

# In Shortage

## Understanding Global Antibiotic Supply Chains Through Pharmaceutical Trade Fairs

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**Abstract:** Many countries have reported supply shortages of antibiotics in recent years. The COVID-19 pandemic has sparked interesting discussions among government officials, public health practitioners, and scholars on how to maintain the security of the global pharmaceutical supply chain and how to decrease dependency on countries such as China. This article discusses the experiences and initial findings of tracing global pharmaceutical supply chains through pharmaceutical trade fairs and events at multiple locations. I argue that the reasons behind antibiotic supply shortages are multifold. Although the geographical concentration of the production of key raw materials and Active Pharmaceutical Ingredients (APIs) in China is considered the main reason for the unstable and disrupted supply chain, it is also important to recognize that the same forces that have driven Western pharmaceutical companies to shift some of their less profitable manufacturing lines to China are also challenging Chinese pharmaceutical companies to adjust and reorient their strategies. As such, antibiotics are facing a conundrum in which the governance of excessive use is complicated by a shortage problem that hampers access to essential drugs.

**Keywords:** antibiotics; global supply chain; Active Pharmaceutical Ingredients; antimicrobial resistance; pharmaceutical trade fair; China

**Résumé:** Ces dernières années, de nombreux pays ont signalé des pénuries d'antibiotiques. La pandémie de COVID-19 a généré d'intéressantes discussions entre les responsables gouvernementaux, les praticiens de la santé publique et les universitaires sur la manière de maintenir la sécurité de la chaîne d'approvisionnement pharmaceutique mondiale et de réduire la dépendance à l'égard de pays tels que la Chine. Cet article présente les expériences et les conclusions initiales de la traçabilité des chaînes d'approvisionnement pharmaceutiques mondiales par le biais de foires et d'évènements

pharmaceutiques organisés dans divers endroits. Je soutiens que les raisons des pénuries d'antibiotiques sont multiples. Bien que la concentration géographique de la production de matières premières clés et d'ingrédients pharmaceutiques actifs (IPA) en Chine soit considérée comme la principale raison de l'instabilité et de la perturbation de la chaîne d'approvisionnement, il est également important de reconnaître que les mêmes forces qui ont poussé les sociétés pharmaceutiques occidentales à déplacer certaines de leurs lignes de fabrication moins rentables vers la Chine poussent également les sociétés pharmaceutiques chinoises à ajuster et à réorienter leurs stratégies. Les antibiotiques sont ainsi confrontés à une énigme dans laquelle la gouvernance de l'utilisation excessive est compliquée par un problème de pénurie qui entrave l'accès aux médicaments essentiels.

**Mots-clés :** antibiotiques ; chaîne d'approvisionnement mondiale ; ingrédients pharmaceutiques actifs ; résistance aux antimicrobiens ; salon pharmaceutique ; Chine

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## Introduction

One morning in April 2022, I woke up with a persistent eye infection. After consulting a doctor and obtaining a prescription for a small bottle of chloramphenicol eyedrops, I was told by a pharmacist that only three pharmacies in Oslo, the capital of Norway, had the medicine in stock and one of them was running low. Desperate for a quick relief from the redness, itchiness, and discomfort in both of my eyes, I hopped on a bus to fetch the medicine myself. It took me almost two hours and as soon as I arrived home, the thought dawned on me that I had just travelled across the city to procure medicine that contains one of the oldest, cheapest, and most essential antibiotics<sup>1</sup>. Chloramphenicol eyedrops, often sold in small transparent plastic bottles with a dark green cap, cost cents during my childhood in China. I remember it so vividly because I loved squeezing the soft bottles when I was a child and the liquid bursting from them tasted bitter. Growing up in China, we always had chloramphenicol eyedrops somewhere in a drawer in the apartment. Now, as a researcher who has spent the past two years seeking to understand the complex and fractured global supply chain of antibiotics, the difficulty of finding chloramphenicol eyedrops in Oslo was extremely intriguing. I felt that I experienced first-hand the antibiotic shortages I had read about elsewhere.

However, it is unclear whether the inconvenience I went through to obtain antibiotic eyedrops would be considered an experience of antibiotic shortage, as

the definition of “shortage” itself is multivalent. For instance, for pharmaceutical suppliers and manufacturers working within the supply chains, when the delivery of a certain product or order is delayed, the incidence might already be considered a “shortage.” For drug regulators, “drug shortage” means “a period of time when the demand or projected demand for the drug exceeds the supply of the drug” (FDA 2019, 4). In the case of antibiotics, not all shortages directly affect patients, as doctors may try to find alternative antibiotics to treat infections if the desired kind is out of stock.

However, using an alternative antibiotic in such situations might have unpredictable long-term effects on Antimicrobial Resistance (AMR). Although antibiotic shortage is certainly not a new phenomenon and is a complicated issue with various contributing factors, the entanglement and fragility of the global pharmaceutical supply chain is one of the main reasons for shortages and the problem has been greatly exposed by the disruptions caused by the COVID-19 pandemic. In spite of increasing reports of antibiotic shortages globally, the scale of the disruption remains unclear for the following reasons: first, the global pharmaceutical supply chain is extremely intricate yet lacks transparency. The production of antibiotics involves manufacturers of raw materials, Active Pharmaceutical Ingredients (APIs) and intermediates, excipients as well as formulators, and very often the financial and material inputs are from various stakeholders from multiple countries. Secondly, there is currently no globally coordinated system to monitor antibiotic shortages.

Taking “shortage” as a concept broadly defined, scholars in Canada, for example, have noticed the alarming trend of antibiotic shortages since the 2000s and that some hospitals have experienced a complete shortage of gentamicin (Valiquette and Laupland, 2015). In 2022, Canada reported a three-month shortage of injectable amoxicillin—a semisynthetic penicillin derivative and one of the most essential and widely used antibiotics in the world. Shortages of amoxicillin were also widely reported in the US recently. A US Pharmacopoeia (USP) report concluded that antimicrobial medicines are “at increased risk for shortage” (USP, 2022). Scholars, healthcare professionals, and government regulators believe that the dependency on a single source of Active Pharmaceutical Ingredients (APIs) and other essential raw materials manufactured in Asia is a major risk to supply chain security (see, for example, Modisakeng et al. 2020; Shafiq et al. 2021; Van Beusekom, 2022). The USP report concludes that the geographical concentration of manufacturing facilities of pharmaceutical ingredients in China and India is a key reason for the shortage.

Such geographical concentration is the result of the restructuring of the global pharmaceutical industry in the past three decades, particularly a result of Western pharmaceutical manufacturers outsourcing to the East to further cut costs (Zhang and Bjerke 2023; see also Peterson 2014; Sunder Rajan 2012). The relatively low price of widely used essential antibiotics does not necessarily guarantee a stable supply chain, as the low value of such antibiotics drives pharmaceutical manufacturers away from such medicines in search of more innovative drugs with higher profit margins.

The geographical concentration of antibiotic API manufacturing often points to production in Asia, particularly in China. In the extremely intricate and fractured global pharmaceutical supply chain today, a drug ready for patient use may contain multiple ingredients and value-adding procedures from different stakeholders across national borders. As such, to deepen our understandings of pharmaceuticals and their supply shortages on a global scale, it is necessary to consider pharmaceuticals as global commodities and to examine the global drug supply chain as an object of anthropological inquiry. Doing so allows us to develop a deeper understanding of pharmaceuticals by “breaking them open” (Hardon and Sanabria 2017, 118) and to analyze how key pharmaceutical ingredients can produce choke points in global antibiotic supply chains. In search for productive ways of doing research on this topic, particularly on China’s role in the global antibiotic supply chain, I started following pharmaceutical trade fairs and events both online and in-person in November 2021, as these events are often open to an audience from outside the pharmaceutical industry, albeit with a registration fee. As medical historian Scott Podolsky (2015) argues, since the beginning of the “antibiotic era,” the marketing efforts of the pharmaceutical industry are intertwined with demand and supply issues and the notion of “the rational use of antibiotics.” Pharmaceutical trade fairs and events as a space for pharmaceutical marketing can therefore provide valuable insights for anthropologists interested in the global pharmaceutical industry and the antibiotic supply chains. As such, this paper is an effort to compile some preliminary insights from my still-nascent anthropological inquiry into the global pharmaceutical industry.

## **Pharmaceutical Trade Fairs: A Glimpse into the Global Pharmaceutical Industry**

Doing research on the global pharmaceutical industry using traditional anthropological methods such as participant observation can be difficult.

As Monahan and Fisher (2015) argue, pharmaceutical companies are often compelled to seal themselves off completely from outside researchers due to imperatives to guard trade secrets and protect brand images (2015, 710). Pharmaceutical trade fairs and events are both inviting and guarded at the same time. On the one hand, pharmaceutical companies are eager to present themselves, introduce products, and foster business opportunities; on the other hand, they are guarded against competitors and extremely wary of inquiries from business outsiders. As such, although pharmaceutical trade fairs and events are often open to participants from outside the industry, subject to a scaled registration fee that provides different levels of access, prospective attendees must provide detailed information about their professional background and areas of interest during the registration process. Furthermore, although every attendee can browse the products and services different pharmaceutical companies provide, it is almost impossible to find crucial information such as the price of a certain product without a verified identity or serious business intent. For example, every attendee can send inquiries to a company; however, without filling out a detailed intent form that must include the information needed to verify the attendee's position in the pharmaceutical industry, there will be no response to the inquiries.

Nevertheless, based on my previous research experience of attending trade fairs (Zhang 2018) and taking inspiration from anthropologists who conducted multi-sited "event ethnography" (Baird 2017; Büscher 2014; Davies et al. 2015; Duffy 2014), I still decided to focus on several pharmaceutical trade fairs and events from 2021 onwards, both online and in-person, as a gateway to gain insights into the guarded industry. "Multi-sited event ethnography" allows researchers like me to apply ethnographic methods to short-term events "to understand a transnational industry involving distinct practices and knowledges that are hard to access" (Baird 2017, 189). For instance, Theodore Baird attends commercial fairs for the border security industry and considers them significant sites where major "power-brokers" are present and where "practices and knowledges can be actively observed and theorized" (Baird 2017, 188). In a similar fashion, by following the "happenings" at various pharmaceutical trade fairs and events, I see such events as important sites of knowledge production and condensed relationships where "professionals perform for peers, convey information, tell stories, and embody their professional identities" (Baird 2017, 189; Monahan and Fisher 2015, 714). These events have provided me with an introduction to the terminology, acronyms, trends, opinions, and debates of the global pharmaceutical industry world.

I participated in several pharmaceutical trade fairs and events with the goal of understanding current pharmaceutical marketing strategies for antibiotics and their pharmaceutical ingredients, as well as the role of Chinese manufacturers in the global pharmaceutical industry today. Pharmaceutical trade fairs and events are in many ways similar to academic conferences, including keynote talks, panel discussions, networking opportunities, exhibitions, and posters. Attendees participate in such events to keep themselves updated on the latest trends in the industry, share ideas, explore business opportunities, and make deals. In the bustling exhibition hall of a pharmaceutical conference featuring drug safety at a four-star hotel in downtown Boston, I was glancing through various booths set up by pharmaceutical and technology companies promoting their unique products and services. Among dozens of talks and panel sessions, I searched in vain for anything related to antibiotics, and how the complicated global antibiotic supply chains might affect drug quality and safety. My anthropological interests in the social perspectives of global antibiotics seemed at odds with hot commercial topics such as innovations in biomedical engineering, digitizing supply chains, and computer algorithms developed to solve drug safety problems. Regardless, I was greeted by enthusiastic salespeople proffering brochures, candies, pens, stickers, and badges. One panel organizer lamented: “This conference used to be more about academic discussions about drug safety issues, but now it has just become a place where people try to sell things.” After the panel discussion, I asked a speaker who has extensive experience working with Chinese pharmaceutical companies about how the quality of the pharmaceutical ingredients used in antibiotic production is monitored. The speaker answered candidly that oversights over the quality of antibiotic ingredients used in drug formulation are mostly up to the good faith that the manufacturers follow Good Manufacturing Practices (GMP). Indeed, pharmaceutical ingredients as pharmacological objects receive less attention than formulated drugs. As Desai and Zaman (2015) argue, although there are a number of technologies available for field-based drug quality screening, none can reliably quantify Active Pharmaceutical Ingredient (API) content or kinetic release from a dissolving tablet at the point of care.

In addition to in-person pharmaceutical events, I also followed several pharmaceutical trade fairs online organized by the CPhI (Convention on Pharmaceutical Ingredients), and the P-MEC, (Pharmaceutical Machinery and Equipment Convention). According to their websites, CPhI and P-MEC “unite more than 100,000 pharmaceutical professionals through exhibitions,

conferences, and online communities to network, identify business opportunities and expand the global market, and host events in Europe, China, Korea, India, Japan, South-East Asia, Middle East and North America.” At the CPhI and P-MEC trade fairs, in addition to in-person opportunities, suppliers and buyers were offered opportunities to connect online by “digital showroom, webinar events, online matchmaking, video meetings, VR shows, etcetera.” I paid special attention to the digital exhibitions and attended several webinars based on my interest in antibiotics and antibiotic ingredients. By doing so, I gained much insight into the position of traditional antibiotics in today’s global pharmaceutical industry. To understand more about China’s role in the global antibiotic supply chains, I particularly focused on CPhI and P-MEC events based in Shanghai and the online opportunities they offer. On the front webpage of the Shanghai trade fairs, six categories of pharmaceutical products and services are featured, including, “APIs, Excipients, Finished Dosage, Natural Extracts, Biopharma, and Animal Health/Feed.” Under each category, nearly two dozen companies are featured by their names and logos, among which the majority are Chinese pharmaceutical manufacturers. A detailed list of exhibitors can also be downloaded from the website. Suppliers of various kinds of antibiotics and pharmaceutical ingredients can be found by searching keywords in the platform database. For example, a search of “benzylpenicillin” revealed many major Chinese producers, including North China Pharmaceutical, one of China’s biggest and oldest producers of penicillin. The company profile identifies the company as “one of the world-leading antibiotic producers first established in 1953 as one of the key development projects during China’s First Five-Year Plan.” As such, although a very guarded industry, due to the pharmaceutical companies’ needs for marketing, it is possible to find out some of the main stakeholders involved in antibiotic manufacturing.

On the CPhI and P-MEC online catalogues, crucial antibiotic ingredients that could potentially create choke points in global supply chains, such as Penicillin-G Potassium and Ceftriaxone Sterile, are displayed in pictures of barrels or images of chemical structures. These key pharmaceutical ingredients are produced predominantly in China because their price is so low that few Western pharmaceutical companies are still producing them (Zhang and Bjerke 2023). Contrary to the “golden age” of antibiotics when pharmaceutical companies put great efforts into marketing antibiotics, the marketing efforts for traditional antibiotics and their ingredients is now near-nonexistent. In the 1950s, drug companies had good reasons for aggressive advertising

strategies for antibiotics such as Aureomycin, Terramycin, and tetracycline. As medical historian Scott Podolsky (2015, 20–22) vividly describes, American drug company Lederle supported its launch of a tetracycline product (marketed as Achromycin) with a “blanketing advertising campaign” and a generous budget for exhibits at medical meetings, including sales promotion devices such as “pens, tongue depressors, and brushes.” However, gone are the days when antibiotics were “blockbuster drugs” heavily invested in and promoted by pharmaceutical companies. Traditional antibiotics are “mature products,” among which many have never been patented, or whose patents were long expired. As such, compared to innovative drugs based on intense research and development efforts, antibiotic production is not so profitable for pharmaceutical companies. The low profit margin of antibiotics and antibiotic ingredients is the fundamental reason behind the geographical concentration of their production in Asian countries such as China. In this sense, the “antibiotic era” is over not only because of the increasing call to curtail the excessive use of antibiotics to prevent a dystopian future of drug resistance. It is also over due to the lack of interest in new antibiotic development and the low profitability for incentivizing pharmaceutical companies to produce essential antibiotics widely used in human and animal health.

### **China and the Global Pharmaceutical Supply Chain**

Participants in the pharmaceutical trade fairs hosted in China include manufacturers and regulators from all over the world. Although the trade fair platforms try to foster an inviting and attractive atmosphere for business opportunities and global connections, many attendees and speakers at the event directly speak about the disruption and disjunction of the global pharmaceutical industry and the global supply chains. In various webinars and panel discussions, the dependency on Chinese-manufactured pharmaceutical ingredients and the disruption caused by such dependency is widely acknowledged and frequently discussed. For instance, an American pharmaceutical analyst paints China as a place that offers unprecedented opportunities for Western pharmaceutical companies to expand their market, while warning of the high risks due to geopolitical challenges such as Sino-American trade wars and the mandatory decoupling of strategic supply chains. European pharmaceutical logistics professionals argue that one of the severe consequences of the dependency on China is that many pharmaceutical manufacturers elsewhere have been experiencing shortages of API supplies in the past two years as the pandemic situation greatly challenged international



transportation. The speaker estimates that an air charter from Asia to Europe cost approximately 300,000 to 400,000 US dollars pre-pandemic; however, in 2021 the industry was demanding 1.3 million US dollars for a charter out of Asia into Europe. While some European pharmaceutical manufacturers welcome collaboration with Chinese suppliers in biotech pharmaceutical products, others lament that it is impossible to compete with China in antibiotic ingredient production due to China's unique cost advantage. Indian pharmaceutical professionals see China as both the fiercest competitor and an indispensable collaborator. Empowered by pharmaceutical nationalism and the "self-reliance" movement, Indian pharmaceutical manufacturers decry Chinese competition in antibiotic API production. Although India is also a big manufacturer of antibiotic ingredients, it is estimated that about 70 to 80 percent of the Indian needs for ingredients come from China, and that some ingredients to produce penicillins and cephalosporins are almost completely manufactured in China (Zhang and Bjerke, 2023).

As such, the global pharmaceutical supply chain has been one of the most heatedly discussed topics at trade fairs and the dependency on China has been at the centre of these relatively open and frank discussions among representatives from pharmaceutical industries all over the world. In a follow-up interview with an experienced antibiotic fermentation expert and pharmacist from the US, he told me that in the late 1970s, when China was looking to improve antibiotic production by receiving technology transfers from the West, major global antibiotic producers were in the US, Europe, Japan, and South Korea. However, since 2004, there have been no more large-scale antibiotic fermentation facilities in North America or Europe, as it became prohibitively expensive to produce antibiotics in the West due to environmental costs. Since the 1990s, antibiotic production in the West has been gradually shut down and biochemical engineers gradually retired. As such, the West now relies on imports of antibiotic ingredients. Despite being a strong believer in international trade and an enthusiastic promoter of international technology transfer to China for almost three decades, he questions if Western countries have outsourced their manufacturing to China too much. He remains skeptical that new antibiotics will be made commercially outside of China for years to come. He further laments:

Now, as a pharmacist, we are faced with many shortages, particularly semi-synthesized penicillins and cephalosporins. This is because the production in China is reduced due to the pandemic. The West has lost

the ability—both in terms of industrial facilities and bioengineering capability—to produce antibiotics. Can it be undone? I doubt it, I really doubt it. (Conversation with Dr. Nelson Kardos, 2023).

The fact that antibiotic manufacturing has shifted to China testifies to the changes in where “value” is located in the global pharmaceutical industry. Social scientists studying pharmaceuticals argue that “value” in today’s global pharmaceutical industry mainly lies in the cost of discovering, testing, and marketing pharmaceutical products (Ecks 2008, 178) and does not always reflect how essential the drugs are. The corporate strategy of the pharmaceutical industry has shifted accordingly, resulting in the “complete separation of value from considerations of patient needs or good health” (Sunder Rajan 2012, 326). The pharmaceutical trade fairs never directly mark the price of a specific product. As such, it is impossible to have a real sense of how much each barrel of antibiotic ingredients actually costs without sending an official inquiry to the manufacturers with proof of an authentic business interest. However, it is possible to understand, based on the lack of marketing efforts put in these products, that antibiotic ingredients are not products that render high value and profitability. Instead of “marketing” the products of antibiotic ingredients at these trade fairs, it is more appropriate to say that they are simply being “displayed” to demonstrate their “availability” and the manufacturers’ “capability” to supply such products. Recognizing the low value and profitability of antibiotic ingredients, many pharmaceutical manufacturers are embracing a “whole-industry-chain” approach that encompasses all stages in the pharmaceutical supply chain, from raw material and ingredient manufacturing and final formulation, in order to reduce risk and to maximize added value and profit.

Without a doubt, the pharmaceutical trade fairs have demonstrated China’s role in the global pharmaceutical landscape today as a main supply source. According to a post-show report published by the CPHI-China organizers: The top ten countries to visit the show were India, Bangladesh, Pakistan, Algeria, Egypt, Indonesia, the United States, Russia, the Philippines, and Brazil. However, China’s role in the global pharmaceutical landscape has changed, not only in response to, but also in accordance with, the neoliberal trends in the international pharmaceutical market. In other words, China has become a major supplier of low-value antibiotic ingredients, not only as a passive recipient of the results of the strategic restructuring initiated by the Western pharmaceutical industry, but also because China is part of the global pharmaceutical restructuring and Chinese manufacturers themselves also

chase high added-value pharmaceutical products while sidelining traditional pharmaceutical products such as antibiotic ingredients. The direct result of this is that China is also experiencing antibiotic shortages. For example, in 2020, the Chinese government released a list of drugs in shortage in their country, including benzylpenicillin. Together with this list, another list of drugs closely monitored for shortage includes antimicrobial medicines such as Pingyangmycin (a Chinese “Indigenous” antibiotic), Mitomycin, and Bleomycin. According to a list released in 2022, five manufacturers of benzylpenicillin are closely monitored to ensure domestic supply (National Health Commission of the People’s Republic of China, 2020, 2022). As such, it is also important to understand that China is in fact a part of the global pharmaceutical industry and experiences the same forces that have driven low-value pharmaceutical ingredient production to China in the first place, rather than hastily defining it simply as a “problem” or “risk” inherent to the global pharmaceutical supply chain.

## **Conclusion**

The governance of antibiotics is hence faced with a conundrum. On the one hand, global public health experts and social scientists are fighting against Antimicrobial Resistance (AMR)—a consequence of mis- and over-use; on the other hand, global supply chain shortages are posing a direct threat to people’s access to essential drugs. It is a widely acknowledged fact that the modern pharmaceutical industry has failed to make low-cost drugs accessible to those who need them (Petryna and Kleinman 2006, 3) and various drug access campaigns led by international organizations such as Doctors Without Borders / Médecins Sans Frontières (MSF) fight to lower the price of such drugs protected by intellectual property rights. However, shortages of essential antibiotics expose a different kind of drug access problem. Although many essential antibiotics, many of which are never patented, or whose patents have long expired, are relatively cheap, access to such drugs is also periodically jeopardized by supply shortages and uneven distribution. Thus, antibiotics are faced with two seemingly contradictory challenges: on the one hand, people are using antibiotics too much as a result of “therapeutic excess” (Halliburton 2017; see also Sunder Rajan 2012), overmedication, and self-medication, and at the same time, there is also an antibiotic supply shortage. However, both excess and shortage challenges can contribute to antimicrobial resistance. As such, a more comprehensive solution for AMR challenges needs to focus both on the consumption of antibiotics and the manufacturing and circulation of them.

Pharmaceutical trade fairs and events provide a starting place for researchers from outside of the pharmaceutical industry to gain valuable insights. Focusing on such events hosted in China is also extremely helpful in developing a deeper understanding of China's role in the global pharmaceutical industry today. On the one hand, Chinese manufacturers use the platforms to showcase their products, and Chinese regulators take these opportunities to introduce relevant regulations and laws for foreign investors to enter the Chinese market. On the other hand, Indian, European, and American manufacturers and regulators search for opportunities to work with Chinese suppliers. With a goal of fostering connections and collaborations, the discussions on the disruptions of supply chains during these events are surprisingly informative and vibrant. It is important to explore pharmaceuticals from the angle of international trade fairs, as it reminds us that pharmaceuticals are essentially global commodities subject to neoliberal capitalist forces. While Petryna and Kleinman (2006, 4) remind us that the anthropological dimensions of new pharmaceuticals and innovative work should be closely examined in relation to the "moral and ethical realities of emergent global drug markets", it is equally important to bring anthropological insights into the declining global drug markets such as traditional antibiotics. Although an analysis of antibiotic supply shortages often points to the geographical concentration of production in China, it is important to recognize that the forces of global neoliberal capitalism have created the current pattern of the geographical concentration of pharmaceutical manufacturing and the systematic abandonment of traditional antibiotics by Western pharmaceutical companies. Secondly, it is equally important to recognize that China is part of the global pharmaceutical industry instead of the antithesis or anomaly of it. The same forces that have driven Western pharmaceutical companies to shift some of their less profitable manufacturing lines to China are challenging Chinese pharmaceutical companies to adjust and reorient their strategies as well. The lack of passion dedicated to traditional antibiotics in current pharmaceutical trade fairs and events is a telltale sign of a "value gap" in global pharmaceutical markets, where cheap yet essential drugs have been gradually abandoned in the speculative restructuring of the global pharmaceutical industry. As such, the antibiotic shortage problem needs to be addressed through a critical analysis of the global neoliberal capitalist forces that have been shaping strategies and orientations of both Western and Asian stakeholders simultaneously.

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## Notes

1 Chloramphenicol is listed on the WHO Essential Drug List. Furthermore, antibiotics are classified into three categories – “access, watch, and reserve,” to assist in the development of tools for antibiotic stewardship to reduce antimicrobial resistance. Chloramphenicol is categorized in the “access group antibiotics,” which indicates that it is an essential medicine that should be widely available, affordable, and quality assured. Other types of antibiotics that belong to the same “access” group include amoxicillin, benzylpenicillin, gentamicin, cefalexin, etc. Some antibiotics in the “watch” and “reserve” groups are also listed in the Essential Drug List. (WHO, 2021)

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