Figure 5 shows the direct economic mechanism driving this collapse. As import volumes accelerated, import prices for FDF antibiotics fell sharply – dropping from roughly US$100 (£75) per kilogram a decade ago to nearly US$55 (£41) per kilogram as of late 2025. Since 1992, import prices have fallen by over 90% for FDFs and about 80% for APIs.[14] These sustained price declines have pushed many essential medicines below economically viable production levels in the US and European countries, forcing manufacturers to exit. These pressures are reinforced by subsidised Chinese API output and India's ultra-low-cost formulation platforms.[15]

[13] Gardiner Harris, 'Drug Making's Move Abroad Stirs Concerns', *New York Times*, 19/01/2009, https://www.nytimes.com/ (checked: 25/03/2026).
[14] Mariana P. Socal et al., 'US Antibiotic Importation and Supply Chain Vulnerabilities', *Jama Health Forum*, 6:10 (2025).
[15] Zeliha Chaffin, 'Europe's dramatic decline in pharmaceutical production threatens health sovereignty', *Le Monde*, 29/12/2025, https://www.lemonde.fr/ (checked: 25/03/2026); Jessica Glenza, 'Generic drugs in the US are too cheap to be sustainable, experts say', *The Guardian*, 19/01/2024, https://www.theguardian.com/ (checked: 25/03/2026); 'Generics 2030: Three strategies to curb the downward spiral', KPMG, 13/11/2020, https://kpmg.com/ (checked: 25/03/2026); and 'China's Irreplaceable Role in the Global Generic Drug API Supply Chain', DrugPatentWatch, 20/01/2026, https://www.drugpatentwatch.com/ (checked: 25/03/2026).

FIGURE 5: US ANTIBIOTIC IMPORT PRICES OVER TIME[16]



This precipitous decline in import prices illustrates why domestic formulation capacity withered among American and European producers: they were competing not in an open market, but against state-supported cost structures they could not match. The economic floor collapsed beneath US formulators long before demand for antibiotics did, driving FDF imports sharply upward while API import demand remained flat. This was not a technological failure, but the predictable outcome of an environment in which American manufacturers were priced out by subsidised Chinese production operating under free trade access and by foreign competitors facing far lower regulatory and compliance costs.

Sustained price suppression has already driven competing producers out of the market, raising the risk that future supply disruptions or price shocks could occur once alternative capacity is eliminated, unless deliberate action is taken to preserve diversified US and European supply. This trajectory reveals a troubling dynamic:

[16] Data retrieved from the US Census Bureau. HTS codes used: 3004.10 and 3004.20. Date range: 2010-2025.

- As the US became more reliant on FDF imports, domestic capability atrophied;
- As domestic capability declined, import dependence became harder to reverse; and
- As import dependence grew, foreign suppliers gained structural leverage without bearing the same safety or reliability standards.

The end result is a brittle system in which the US' antibiotic supply is tightly coupled to foreign production decisions, foreign regulatory systems, and foreign industrial policies. In particular, the geopolitical posture and foreign policy decisions of key supplier states such as the PRC and India can shape export availability and therefore directly affect American and European access to essential antibiotics.

4.0

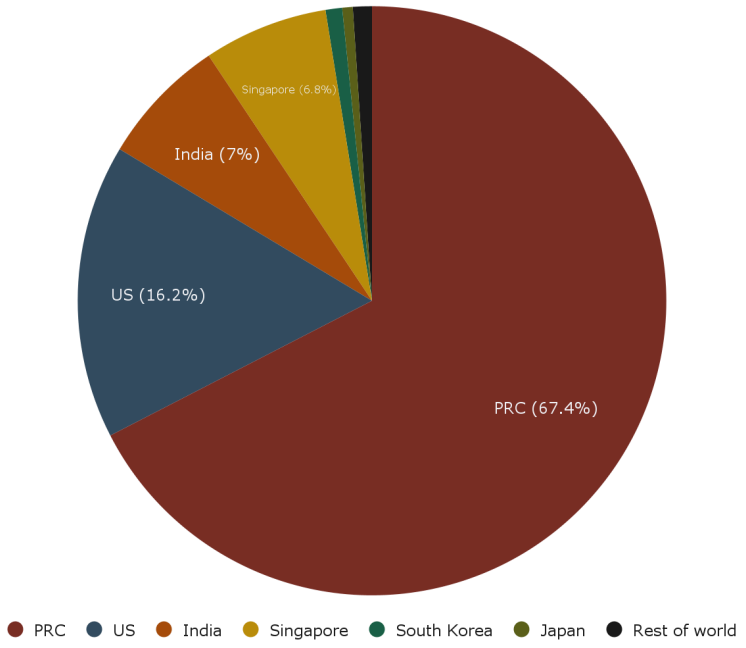
EU+EFTA antibiotic dependence

Pockets of antibiotic manufacturing capability remain in Europe but, like the US, many European countries now rely heavily on foreign suppliers for both active ingredients and FDF antibiotics. The EU+EFTA's dependence is less acute upstream compared to the US. However, the PRC still supplies the overwhelming majority of European nations' antibiotic API imports. The remaining fermentation plants in Europe operate at a fraction of global scale, leaving many countries exposed to the same two-country supply chain that shapes American vulnerability.

4.1 EU+EFTA API imports: Upstream dependence on the PRC

The EU+EFTA's antibiotic vulnerability begins with API sourcing. Like the US, European countries are also highly reliant on Chinese antibiotic API supply. Figure 6 shows the distribution of EU+EFTA antibiotic API imports by source country.

FIGURE 6: EU+EFTA IMPORT OF ANTIBIOTIC APIS BY COUNTRY[17]



The PRC supplies 67% of all EU+EFTA antibiotic API imports. The US (the next largest supplier) provides only 16%, and this category includes intermediates and specialised products rather than large-scale fermentation output. Singapore and India account for minor additional volumes, although Singapore's role is largely a transit and re-export hub rather than a true manufacturing source. Neither approaches the breadth, scale, or cost structure of Chinese production.

Historically, antibiotic APIs in European nations were supplied by domestic pharmaceutical producers. In the post-Second World War period, penicillin production expanded across Western Europe, with manufacturing plants operating in countries including Italy, France, and Spain.[18] Yet, as the PRC scaled production and made many global pricing models unsustainable, many European facilities either contracted, shifted to niche products, or closed altogether. This transformation is visible in

[17] Data retrieved from Eurostat. HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.
[18] Daniele Cozzoli, 'Penicillin and the European response to post-war American hegemony: The case of Leo-penicillin', *History and Technology*, 30:1-2 (2014).

the dominance of Chinese suppliers where European counterparts once held significant market share.

European Commission policy analyses note that pharmaceutical supply chains are highly integrated globally, and that production of generic APIs is increasingly concentrated in the PRC and India, creating upstream supply dependencies.[19] With current market conditions, this makes it nearly impossible for European producers to expand output without relying on the very same Chinese firms that dominate the global supply chain.

4.2 EU+EFTA API and FDF import breakdown

Table 3 provides a detailed breakdown of EU+EFTA API and FDF import shares, highlighting the geographic structure of European dependence.

TABLE 3: EU+EFTA ANTIBIOTIC IMPORTS BY COUNTRY (API AND FDF)[20]

Country	Antibiotic API imports (MT)	API import share	Country	FDF imports (MT)	Final drug import share
PRC	23,667	67.4%	India	7,367	45.5%
US	5,673	16.2%	PRC	5,110	31.6%
India	2,470	7.0%	US	1,152	7.1%
Singapore	2,397	6.8%	Turkey	468	2.9%
South Korea	321	0.9%	North Macedonia	456	2.8%
Japan	202	0.6%	New Zealand	366	2.3%
Rest of world	366	1.0%	Rest of world	1,272	7.9%

The API side of the table confirms the central finding of Figure 6: that the PRC's more than 23,000 tonne supply of APIs dwarfs contributions from every other country. On the finished-dosage side,

[19] 'In-depth reviews of strategic areas for Europe's interests', European Commission, No date, https://commission.europa.eu/ (checked: 25/03/2026).
[20] Data retrieved from the Eurostat. HTS codes used for FDF antibiotics: 3004.10 and 3004.20. HTS codes used for antibiotic APIs: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

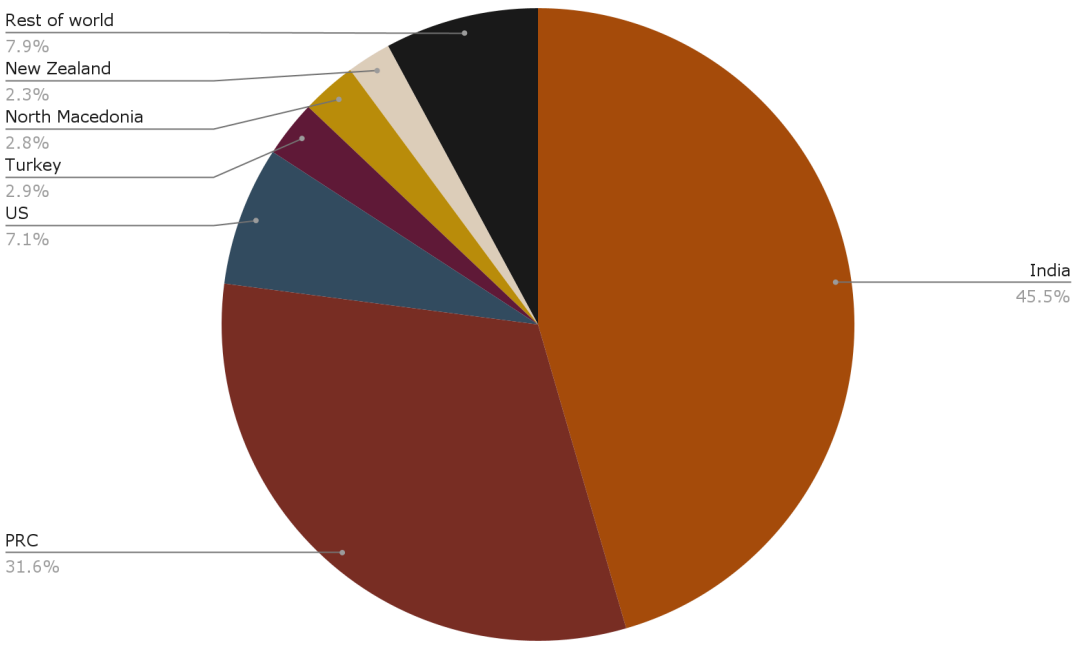
India supplies 46% of EU+EFTA FDFs, while the PRC supplies 32%. Together, these two countries provide 77% of all finished antibiotics entering the EU+EFTA. This mirrors the American global supply chain described earlier: the PRC produces the ingredients; India formulates the final drugs; and European nations import them.

The table thus reinforces the structural dependence created by global consolidation. Europe's antibiotic supply is no more diversified than the US supply – and in some respects, is more vulnerable.

4.3 EU+EFTA FDF imports: India and the PRC's downstream control

Taking a closer look at the finished-dosage side of Table 3, Figure 7 illustrates the geographic concentration of antibiotic drugs entering the EU+EFTA market. While multiple countries export finished antibiotics to European countries, the market is dominated by India and the PRC.

FIGURE 7: EU+EFTA IMPORT OF ANTIBIOTIC FDFS BY COUNTRY[21]



[21] Data retrieved from Eurostat. HTS codes used: 3004.10 and 3004.20. Date range: January 2024–December 2025.

Figure 7 shows that India and the PRC together supply over three quarters of finished antibiotic imports entering the EU+EFTA market. The remaining suppliers – including the US, Turkey, and several smaller exporters – account for only a small share of the market. This pattern reinforces the broader structure of the global antibiotic supply chain: the PRC dominates upstream ingredient production while India serves as the primary formulation hub.

This overwhelming import share stands in stark contrast to the historical strength of European nations in pharmaceutical formulation. Several EU countries – Austria, France, Germany, Italy, Slovenia, and Spain – still maintain antibiotic formulation and sterile-injectable manufacturing capacity.[22] Yet, this industrial base has been progressively displaced by lower-cost, higher-volume Indian producers. India now dominates EU+EFTA imports of oral-dose antibiotics – including amoxicillin, cefuroxime, and azithromycin – while the PRC plays a growing role in sterile injectables such as ceftriaxone and meropenem through its upstream control of key APIs.

The consequences of this structural shift are visible across the continent. In 2025, Xellia announced the shutdown of its Copenhagen antibiotics complex – one of Europe's largest remaining fermentation and injectable-antibiotics facilities for non-penicillin classes – after concluding that European production could no longer compete with Asian cost structures.[23] With this closure, European countries were left with only a single major antibiotic fermentation base at scale for penicillin-class production – Sandoz's Kundl site in Austria – underscoring how little upstream capacity now remains.

Sandoz's Kundl facility anchors the only fully integrated penicillin-production network in Europe or the US. It already supplies over a hundred countries, and could be rapidly scaled further if supported by stable market signals and aligned trade and industrial policy.[24] Its continued operation demonstrates that American and European capacity can expand when the economic environment rewards resilience rather than lowest-cost imports.

[22] 'EU production and trade of antibiotics', Eurostat, 18/11/2019, https://ec.europa.eu/ (checked: 25/03/2026).
[23] Joseph Keenan, 'Xellia to shutter Copenhagen antibiotics plant, dealing a blow to EU reshoring efforts', *Fierce Pharma*, 07/05/2025, https://www.fiercepharma.com/ (checked: 25/03/2026).
[24] Danielle Myles, 'Kundl strengthens Europe's last bastion of penicillin', *FDI Intelligence*, 08/08/2024, https://www.fdiintelligence.com/ (checked: 25/03/2026).

Yet, even this remaining capability operates within market conditions that continue to place pressure on the European antibiotic manufacturing base. Across the continent, reference-pricing systems, tender-based purchasing, and strict reimbursement caps have driven generic prices down to levels that leave limited margins for manufacturers, particularly for injectable antibiotics. As in the US, a 'lowest-price wins' procurement model has reduced the number of economically viable producers and increased reliance on a small number of high-volume Asian suppliers for essential generics.

These outcomes reflect the same market dynamics described earlier: sustained downward pricing pressure has narrowed the pool of viable producers, leaving European nations dependent on a small number of foreign suppliers despite retaining technical manufacturing capability.

The broader structural position of European countries becomes clear when examining upstream and downstream data together. 67% of antibiotic API imports are sourced from the PRC – a conservative trade-based measure that likely understates the EU+EFTA's dependence on Chinese-controlled upstream intermediates – leaving Europeans without the input resilience needed to sustain or expand their own formulation capacity. The PRC's control of key intermediates and global-scale fermentation – including approximately 90% of global 6-APA production capacity – means even a short-term disruption would propagate rapidly through the supply chain.[25] Downstream, European countries retain formulation plants, but their aggregate scale is increasingly overshadowed by the large volume of low-cost finished drugs imported from India and the PRC, many of which themselves rely on Chinese-produced API.

This dual dependency is deeper than that of the US, reflecting the EU+EFTA's higher import concentration for both finished drugs and APIs. Yet, these vulnerabilities remain reversible: European nations have the historic capability and industrial skill to produce both APIs and finished antibiotics. What they lack are the market conditions – distorted by foreign subsidies, global price pressure, and fragmented policymaking – that would allow those capabilities to operate at scale.

[25] 'Critical Condition: Securing Europe's Fragile Antibiotic Supply Chain', Newmarket, 04/11/2025, https://newmarket-strategy.com/ (checked: 25/03/2026).

5.0

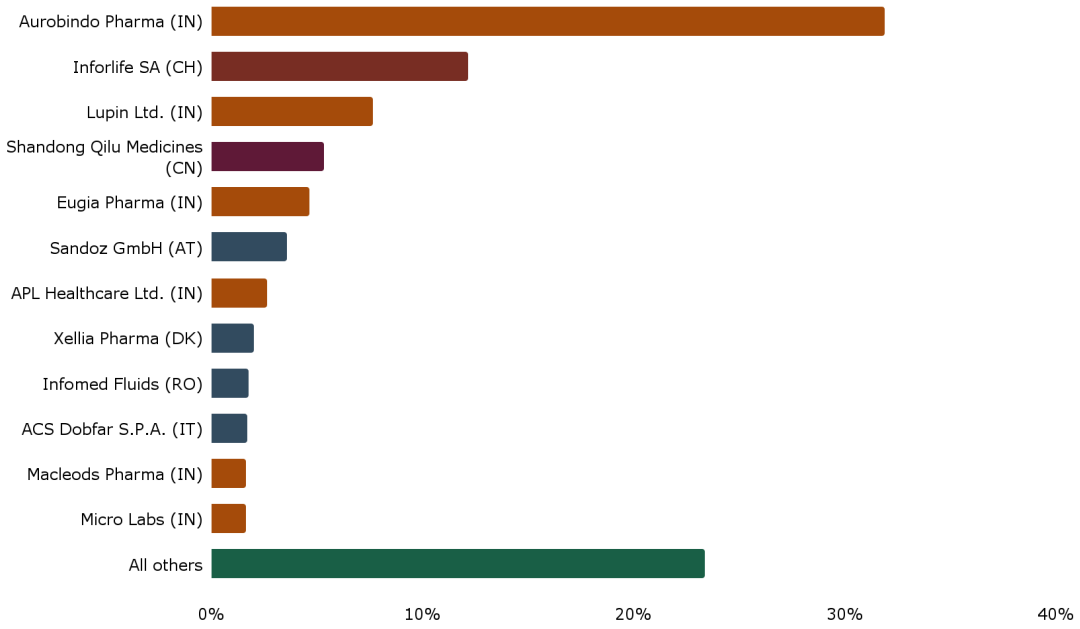
Company-level supply concentration

Country-level import patterns reveal the geographic structure of antibiotic dependence, but firm-level concentration exposes the true operational chokepoints within global supply chains. A highly consolidated supplier base means that disruptions at individual companies – whether regulatory closures, contamination events, production shutdowns, logistics failures, or energy constraints – can trigger shortages across entire molecule classes. In such a concentrated system, the policy decisions of the governments overseeing these producers – including export restrictions, regulatory interventions, or broader geopolitical actions – can disrupt supply as easily as operational failures within the firms themselves. Antibiotics depend on a small number of exporters operating at industrial scale.

5.1 US FDF suppliers: Dominance by Indian firms

As seen in Figure 8, the US relies disproportionately on a handful of Indian manufacturers for FDF antibiotics, reflecting a market in which domestic formulators have been priced out by concentrated lower-cost offshore competitors.

FIGURE 8: US IMPORT OF ANTIBIOTIC FDFS BY COMPANY[26]



Aurobindo Pharma alone supplies over 30% of all finished-dosage antibiotics imported into the US; a high level of single-firm reliance for such a critical category of medicines. Several other Indian firms – Lupin, Eugia Pharma, APL Healthcare, Macleods, and Micro Labs – add smaller but meaningful shares, collectively pushing India's footprint to cover a substantial portion of American FDF imports.

European suppliers such as Sandoz and Inforlife demonstrate that some formulation capability still exists in like-minded jurisdictions. However, the European supply is not currently at the same scale or sustainability as the Indian supply. European manufacturers cannot scale or compete against the low-cost, high-volume platforms of the PRC and India, whose structure has steadily priced-out American and European producers for decades.

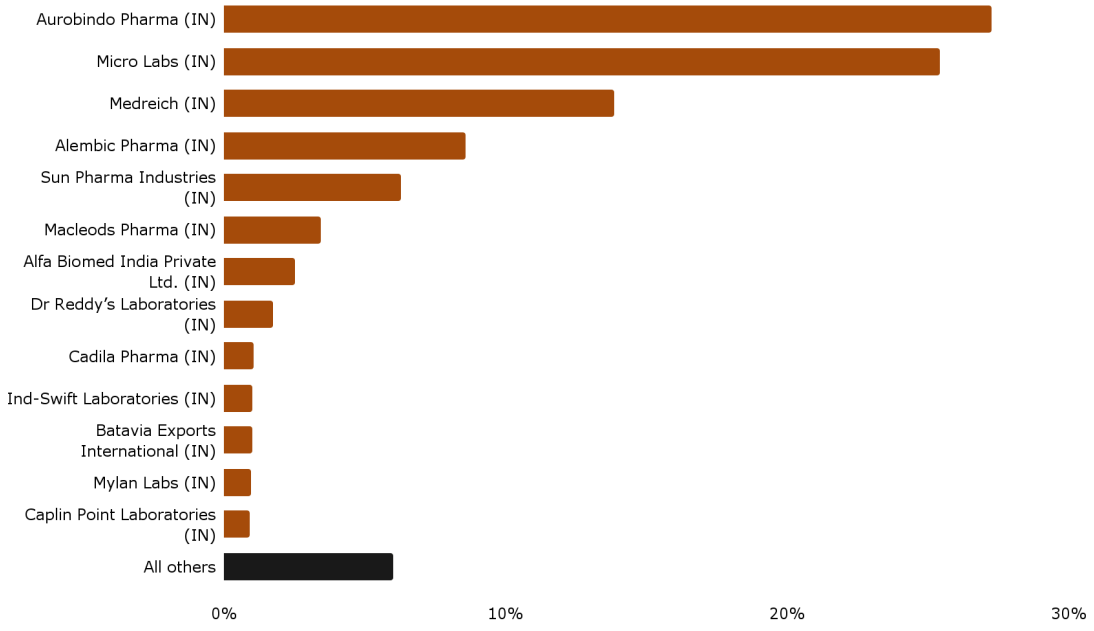
This means a disruption at any major Indian plant – or at Chinese API facilities supplying them – would immediately reverberate and impact US hospital and outpatient care supply.

[26] Data retrieved from US bill of lading data. HTS codes used: 3004.10 and 3004.20. Date range: January 2024-December 2025.

5.2 EU+EFTA FDF suppliers: Heavily concentrated from India

European dependence on Indian suppliers is even more concentrated than in the US, as the distribution of EU+EFTA antibiotic imports shows in Figure 9.

FIGURE 9: EU+EFTA IMPORT OF ANTIBIOTIC FDFS BY COMPANY[27]



Aurobindo (27.2%) and Micro Labs (25.4%) together supply 52.6% of all Indian-origin FDF antibiotics imported into the EU+EFTA market. The concentration is so sharp that the top five Indian exporters collectively supply 81% of all Indian-origin FDF imports. This means that European countries do not merely rely on India as a country – they rely on a small cluster of Indian firms with an outsized market share.

The implication is clear: a shutdown, recall, quality warning letter, or export disruption affecting one or two of the leading suppliers would

[27] Data retrieved from US bill of lading data. HTS codes used: 3004.10 and 3004.20. Date range: January 2024-December 2025.

have immediate, systemwide consequences across multiple European countries.

5.3 Firm-level dynamics as the hidden source of systemic fragility

Country-level data shows where antibiotics originate, but company-level concentration reveals how vulnerable the system truly is. The US and EU+EFTA antibiotic supply depends on a very small number of firms. There are only a few foreign-subsidised firms that can easily maintain sustainable, large-scale capacity in the current market conditions. This geographic concentration gives continued regulatory compliance and production output an outsized impact on whether antibiotics remain available in the US and across Europe.

Import surges, thin margins, and volatile global prices have driven many American and European firms out of the market, leaving only a narrow band of high-output producers in the PRC and India. As a result, most antibiotic molecule classes – especially key APIs and intermediates – are produced by only a handful of firms worldwide.

Only four companies globally manufacture the API for penicillin, reflecting extreme supply concentration in critical ingredients.[28] In such a fragile system, a single regulatory or quality failure can disrupt entire drug families, persistent price suppression erodes surge capacity and reduces resilience, and failures at upstream intermediate producers cascade across multiple downstream formulators.

Crucially, company failures are a frequent occurrence – contamination events, shutdowns, and supply interruptions are routine in global antibiotic production. This fragility shows up in patient access: antibiotics are 42% more likely to experience shortages than the average drug, reflecting how concentrated global production has become.[29]

This risk is not hypothetical – it has already happened in India's own finished-dosage sector. In 2013, Ranbaxy – then one of India's largest antibiotic and generic drug exporters – pleaded guilty to felony charges in the US after admitting it manufactured adulterated medicines,

[28] Nusrat Shafig et al., 'Shortage of essential antimicrobials: a major challenge to global health security', *BMJ Global Health*, 6:11 (2021).
[29] Vimala Raghavendran and Matthew Christian, 'Supply chain vulnerabilities exist for antimicrobial medicines: USP Medicine Supply Map analysis', *Quality Matters*, 24/05/2022, https://qualitymatters.usp.org/ (checked: 25/03/2026).

falsified stability data, and hid failed quality results from regulators.[30] FDA investigators found that the company had released substandard products into the US market, including essential antibiotics, based on fabricated test results and false statements to the FDA.[31] When a dominant Indian formulator collapses in this way, it exposes how a single downstream failure can jeopardise drug supply and patient safety across multiple countries.

When so few firms anchor antibiotic production, disruptions propagate instantly across borders, leaving hospitals with no alternatives. Each breakdown – whether caused by fraud, contamination, or operational failure – reverberates through the US and European countries due to the decline in domestic redundancy.

[30] 'Generic Drug Manufacturer Ranbaxy Pleads Guilty and Agrees to Pay $500 Million to Resolve False Claims Allegations, cGMP Violations, and False Statements to the FDA', US Department of Justice, 13/05/2013, https://www.justice.gov/ (checked: 25/03/2026).
[31] Ibid.

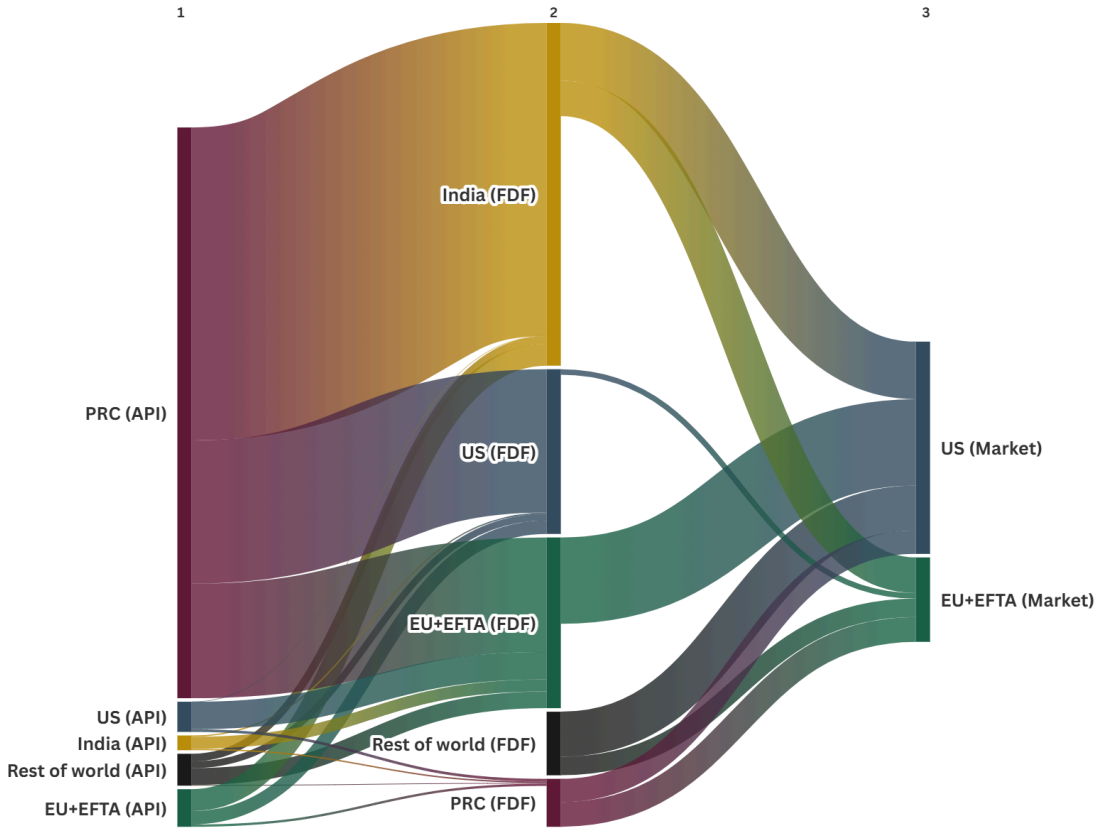
6.0

Upstream control: India's reliance on Chinese APIs

While India is the world's dominant exporter of finished-dosage antibiotics, that position is entirely dependent on uninterrupted access to Chinese-made APIs. API production is the true 'source code' of antibiotic manufacturing; without Chinese inputs, downstream formulation halts. India cannot meet global antibiotic demand without the PRC – and therefore neither can the US or European countries. Together, the PRC's upstream concentration and India's downstream dominance create a single global chokepoint.

The PRC sits at the centre of nearly every major antibiotic API stream, while India serves as the primary formulation hub that converts those APIs into finished medicines. The vast majority of global supply flows along this Chinese-Indian spine before reaching American and European markets. Figure 10 maps these flows and makes the chokepoint structure unmistakable.

FIGURE 10: THE GLOBAL PRC-INDIA CHOKEPOINT[32]



The Sankey diagram shows two key structural dynamics:

1. **The PRC has clear upstream dominance:** The majority of all antibiotic API streams originate in the PRC, regardless of where the finished drug is ultimately formulated. India's own API production is dwarfed by its API imports from the PRC.

2. **India converts Chinese APIs into FDF exports for the US and EU+EFTA:** The majority of FDF antibiotic flows into American and European markets trace back to Chinese APIs. The single largest API importer and FDF exporter is India, but the rest of the world

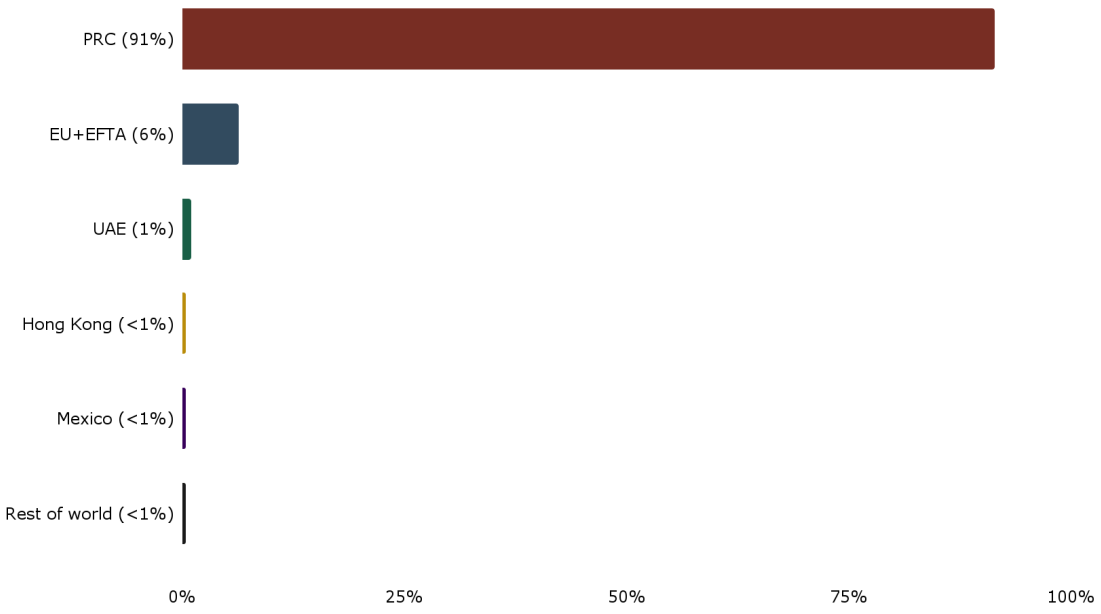
[32] Data retrieved from US Census Bureau, Eurostat and US Bill of Lading Data. HTS codes used for FDF antibiotics: 3004.10 and 3004.20. HTS codes used for antibiotic APIs: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

also heavily relies on Chinese API supply. India's role is not independent of the PRC, but is entirely tied to Chinese supply.

6.1 India's API imports: Over 90% dependence on the PRC

As India formulates such a large share of the world's antibiotics, its API sourcing patterns have become a proxy for global vulnerability. Commercial formulators have shifted toward near-universal dependence on Chinese-origin 6-APA for penicillin-class production. Figure 11 shows India's antibiotic API import volume and origin.

FIGURE 11: INDIAN IMPORT OF ANTIBIOTIC APIS BY COUNTRY[33]



This figure reveals a staggering degree of upstream dependence. The PRC supplies 91.3% of all antibiotic APIs imported into India. By

[33] Data retrieved from Indian Directorate General of Commercial Intelligence and Statistics. HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

contrast, the EU+EFTA supplies just 6.4%, and the rest of the world combined supplies just over 2%.

India's efforts to re-establish penicillin-class API capacity – supported by substantial government subsidies – reflect a clear recognition of upstream vulnerability, but also underscore the economic difficulty of competing with entrenched Chinese incumbents. In 2024, Aurobindo commissioned a new 6-APA fermentation and conversion facility; the first major attempt in years to establish a penicillin-class intermediate plant designed to operate independently of Chinese supply.[34] The project moved forward only because of substantial support from the Indian government through production-linked incentives and other subsidies, reflecting the economic impossibility of competing with Chinese prices on a market basis alone. Yet, even this highly subsidised plant proved vulnerable: shortly after opening, the facility was forced to shut down following a fire in an electrical unit, underscoring how easily global supply can be destabilised when a single upstream site goes offline.[35]

India's experience illustrates how difficult it is to rebuild upstream capacity once global pricing and scale advantages have consolidated elsewhere, as sustained price suppression – whether directed at established producers or emerging competitors – systematically inhibits alternative capacity from reaching scale absent comprehensive government policy support for domestic production.

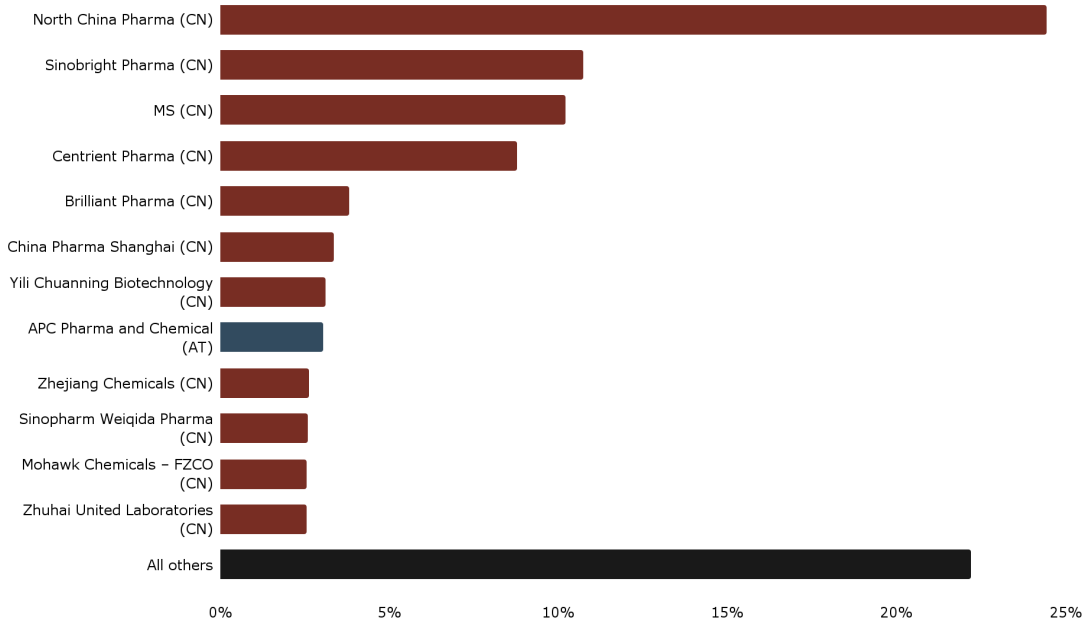
It is clear the vast majority of antibiotic tablets and injectables manufactured in India – and later exported to the US or EU+EFTA – still rely on Chinese-produced ingredients. If Chinese API exports are reduced, Indian formulation volume collapses. This is not a theoretical risk – Covid-19 lockdowns in the PRC's Hubei province disrupted API supplies to India, prompting the Government of India to restrict exports of several medicines.[36]

[34] 'Aurobindo arm resumes Penicillin G production after APPCB nod to operate fire-hit Kakinada plant', *The Hindu*, 30/06/2025, https://www.thehindu.com/ (checked: 25/03/2026).
[35] Ibid.
[36] Reji K. Joseph and Ramaa Arun Kumar, 'Reducing Import Dependence on APIs in the Indian Pharmaceuticals Sector: An Analysis of Early Experience of the PLI Phase-I Scheme', Institute for Studies in Industrial Development, 13/01/2022, https://isid.org.in/ (checked: 25/03/2026).

6.2 India's Chinese API suppliers: A small group

India's near-total reliance on Chinese APIs is compounded by the fact that this supply comes from a very small group of Chinese companies, creating a third and deeper layer of concentration atop the PRC-India chokepoint. Figure 12 identifies the leading Chinese firms supplying antibiotic APIs to India.

FIGURE 12: INDIAN IMPORT OF ANTIBIOTIC APIS BY COMPANY[37]



Several detailed insights emerge from Figure 12. The top four API suppliers to India by volume – North China Pharma, Sinobright Pharma, MS, and Centrient Pharma – together account for 54% of India's total antibiotic API imports. North China Pharmaceutical Group (24.4%) was a major construction initiative under the PRC's First Five-Year Plan, and today is among the PRC's largest pharmaceutical giants. Centrient Pharma (8.8%), although Dutch-owned, operates its major API facilities in the PRC, illustrating how antibiotic production once largely based in

[37] Data retrieved from India import bill of lading data. HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024-December 2025.

Europe has been offshored. Sinobright Pharma (10.7%) is a Chinese exporter specialising in high-volume penicillins and cephalosporins. The remaining major suppliers are also predominantly PRC-based producers, reinforcing a structural pattern in which the PRC controls much of the upstream supply of ingredients used to produce antibiotics globally.

This concentration represents the fourth and deepest layer of global antibiotic vulnerability:

- **Layer 1:** American and European reliance on India and the PRC for finished-dosage antibiotics;
- **Layer 2:** Heavy firm-level concentration among Indian FDF manufacturers;
- **Layer 3:** India's near-total dependence on the PRC for antibiotic APIs; and
- **Layer 4:** Within the PRC, reliance on a small cluster of firms responsible for the majority of global API output.

The global antibiotic supply chain is not merely dependent on the PRC – it is dependent on a handful of individual facilities and production clusters within the PRC. The fragility of this arrangement is already evident. In 2016, an explosion at a single Chinese API plant wiped out the world's supply of piperacillin-tazobactam, a frontline hospital antibiotic.[38] As the PRC was the sole global API source, this one accident triggered worldwide shortages and forced hospitals across multiple continents to ration care.[39] This was not an anomaly; it was a preview of how the entire system reacts when a single upstream plant goes offline.

Any disruption at a major Chinese API facility could ripple outward through the entire global chain – halting India's finished-dosage production, constraining US hospital formularies, destabilising European health systems, and draining global emergency stockpiles. When so much of the world depends on so few upstream producers, a single failure can become a systemic shock, with no redundancy to absorb the impact.

[38] Nadya Wells, Vinh-Kim Nguyen, and Stephan Harbarth, 'A pharmaceutical policy accident: collision of shareholder capitalism and Chinese state capitalism driving the shortage of an essential antibiotic', *Journal of Pharmaceutical Policy and Practice*, 17:1 (2024).
[39] Ibid.

Together, upstream concentration and the erosion of alternative capacity elsewhere transform what began as price competition into a structural dependency with limited resilience.

7.0

Case study: Penicillin and amoxicillin

To distinguish general import exposure from system-critical chokepoint risk, this Report treats penicillin-class intermediates — particularly 6-APA — as a separate dependence metric. As 6-APA sits upstream of all major penicillin-derived antibiotics, concentration at this stage represents the decisive vulnerability in the broader antibiotic supply chain.

Penicillin-class antibiotics, and amoxicillin in particular, are central to both outpatient and hospital-based care. They are the most widely used antibiotics globally, with amoxicillin frequently ranking as the single most prescribed agent in many health systems. In the US, penicillin-derived antibiotics account for 45% of all outpatient antibiotic prescriptions.[40] Amoxicillin alone represents 28% of all outpatient prescriptions, making it the single most widely used antibiotic in the country.[41]

Its role as a first-line treatment for respiratory infections, otitis media, and other community-acquired conditions is well established.[42] Penicillin-derived β-lactams also anchor modern surgical prophylaxis – cefazolin remains the standard preventive antibiotic used across US operating rooms.[43]

[40] 'Total Outpatient Oral Antibiotic Prescriptions in 2024', Centre for Disease Control and Prevention (US), 27/08/2025, https://www.cdc.gov/ (checked: 25/03/2026).
[41] Ibid.
[42] Bobak J. Akhavan, Niloufar R. Khanna, and Praveen Vijhani, 'Amoxicillin', National Library of Medicine, 17/11/2023, https://www.ncbi.nlm.nih.gov/ (checked: 25/03/2026).
[43] 'SHC Surgical Antimicrobial Prophylaxis Guidelines', Stanford Health Care, 06/09/2025, https://med.stanford.edu/ (checked: 25/03/2026).

Yet, despite their ubiquity and clinical importance, the upstream production of penicillin-class APIs – including Penicillin G and its key derivative 6-APA, the essential intermediate used to produce amoxicillin – has become highly concentrated in the PRC. As has been demonstrated previously, approximately 90% of global 6-APA production capacity is located in the PRC, reflecting the near-monopolisation of a critical intermediate for penicillin-class antibiotics, which account for approximately 47% of total antibiotic consumption across the EU+EFTA.[44] This concentration is reinforced by structural evidence: only seven 6-APA manufacturing sites exist worldwide, five of which are located in the PRC, underscoring a severe chokepoint in the global penicillin supply chain.[45]

Only four companies globally manufacture the API for penicillin, adding a firm-level bottleneck on top of the PRC's geographic dominance and leaving the world dependent on a vanishingly small number of upstream producers.[46] This extreme concentration extends to the key intermediate itself. Many historic penicillin and 6-APA fermentation sites across Europe and the US have shut down permanently over the past two decades, leaving only a limited number of active facilities worldwide. Without 6-APA, neither Penicillin V nor amoxicillin can be produced, leaving control over this single upstream molecule as influential over the resilience of the entire penicillin class.

Analysis from the US Pharmacopeia's (USP) Medicine Supply Map further underscores this fragility.[47] USP examined the geographic origin of Key Starting Materials (KSMs) and APIs across dozens of critical antibiotics, including amoxicillin, and demonstrated that even when India manufactures finished amoxicillin, the underlying chemistry originates in the PRC. Penicillin-class KSMs and intermediates are overwhelmingly sourced from Chinese producers, making India's downstream formulation dependent on Chinese upstream control.

[44] 'Critical Condition: Securing Europe's Fragile Antibiotic Supply Chain', Newmarket, 04/11/2025, https://newmarket-strategy.com/ (checked: 25/03/2026); and 'Antimicrobial consumption in the EU/EEA (ESAC-Net)', European Centre for Disease Prevention and Control, 30/10/2024, https://www.ecdc.europa.eu/ (checked: 25/03/2026).
[45] 'Understanding the antibiotic manufacturing ecosystem', Boston Consulting Group and Wellcome, 06/04/2022, https://www.amr-insights.eu/ (checked: 25/03/2026).
[46] Nusrat Shafig et al., 'Shortage of essential antimicrobials: a major challenge to global health security', *BMJ Global Health*, 6:11 (2021).
[47] Vimala Raghavendran and Matthew Christian, 'Supply chain vulnerabilities exist for antimicrobial medicines: USP Medicine Supply Map analysis', *Quality Matters*, 24/05/2022, https://qualitymatters.usp.org/ (checked: 25/03/2026).

India formulates a large share of global amoxicillin finished-dosage forms, but imports more than 90% of its 6-APA from the PRC.[48] This structure can obscure true dependency: finished drugs may appear Indian in origin, but their molecular foundation is Chinese.

This pattern exemplifies the broader systemic design of the antibiotic supply chain: a tightly linked PRC → India → US/Europe pathway. The PRC manufactures the API; India formulates the finished-dosage product; and the US and Europe import the result. Even when formulation occurs domestically, the critical API inputs typically remain Chinese, erasing any presumed resilience from local production.

This structure of dependency was not incidental. It emerged from a decades-long market collapse triggered by the PRC's massive expansion of penicillin fermentation capacity. Beginning in the late 1990s, Chinese firms scaled up Penicillin G production dramatically, flooding global markets and driving prices well below American, European, and Indian production costs.[49] Within a few years, Penicillin G and its derivative 6-APA became unprofitable to manufacture in the US and Europe. 6-APA production requires large-scale fermentation and enzymatic cleavage infrastructure – capital-intensive, energy-intensive assets that were dismantled in the US and European countries after the PRC's price suppression, making domestic operations uneconomic. By 2004, the last American facility producing the raw material for penicillin – located in East Syracuse, New York – had shut down, ending domestic penicillin API production.[50]

European nations followed a similar trajectory: Germany closed its final penicillin API plant in 2017, leaving Sandoz's Kundl facility in Austria as Europe's sole vertically integrated penicillin producer, and the only site today which still manufactures Penicillin G, converts it into 6-APA, and produces downstream semi-synthetic penicillin APIs. Recent European Commission actions were explicitly taken to prevent this capability from disappearing from Europe altogether.[51] Kundl remains the last major fully

[48] Erkan Duman, Gabriela Grasa Mannino, and Shreyash Suryavanshi, 'Concentrated origins, widespread risk: New USP insights on key starting materials', *Quality Matters*, 14/11/2025, https://qualitymatters.usp.org/ (checked: 25/03/2026).
[49] 'Bad Medicine: How the Pharmaceutical Industry Is Contributing to the Global Antibiotics Crisis', SomeOfUs, 04/08/2015, https://s3.amazonaws.com/ (checked: 25/03/2026).
[50] Brad Wenstrup, 'We must break our dangerous dependency on medication from China', *The Columbus Dispatch*, 29/07/2023, https://www.dispatch.com/ (checked: 25/03/2026).
[51] 'State aid: Commission approves €28.8 million Austrian measure to support the modernisation of Sandoz's penicillin production in Tyrol', European Commission, 27/07/2023, https://ec.europa.eu/ (checked: 25/03/2026); and Andreas Macho, 'The last penicillin factory in the West', *Welt*, 26/06/2023, https://www.welt.de/ (checked: 25/03/2026).

vertically integrated penicillin production base in the US or EU+EFTA, with no comparable upstream-to-downstream penicillin capacity elsewhere.

The scale of production already concentrated at Kundl demonstrates that this remaining capability is not marginal or symbolic, but industrially significant. Approximately one in two boxes of penicillin used in European countries is supplied, whether directly or indirectly, from Sandoz's Kundl plant, reflecting its central position in the continent's penicillin supply.[52] This footprint illustrates that Kundl is not merely a legacy facility, but a functioning, high-volume production anchor which has already absorbed much of the capacity lost elsewhere in Europe. Its continued operation provides concrete evidence that large-scale penicillin manufacturing can be sustained outside the PRC, and that there are existing facilities which can serve as viable platforms for further expansion and diversification away from Chinese-dominated upstream supply.

Yet, the existence of a single remaining American or European production anchor does not offset the broader structure of global dependence. The PRC's dominance extends beyond downstream penicillin and finished formulations to the upstream molecular precursors themselves. About 90% of the antibiotic APIs used in the US final market now originate in the PRC.[53]

The JAMA Health Forum's 2024 analysis of American antibiotic-API imports underscores how exposed the penicillin value chain has become. The study identifies upstream β-lactam intermediates – including 6-APA – as belonging to the highest-risk category of APIs, reflecting the extraordinary concentration of supply.[54] The findings show antibiotic APIs exhibit minimal geographic diversification, with the PRC serving as the dominant globally scaled producer for key intermediates. This leaves the US dependent on a supply chain that lacks redundancy outside a single country.[55]

This chokehold enables Chinese firms to exert global pricing pressure: in 2024-2025, they slashed the price of Penicillin G and related

[52] Andreas Macho, 'The last penicillin factory in the West', *Welt*, 26/06/2023, https://www.welt.de/ (checked: 25/03/2026).
[53] 'Exiger Report Shows Urgent Risk to US Healthcare and Dangerous Dependence on China-Made Pharmaceuticals, with One Third of Antibiotics Traced to Forced Labour', *PR Newswire*, 17/04/2025, https://www.prnewswire.com/ (checked: 25/03/2026).
[54] Mariana P. Socal et al., 'US Antibiotic Importation and Supply Chain Vulnerabilities', *Jama Health Forum*, 6:10 (2025).
[55] Ibid.

intermediates by 40-50%, which threatens to bankrupt newly launched Indian fermentation facilities before they could scale up.[56]

The penicillin case thus echoes every major risk documented in this report: global overdependence on a small group of upstream Chinese firms, downstream bottlenecking in India, and the erosion of American and European production capacity under sustained price suppression. It is a concrete example of how even the most fundamental, high-volume antibiotics now hinge on a fragile, foreign-controlled chain.

Any serious effort to restore American and European antibiotic resilience must begin by re-establishing penicillin-class API production in the US and European nations. Until that is done, the supply of the world's most essential antibiotic remains structurally exposed to potential external disruption.

[56] Ambika Sharma, 'China's price war hits Indian Active Pharmaceutical Ingredients industry', *The Tribune*, 12/09/2025, https://www.tribuneindia.com/ (checked: 25/03/2026).

8.0

Policy recommendations

Antibiotic dependence in the US and Europe is driven not by a loss of technical capability, but by distorted market conditions that favoured concentrated, subsidised foreign supply. Rebuilding resilience requires reshaping these conditions so domestic and allied producers can operate viably at scale. The policy actions presented here target the specific structural weaknesses identified in the antibiotic supply chain: upstream API concentration, downstream formulation dependence, firm-level chokepoints, and misaligned procurement incentives.

8.1 Use targeted tariff-rate quotas to stabilise the market and counter low-cost foreign pricing

Antibiotic APIs and finished products have been subject to persistent foreign suppression, primarily from the PRC's subsidised fermentation complex and India's low-cost formulation platforms. A US-EU Tariff-Rate Quota (TRQ) system would establish a tariff wall against high-risk suppliers, while preserving tariff rates for generic drugs at Most Favoured Nation (MFN) levels (effectively zero) between the US and EU, which both operate under trusted, high-standard regulatory environments. This coordinated TRQ would prevent protracted low-cost competition from destabilising domestic and allied producers, while maintaining adequate supply during the transition. A TRQ designed for antibiotics would:

- Limit exposure to unsafe or unreliable suppliers;
- Distinguish allied production (US and EU) from higher-risk imports;

- Create predictable market space for reshored and allied facilities; and

- Counteract price suppression which has historically contributed to American and European plants going offline.

A TRQ is a calibrated mechanism that establishes US-EU tariff protection, helps correct a distorted global market, and enables long-term investment in American and European antibiotic manufacturing.

8.2 Deploy targeted financial incentives to restart and expand antibiotic manufacturing capacity

Rebuilding meaningful American and European capacity requires lowering the barriers to entry for domestic API fermentation, chemical synthesis, and sterile-injectable formulation. These production stages are capital-intensive, low-margin, and highly sensitive to global price movements. Targeted incentives – including production tax credits, investment credits, accelerated depreciation, or direct-pay mechanisms – can make domestic and allied production economically viable again.

These tools would support the construction and modernisation of fermentation facilities, the reopening or expansion of chemical synthesis lines, new investment in sterile-injectable capacity for hospital-essential drugs, and the scaling of oral-solid antibiotic production for outpatient care. Taken together, this approach would enable the US and EU+EFTA to rebuild the industrial base that once anchored the global antibiotic supply.

8.3 Strengthen oversight and quality assurance for imported antibiotics

As domestic and allied capacity is rebuilt, the US and many European countries may continue relying on imports in the short term – particularly from India, which in turn relies on Chinese APIs. Oversight mechanisms must therefore be strengthened to protect supply reliability and ensure quality. Effective measures include:

- Unannounced, risk-based inspections of foreign plants;

- Independent laboratory testing for vulnerable molecule classes;
- Enforcement actions for repeated compliance failures; and
- Mandatory disclosure of API origin throughout the supply chain.

These safeguards ensure imported antibiotics meet consistent standards, prevent unsafe drugs from displacing high-quality US and European producers, and reduce the risk of quality-driven shortages or recalls.

8.4 Align procurement with supply-security goals

Government procurement is often the decisive force shaping antibiotic supply chain outcomes. When national programmes and major public purchasers prioritise only the lowest-cost supplier, they unintentionally reinforce dependence on concentrated foreign producers and drive domestic firms out of the market. This 'price-only' competition is exactly what has driven American generic prices to unsustainably low levels, contributing to recurring shortages and a shrinking pool of manufacturers.

By contrast, procurement reform can anchor demand for high-quality domestic antibiotics, creating the stable, long-term market signals which manufacturers need to invest, scale capacity, and reopen production lines. When governments commit to buying resilient, trusted supply, industry follows. Procurement reform should:

- Favour suppliers offering reliable domestic or allied production;
- Require API-origin transparency for all contracted antibiotics;
- Support dual-sourcing or multi-region sourcing where feasible;
- Use long-term volume commitments to anchor investment in reshored facilities; and
- Integrate supply-chain risk criteria into government and national security purchasing decisions.

The fastest path to implementation runs through public health procurement. In the US, that means major federal health systems such as the Department of Veterans Affairs and the Department of War. In the United Kingdom (UK) and European nations, it means the Department of Health and Social Care, National Health Service procurement structures, the European Commission's Health Emergency Preparedness and Response-supported joint procurement mechanisms, and national health ministries and hospital purchasing bodies across EU member states. These systems are among the largest purchasers of antibiotics and already sit at the centre of health security and medicines supply resilience. Aligning their procurement policies with supply chain resilience through domestic and like-minded country sourcing preferences, long-term contracts, and stronger API-origin transparency requirements would create immediate, durable demand for British, American, European, and like-minded production.

In the US, this would require targeted procurement reforms, including incorporating pharmaceutical supply security into Department of War purchasing criteria. In the UK and European countries, it should be embedded directly in essential medicines procurement frameworks and anti-shortage planning.

American and European production cannot succeed if procurement systems continue rewarding the very vulnerabilities which policymakers seek to reduce. However, with aligned purchasing power, government procurement becomes an indispensable tool to rebuild domestic capacity and ensure a resilient antibiotic supply.

8.5 Integrate antibiotic supply security into North Atlantic Treaty Organisation (NATO) and allied force readiness planning

Modern military readiness depends not only on weapons systems and logistics, but also on guaranteed access to essential medical countermeasures – including antibiotics. NATO allies cannot maintain credible force readiness if their medical systems rely on foreign-controlled supply chains for frontline antibiotics, particularly penicillin-class and hospital-essential agents. Ensuring uninterrupted availability of these medicines is as vital to operational resilience as secure fuel or munitions supply.

NATO's planning frameworks should therefore include antibiotic supply-chain security as a core readiness requirement: identifying vulnerabilities, prioritising allied production, and preventing dependence on Chinese-controlled API sources that could be disrupted or weaponised during a crisis. A military alliance cannot project strength if its medical backbone depends on another's industrial decisions.

8.6 Build coordinated US-EU+EFTA antibiotic manufacturing and supply networks

As the US and EU+EFTA rely on the same foreign producers, fragmented national strategies cannot deliver the scale or stability needed to rebuild antibiotic manufacturing. A coordinated transatlantic approach would expand the market for high-quality American and European production, reduce duplicative regulatory burdens, and create the predictable demand environment which European and American firms need to invest and compete globally. Such cooperation not only strengthens supply security – it strengthens the position of allied manufacturers. Joint initiatives could include:

- Shared investment in fermentation and synthesis facilities located in allied jurisdictions;
- Harmonised API-origin and quality standards that reward compliant, high-quality producers;
- Coordinated TRQ or tariff structures that support American and European manufacturers against unfairly priced imports;
- Shared surveillance of global antibiotic supply risks to ensure early warning and rapid response; and
- Building trusted-supplier corridors between the US and EU+EFTA to streamline movement of intermediates and finished products.

This partnership-based approach strengthens the collective ability of American and European producers to reduce the risks emanating from concentrated foreign control, expand capacity, and rebuild a diversified, resilient antibiotic supply chain.

9.0

Conclusion

The evidence in this Report shows the antibiotic supply serving the US and Europe is structurally vulnerable, and sustained by a small set of foreign producers whose decisions and continuity directly determine American and European access to essential medicines. This dependence is already causing disruptions across US and European antibiotic supply chains, and domestic producers are being pushed out of the market.

The primary vulnerability stems from a chain of dependencies across the supply system. The US and European countries rely heavily on imports from India and the PRC for finished medicines. Those medicines are produced by a small number of manufacturers, which themselves depend heavily on Chinese APIs – where production is further concentrated among a limited set of firms. At each step, the system becomes more fragile, leaving supply exposed not only to disruption, but also to documented drug quality, safety, and compliance failures among major foreign exporters.

Yet, the US and EU+EFTA are fully capable of restoring control over this supply chain. US and European antibiotic API and FDF manufacturers only need a policy environment which rewards reliability over lowest-cost sourcing. Strategic tools – TRQs, targeted industrial incentives, stronger oversight of foreign production, and procurement reform – can rebuild upstream ingredients, downstream formulation, and a trusted network of allied manufacturers. Preserving and expanding critical existing capacity, particularly the Sandoz Kundl plant, provides the foundation for rebuilding antibiotic API capacity in the US and several European countries.

Antibiotics are essential infrastructure. Re-establishing secure production is a national security imperative, and with coordinated action,

the US and Europe can replace today's precarious dependence with a resilient, sovereign foundation for modern medicine.

10.0

Annexes

Annex 1: Methodological transparency

This report relies on harmonised US-EU+EFTA trade data and firm-level import/export records to quantify antibiotic import dependence, supplier concentration, and upstream/downstream vulnerabilities.

HTS FRAMEWORK

The following HS codes that exclusively capture human-use antibiotics were included:

- **2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90** (bulk APIs);
- **3004.10, 3004.20** (FDF antibiotics).

DATA SOURCES

The analysis integrates:

- **US Census (USA Trade Online)** for US imports of API and FDF products;
- **Eurostat (EU and EFTA)** for parallel EU antibiotic import flows;
- **Bill of lading and customs shipment record data** for company-level concentration patterns, including Indian export data and Chinese API exporters; and

- **Indian Directorate General of Commercial Intelligence.**

SCOPE LIMITATIONS

Country-level import statistics necessarily capture all goods reported under each HTS code, which means they include both human and veterinary antibiotics. However, veterinary-only companies and veterinary-specific production lines were excluded from company-level concentration data to prevent distortion of human-medicine vulnerability analysis. As veterinary and human antibiotics can share the same HTS code, country-level aggregation may slightly overstate total market volumes and differ from company-level aggregates.

TIMEFRAME AND COMPARABILITY

US and EU+EFTA data was analysed for January 2024 through to December 2025.

Annex 2: Glossary of technical terms

- **Active Pharmaceutical Ingredient (API):** The bulk chemical or fermented substance that gives a drug its therapeutic effect; the essential upstream input for antibiotic manufacturing.
- **Finished-Dosage Form (FDF):** A fully formulated, patient-ready medicine (e.g., tablets, capsules, or sterile injectables). FDF production cannot occur without APIs.
- **β-lactam antibiotics:** A major antibiotic class – including penicillins and cephalosporins – produced through fermentation and chemical synthesis and widely used in hospitals.
- **Fermentation capacity:** Industrial-scale bioproduction used to manufacture many antibiotic APIs. Globally concentrated in the PRC.
- **Intermediate (chemical intermediate):** A precursor substance required to synthesise APIs. The PRC dominates global production of antibiotic intermediates.

- **MFN/PNTR status:** Most Favoured Nation (MFN), known in the US as Permanent Normal Trade Relations (PNTR), grants low tariff rates. The PRC's PNTR access after 2001 accelerated its rise in antibiotic API production.

- **Tariff-Rate Quota (TRQ):** A trade tool that allows a limited volume of imports at a low tariff while imposing high tariffs on imports above that threshold, used to stabilise domestic production.

Annex 3: Figures and tables

TABLE 1: ANTIBIOTIC HTS CODES AND MOLECULE CLASSES

HTS code	Description	Stage	Antibiotic classes included	Representative molecules
2941.10	Penicillins and derivatives (bulk pharmaceuticals)	API	Penicillins (β-lactams)	Amoxicillin, Ampicillin, Penicillin G/V; inputs for Amoxicillin-Clavulanate and Ampicillin-Sulbactam
2941.20	Streptomycins and derivatives (bulk pharmaceuticals)	API	Aminoglycosides (streptomycin class)	Streptomycin, Dihydrostreptomycin
2941.30	Tetracyclines and derivatives (bulk pharmaceuticals)	API	Tetracyclines	Tetracycline, Doxycycline
2941.40	Chloramphenicol and derivatives (bulk pharmaceuticals)	API	Amphenicols	Chloramphenicol, Thiamphenicol, Florfenicol
2941.50	Cephalosporins and derivatives (bulk pharmaceuticals)	API	Cephalosporins (β-lactams)	Ceftriaxone, Cefazolin, Cefuroxime, Cefotaxime, Ceftazidime
2941.90	Other antibiotics (bulk pharmaceuticals)	API	Macrolides, Carbapenems, Glycopeptides, Lincosamides, others	Azithromycin, Clarithromycin, Vancomycin, Clindamycin, Meropenem, Imipenem; components used in combination antibiotics
3004.10	Medicaments containing penicillins or derivatives, in measured doses	FDF	Penicillins and combinations	Amoxicillin tablets/ capsules, Amoxicillin-Clavulanate, Ampicillin products

3004.20	Medicaments containing other antibiotics, in measured doses	FDF	Cephalosporins, Carbapenems, Macrolides, Glycopeptides, Tetracyclines, others	Ceftriaxone vials, Cefazolin vials, Meropenem vials, Vancomycin vials, Azithromycin tablets, Doxycycline, Piperacillin-Tazobactam

TABLE 2: US ANTIBIOTIC IMPORTS BY COUNTRY (API AND FDF)[57]

Country	Antibiotic API imports (MT)	API import share	Country	FDF imports (MT)	Final drug import share
PRC	29,610	86.9%	India	11,903	27.1%
Bulgaria	1,670	4.9%	PRC	4,809	11.0%
Israel	797	2.3%	Italy	4,794	10.9%
Spain	722	2.1%	Jordan	4,433	10.1%
India	281	0.8%	Switzerland	4,395	10.0%
Italy	213	0.6%	Canada	3,498	8.0%
Canada	162	0.5%	Austria	2,144	4.9%
Mexico	157	0.5%	Portugal	1,944	4.4%
Croatia	125	0.4%	Ireland	1,131	2.6%
Brazil	117	0.3%	Spain	1,043	2.4%
Rest of world	205	0.6%	Rest of world	3,785	8.6%

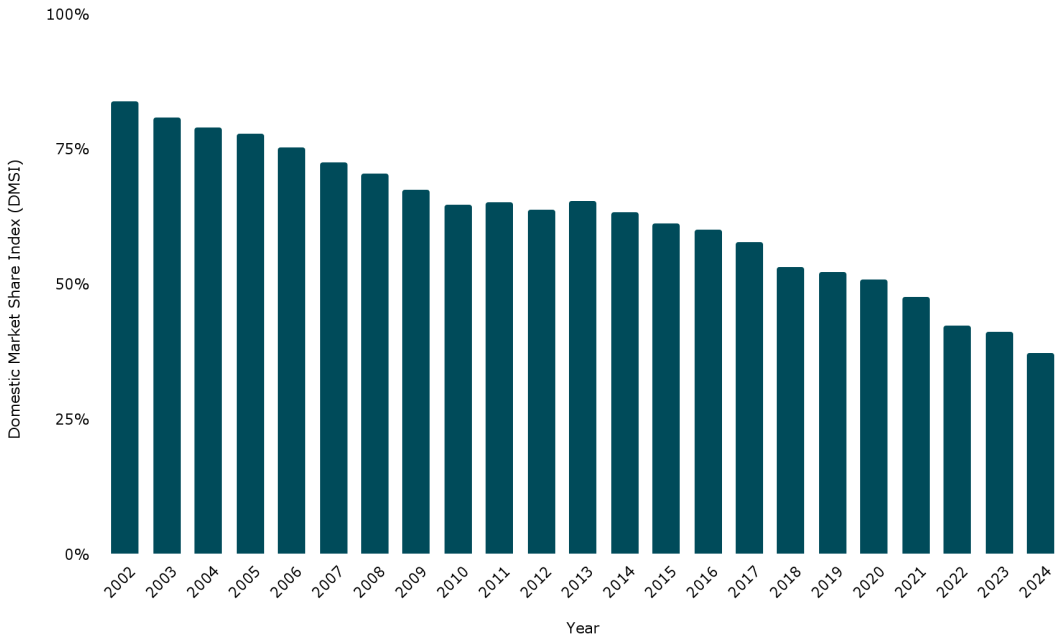
TABLE 3: EU+EFTA ANTIBIOTIC IMPORTS BY COUNTRY (API AND FDF)[58]

Country	Antibiotic API imports (MT)	API import share	Country	FDF imports (MT)	Final drug import share
PRC	23,667	67.4%	India	7,367	45.5%

[57] Data retrieved from the US Census Bureau. HTS codes used for FDF antibiotics: 3004.10 and 3004.20. HTS codes used for antibiotic APIs: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.
[58] Data retrieved from the Eurostat. HTS codes used for FDF antibiotics: 3004.10 and 3004.20. HTS codes used for antibiotic APIs: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

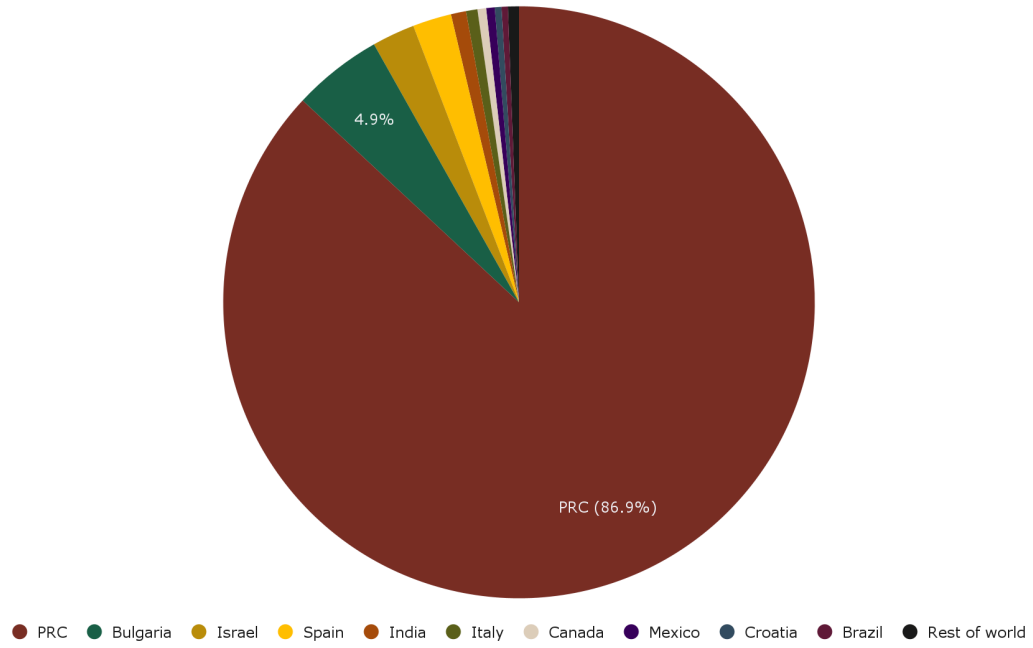
US	5,673	16.2%	PRC	5,110	31.6%
India	2,470	7.0%	US	1,152	7.1%
Singapore	2,397	6.8%	Turkey	468	2.9%
South Korea	321	0.9%	North Macedonia	456	2.8%
Japan	202	0.6%	New Zealand	366	2.3%
Rest of world	366	1.0%	Rest of world	1,272	7.9%

FIGURE 1: DOMESTIC US PHARMACEUTICAL MARKET SHARE[59]



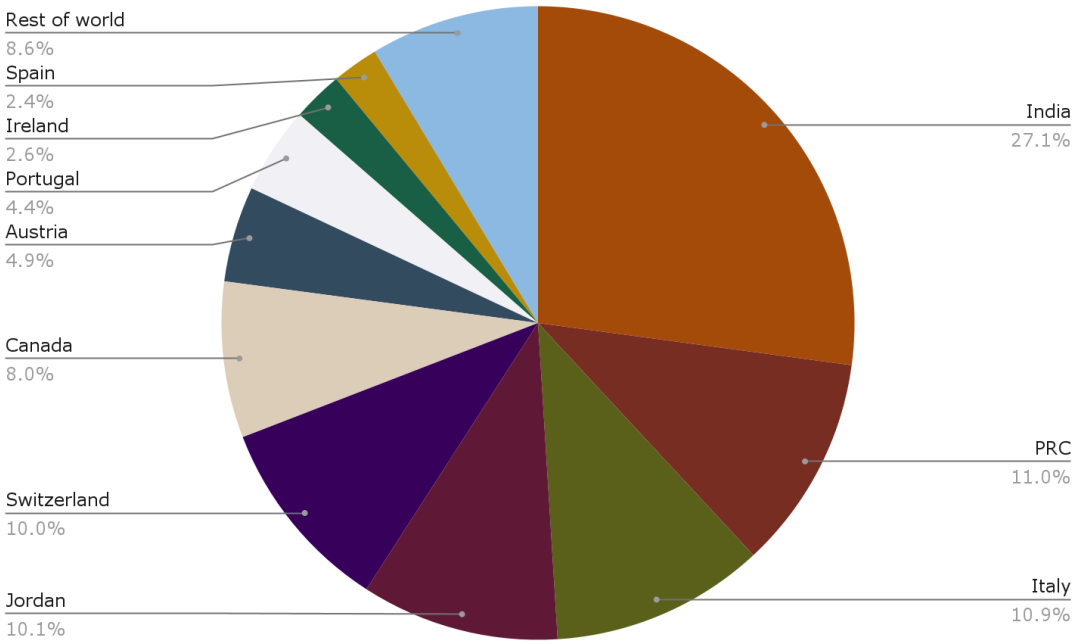
[59] DMSI is calculated as: =100*(1-(imports/(output+imports-exports)). Data retrieved from the Bureau of Labour Statistics (Sectoral output) and the US Census Bureau (import/export value). Date range: 2002-2024.

FIGURE 2: US IMPORT OF ANTIBIOTIC APIS BY COUNTRY[60]



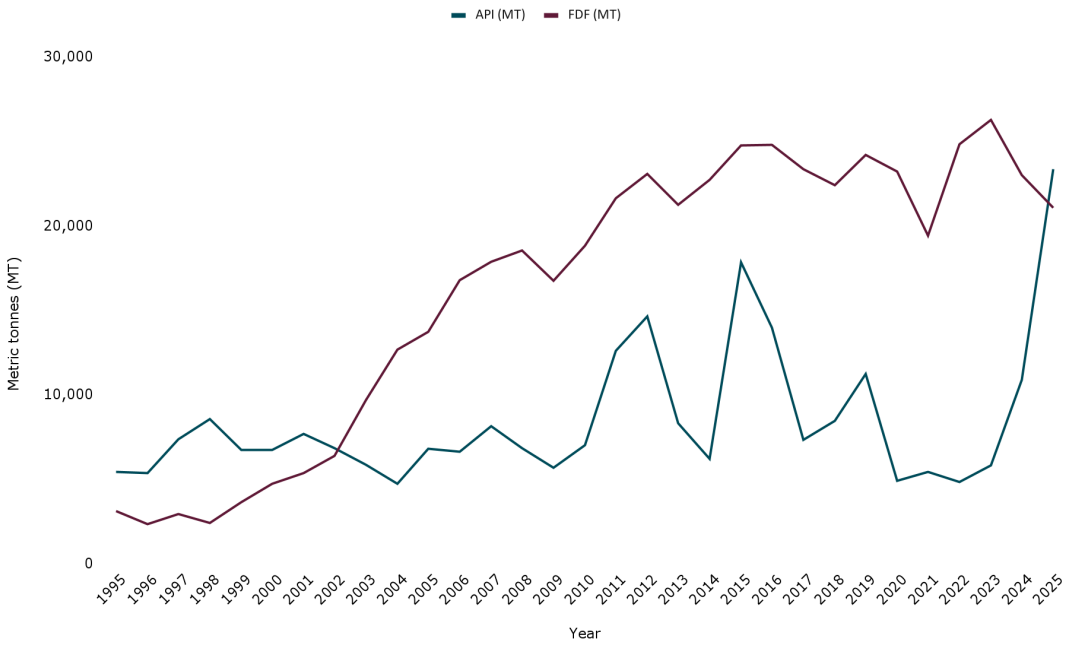
[60] Data retrieved from the US Census Bureau. HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

FIGURE 3: US IMPORT OF ANTIBIOTIC FDFS BY COUNTRY[61]



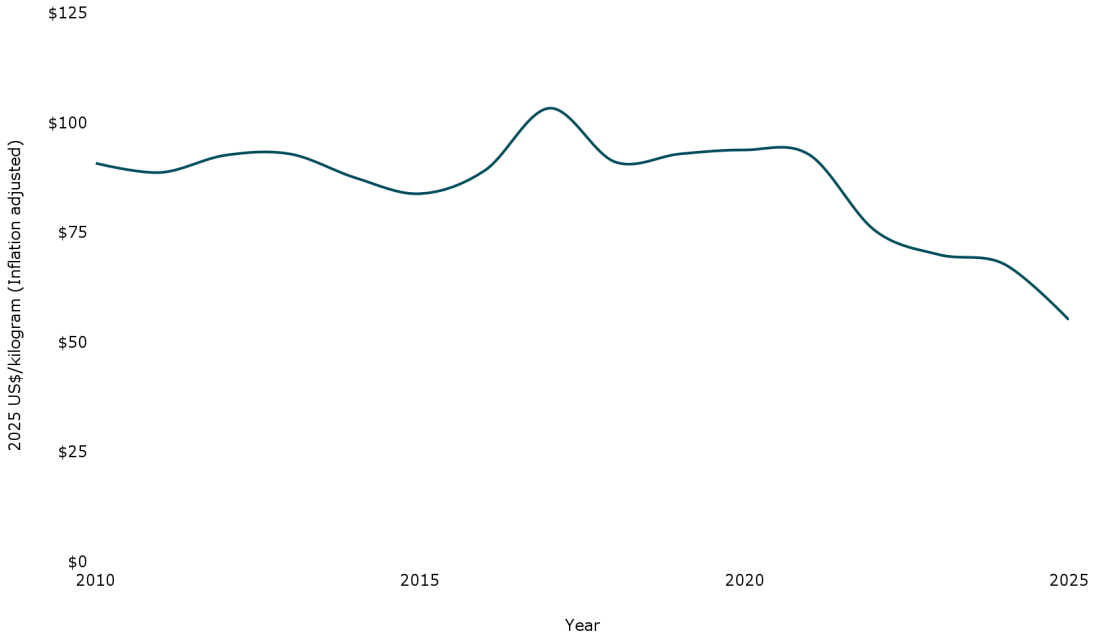
[61] Data retrieved from Eurostat. HTS codes used: 3004.10 and 3004.20. Date range: January 2024–December 2025.

FIGURE 4: US ANTIBIOTIC API AND FDF IMPORTS OVER TIME[62]



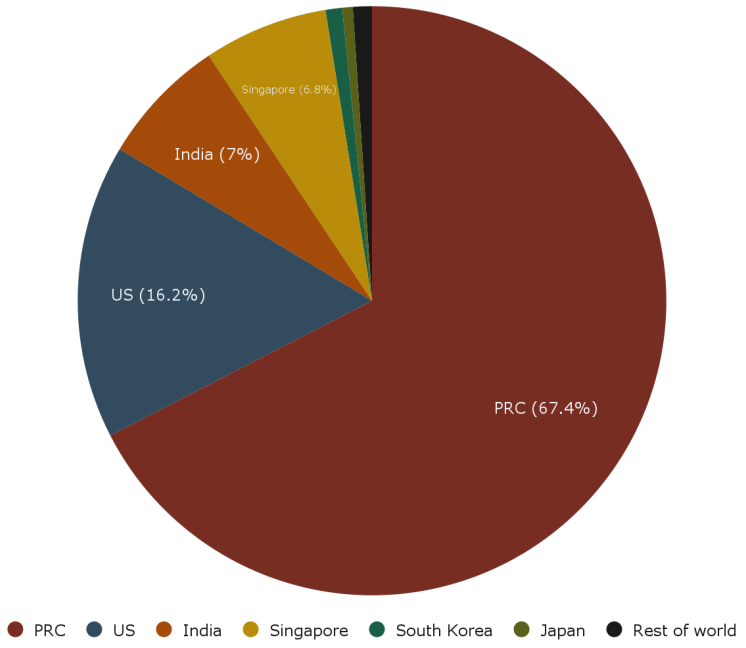
[62] Data retrieved from the US Census Bureau. Antibiotic FDF HTS codes used: 3004.10 and 3004.20. Antibiotic API HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: 1995-2025.

FIGURE 5: US ANTIBIOTIC IMPORT PRICES OVER TIME[63]



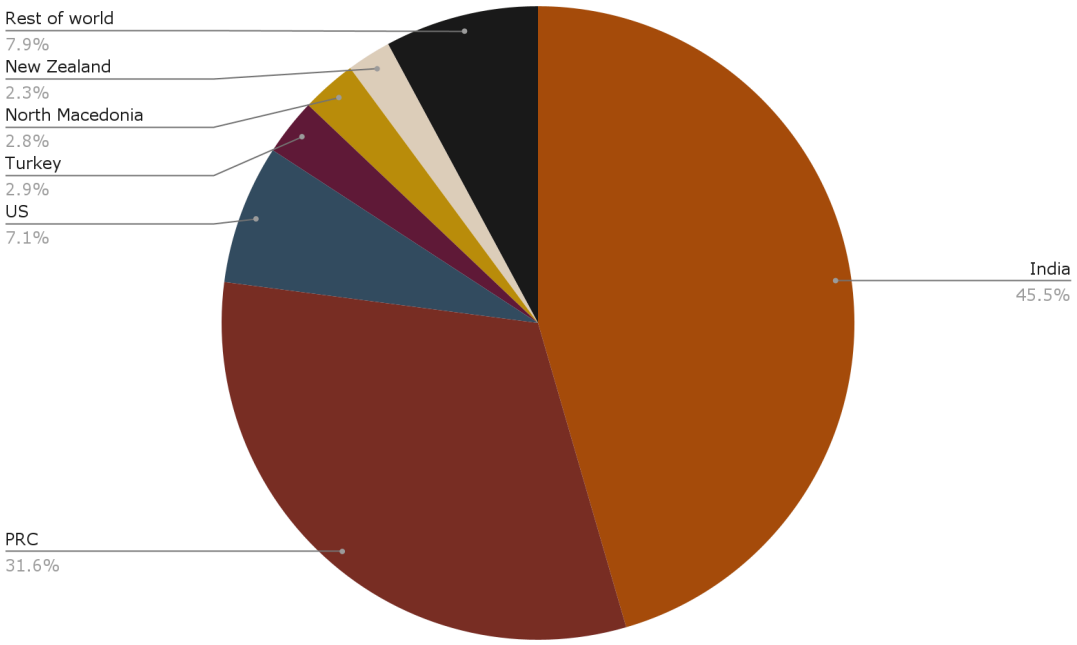
[63] Data retrieved from the US Census Bureau. HTS codes used: 3004.10 and 3004.20. Date range: 2010-2025.

FIGURE 6: EU+EFTA IMPORT OF ANTIBIOTIC APIS BY COUNTRY[64]



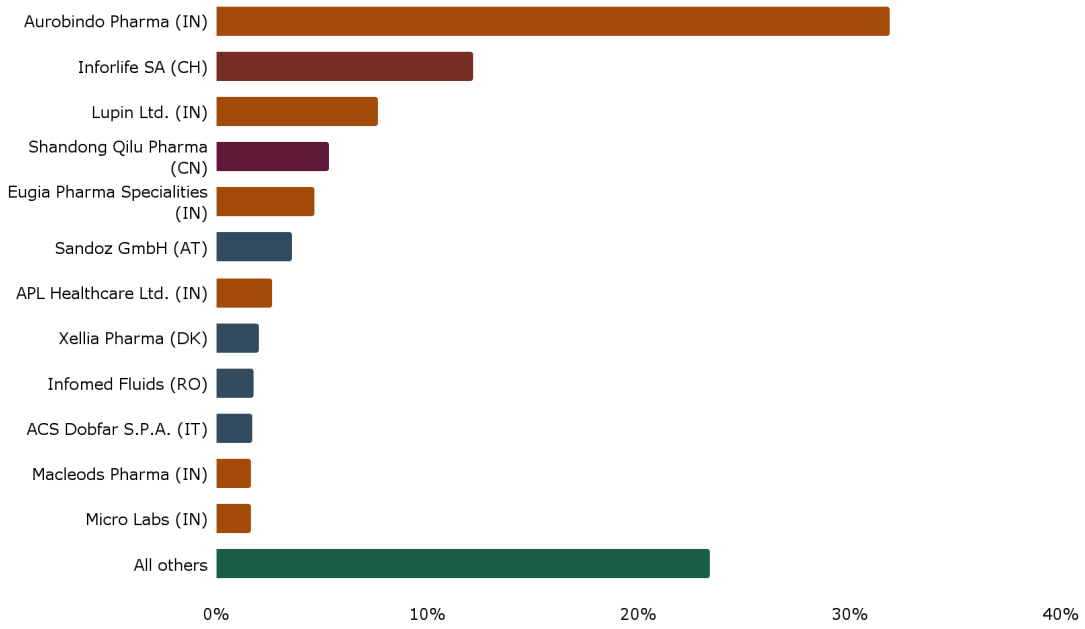
[64] Data retrieved from Eurostat. HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

FIGURE 7: EU+EFTA IMPORT OF ANTIBIOTIC FDFS BY COUNTRY[65]



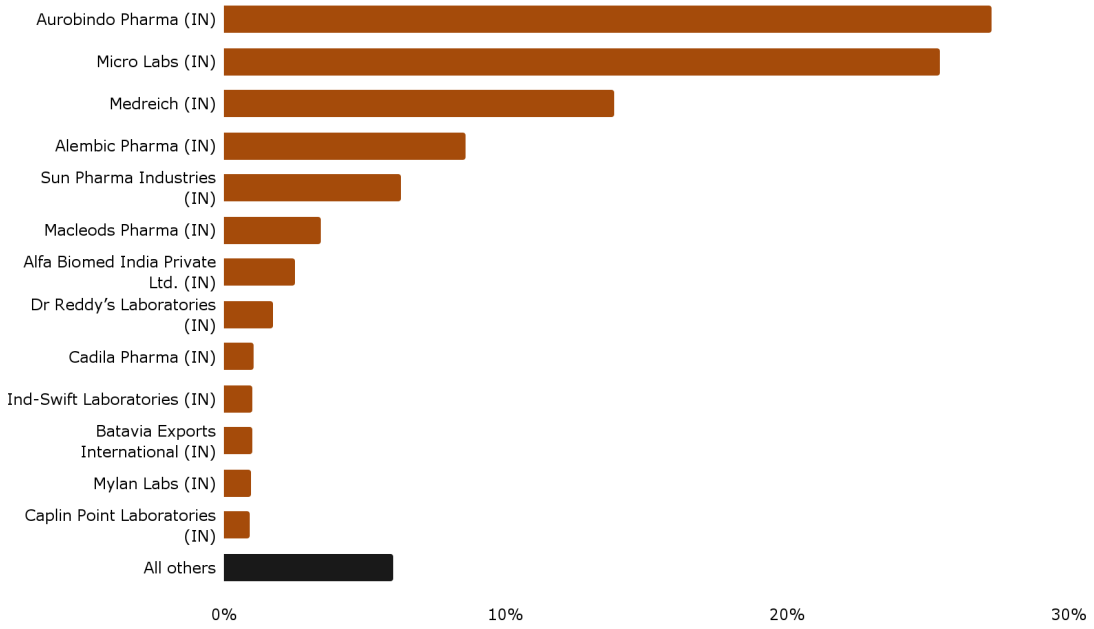
[65] Data retrieved from Eurostat. HTS codes used: 3004.10 and 3004.20. Date range: January 2024-December 2025.

FIGURE 8: US IMPORT OF ANTIBIOTIC FDFS BY COMPANY[66]



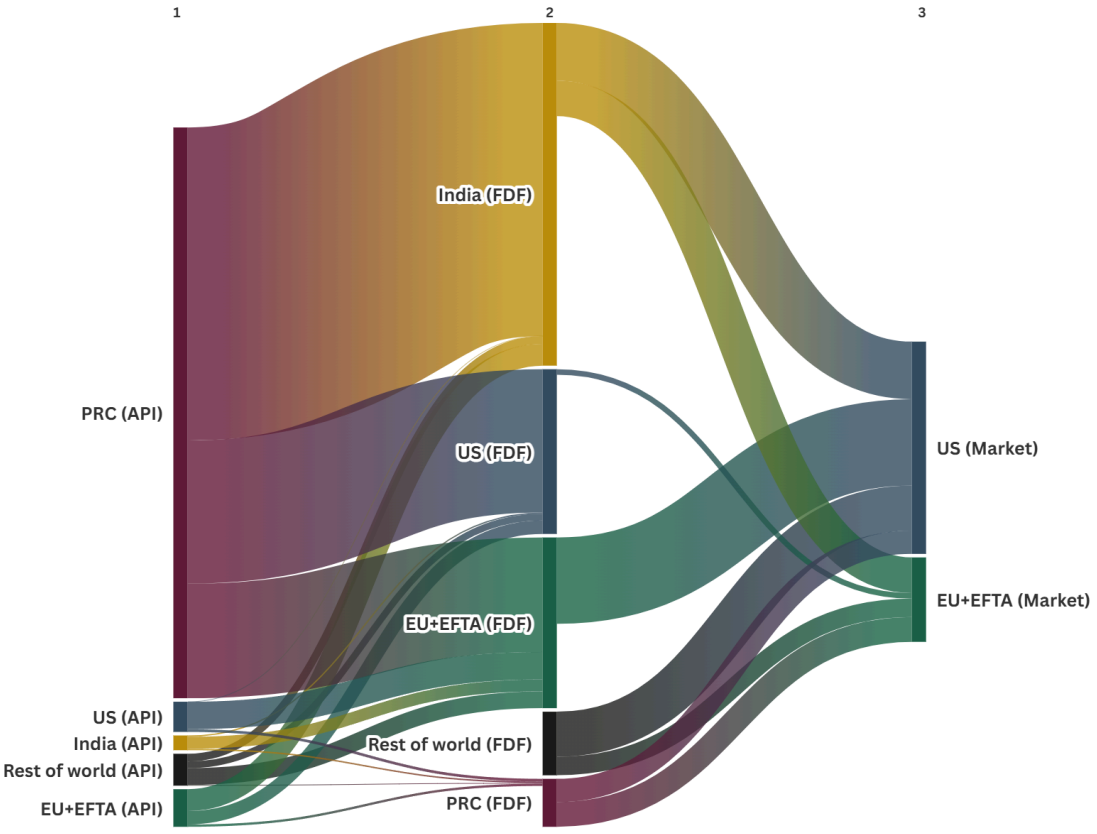
[66] Data retrieved from US Bill of Lading Data. HTS codes used: 3004.10 and 3004.20. Date range: January 2024–December 2025.

FIGURE 9: EU+EFTA IMPORT OF ANTIBIOTIC FDFS BY COMPANY[67]



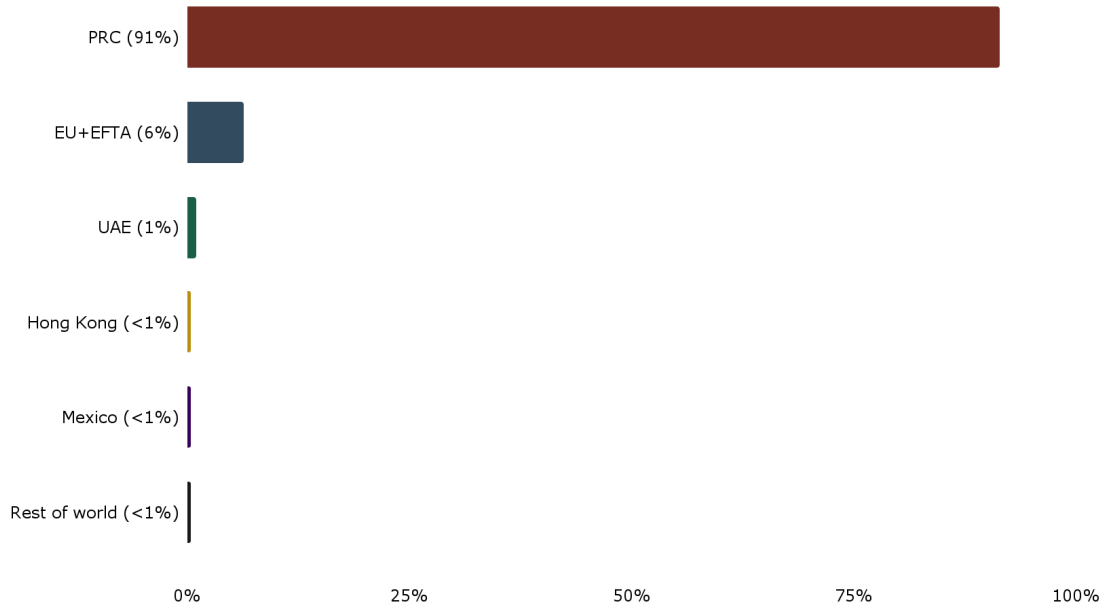
[67] Data retrieved from US bill of lading data. HTS codes used: 3004.10 and 3004.20. Date range: January 2024–December 2025.

FIGURE 10: THE GLOBAL PRC-INDIA CHOKEPOINT[68]



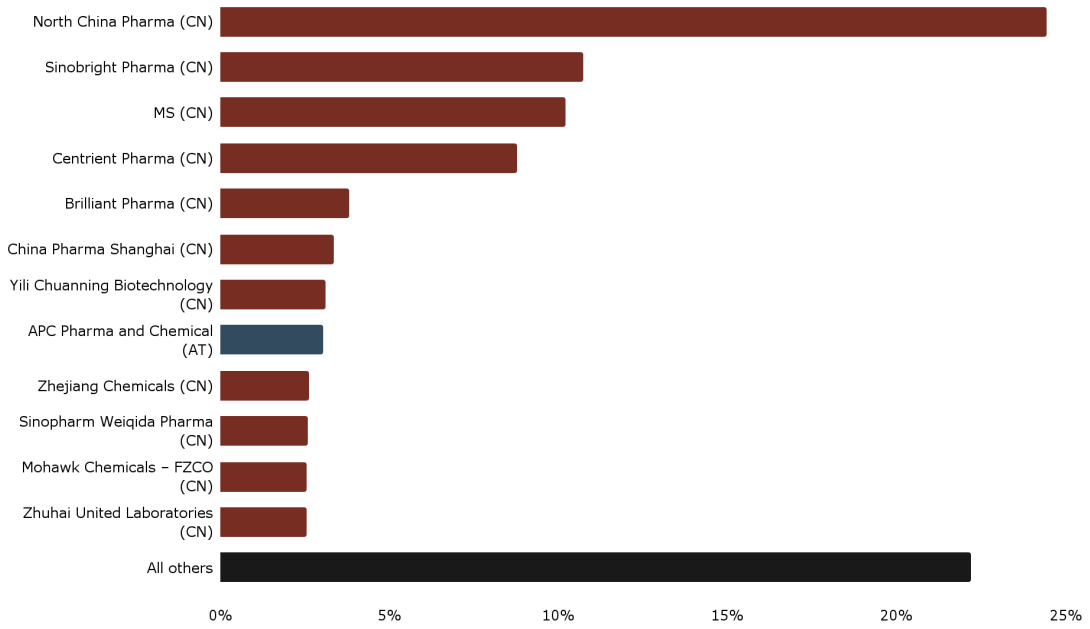
[68] Data retrieved from US Census Bureau, Eurostat, and US bill of lading data. HTS codes used for FDF antibiotics: 3004.10 and 3004.20. HTS codes used for antibiotic APIs: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

FIGURE 11: INDIAN IMPORT OF ANTIBIOTIC APIS BY COUNTRY[69]



[69] Data retrieved from Indian Directorate General of Commercial Intelligence and Statistics. HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

FIGURE 12: INDIAN IMPORT OF ANTIBIOTIC APIS BY COMPANY[70]



[70] Data retrieved from India import bill of lading data. HTS codes used: 2941.10, 2941.20, 2941.30, 2941.40, 2941.50, and 2941.90. Date range: January 2024–December 2025.

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The Council on Geostrategy is an independent non-profit organisation situated in the heart of Westminster. We focus on an international environment increasingly defined by geopolitical competition and the environmental crisis.

Founded in 2021 as a Company Limited by Guarantee, we aim to shape British strategic ambition in a way that empowers the United Kingdom to succeed and prosper in the 21st century. We also look beyond Britain's national borders, with a broad focus on free and open nations in the Euro-Atlantic, the Indo-Pacific, and Polar regions.

Our vision is a united, strong, and green Britain, which works with other free and open nations to compete geopolitically and lead the world in overcoming the environmental crisis – for a more secure and prosperous future.

Notes

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