

Pfizer Inc

Large R&D-based pharmaceutical company

Stock exchange: NYSE • Ticker: PFE • HQ: New York, USA • Employees: 92,400

PERFORMANCE

Pfizer performs well in its evaluated Research Areas, and is one of the leaders when compared to other large R&D-based pharmaceutical companies in scope.

R&D: Performs well. Pipeline consists of eight projects for medicines and vaccines for priority pathogens. Reports commitment to access and stewardship planning and is active in intellectual capital sharing.

Responsible Manufacturing: Performs well. Reports comprehensive environmental risk-management strategy for own sites and suppliers; risk assessments based on discharge limits have been completed at own sites and are ongoing at suppliers' sites.

Appropriate Access: Performs well. Files its on- and off-patent products for registration in access countries. Strategies to ensure continuous supply include forecasting and data sharing to prevent shortages.

Stewardship: Performs strongly. It publicly shares raw data of its surveillance programme. Its educational programmes have comprehensive conflict of interest (COI) mitigation. Partly decouples sales incentives from volumes and adapts packaging to improve adherence to treatment.

SALES AND OPERATIONS

Therapeutic areas: Cardiovascular diseases; Diabetes; Immunology; Infectious diseases; Oncology; Rare diseases

Business segments: Biopharmaceuticals; Upjohn; Hospira; Consumer Healthcare

Product categories: Biosimilars; Consumer healthcare (JV with GSK); Generic medicines; Innovative medicines (including ViiV Healthcare, JV with GSK and Shionogi); Vaccines

Manufacturing & supply: Pfizer supplies its antibacterial medicines, antibacterial vaccines and antifungal medicines across 182 countries, 85 of which are low- and middle-income countries.

M&A since 2018: None in the antibacterial and/or antifungal sectors

PIPELINE for diseases in scope

Pipeline size: 8 projects for priority pathogens* (4 antibacterial medicines; 4 antibacterial vaccines)

Development stages: 6 clinical projects, including a Phase III vaccine candidate for *C. difficile* infections and a Phase I clinical vaccine candidate for the prevention of group B *Streptococcus* infections, which are a leading cause of neonatal sepsis and meningitis globally, and 1 pre-clinical project

Novelty: No novel clinical-stage medicine projects

Regulatory approvals: 1, for ceftaroline fosamil (Zinforo®) for treating complicated skin and soft tissue infections and community-acquired bacterial pneumonia in paediatric populations in June 2019 by the EMA

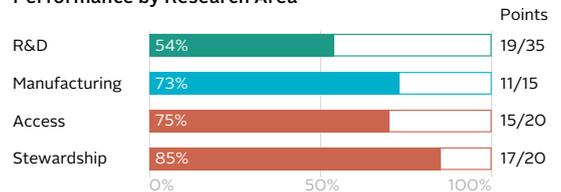
Access plans: 5 of 5 late-stage R&D projects with project-specific access plans, most commonly equitable pricing strategies, including strategies developed in partnership with Gavi, the Vaccine Alliance

Stewardship plans: 2 of 2 late-stage R&D medicine projects are covered by portfolio-wide stewardship plans, including initiatives for surveillance (ATLAS) and research and education on AMR (via unrestricted grants)

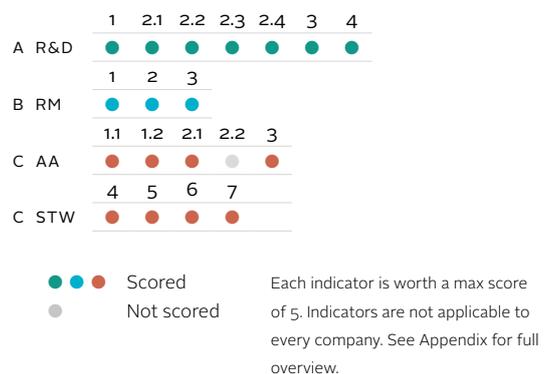
Performance in the Benchmark



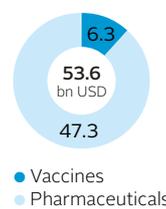
Performance by Research Area



How Pfizer was evaluated



Revenues by product (2018)



Revenues by region (2018)



PORTFOLIO for diseases in scope

Largest portfolio: At least 190 products (106 unique INNs): 157 antibacterial medicines; 5 antibacterial vaccines; 28 antifungal medicines

Essential medicines: 39% (74) products are on the 2019 WHO EML

AWaRe medicines:** 29 Access group; 14 Watch group; 3 Reserve group

Anti-TB medicines:** 13 (incl. 1 Watch group, 3 Reserve group)

Pipeline for priority pathogens



Products on the market



The number of products is based on data from public sources, IQVIA, and data submitted by the company. It may not account for Pfizer's entire portfolio.

* Bacteria and fungi that have been identified as priority R&D targets for limiting AMR, by either the WHO and/or the Centers for Disease Control and Prevention (CDC). See Appendix V.

** Listed on the 2019 WHO EML (Section 6).

OPPORTUNITIES FOR PFIZER

Remain engaged in R&D for antibacterial medicines and vaccines. Pfizer is one of the few large research-based pharmaceutical companies still active in R&D for antibacterial medicines and vaccines. It is critical for the development and commercialisation of new products that large research-based pharmaceutical companies remain engaged in this space, either through acquisitions and in-licensing or through discovery.

Follow up to public commitments and increase public disclosure on environmental risk management. Following up on its commitments as a signatory to the Industry Roadmap for Progress on Combating AMR, Pfizer can work with stakeholders to develop a practical mechanism to publicly disclose (1) a list of its suppliers and waste-treatment plants and (2) the results of environmental audits and the levels of antibacterial discharge from its own sites and the sites of its suppliers.

Expand registration and ensure adequate supply of its antibacterial and antifungal medicines in access countries. Pfizer can file for registration and ensure adequate supply of its antifungal medicines tavaborole (Kerydin®) and isavuconazole (Cresemba®) and the forgotten antibiotics on the 2019 WHO EML within its current portfolio (benzylpenicillin, chloramphenicol, ertapenem, nitrofurantoin and spectinomycin) in more access countries.

Scale up UK pilot and fully decouple sales incentives from sales volumes. In order to mitigate the risk of inappropriate use of its antibacterial and/or antifungal medicines, Pfizer can build on its current pilot in the UK and fully decouple incentives for sales agents from sales volumes.

Continue to publicly share raw data from its surveillance programme ATLAS. Pfizer shared publicly (with the AMR Register) the raw data collected for its long-term, multinational surveillance programme ATLAS. Pfizer can continue to share the raw data collected for this programme, and its other surveillance programmes, in the coming years.

CHANGES SINCE 2018

- Collaborated with Zipline, and Zipline's other partners, to support the Government of Ghana to deliver essential medicine products, such as vaccines, to rural Ghana, by means of medical drones.
- Provided over 7 million doses of fluconazole (Diflucan®) treatments to government and non-governmental organisations (NGOs) in access countries over the last two years (2017-2019), under the Diflucan® Partnership Program.
- Publicly announced in September 2019 the implementation of the full decoupling of incentives for sales agents from antibacterial sales volumes in the UK.
- Newly shares raw data from its ATLAS surveillance programme on an open-access data platform, and expanded the programme to cover more priority pathogens.
- Reduced the price at which it supplies its pneumococcal conjugate vaccine (PCV) to Gavi-eligible countries (and to settings designated as humanitarian emergencies by the WHO) to its lowest global price USD 2.90 per dose for multi-dose vials.

PERFORMANCE BY RESEARCH AREA

A RESEARCH & DEVELOPMENT Evaluated: medicine & vaccine pipelines for priority* bacteria & fungi

A.1 No information on relevant R&D investments

Pfizer does not report publicly, or to the Benchmark, how much it invested in R&D for antibacterial or antifungal medicines or vaccines in 2017 and 2018.

A.2.1 Mid-sized pipeline compared to peers

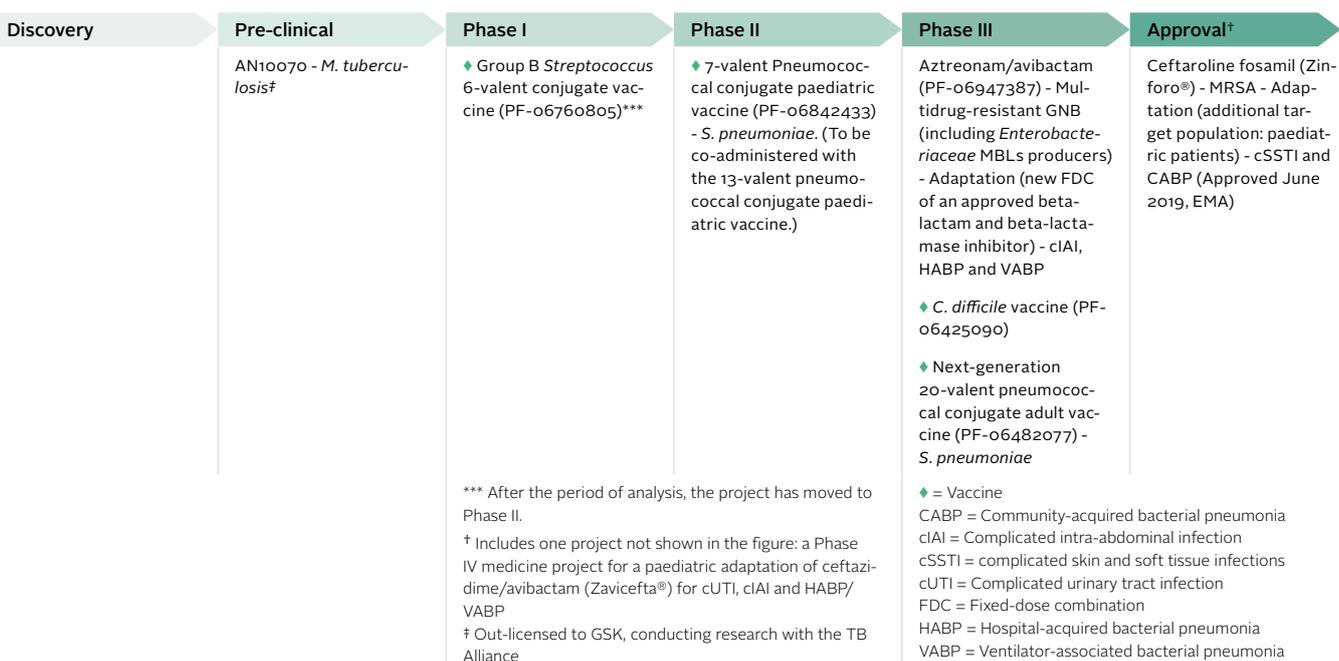
Among the large research-based pharmaceutical companies evaluated, this pipeline is mid-sized. Pfizer reports eight projects targeting priority pathogens in its pipeline, all of which target bacterial pathogens, including four vaccine and four medicine projects. The majority of these candidates (6) are in clinical development.

Of the remaining projects, one is in pre-clinical development, and one, ceftazidime/avibactam (Zavicefta®), is in Phase IV.

A.2.2 No clinical-stage novel projects

Pfizer's clinical-stage medicine pipeline for priority pathogens consists entirely of adapted R&D projects. It does not currently include candidates

Pipeline targeting priority pathogens: 8[†] As at 16 October 2019



that are considered novel using WHO's criteria published in the 2018 WHO Update of antibacterial agents in clinical development. However, Pfizer is developing a fixed-dose combination of aztreonam/avibactam for complicated intra-abdominal infections and hospital-acquired and ventilator-associated pneumonia, which may offer clinical benefits.

A.2.3 Four vaccines in the pipeline

Pfizer reports four new vaccine projects, making this the second largest pipeline for new vaccines among companies evaluated. These four new projects are in clinical development and target *C. difficile*, group B *Streptococcus* and *S. pneumoniae*.

A.2.4 Three candidates targeting critical and/or urgent priorities

Pfizer's clinical pipeline includes a vaccine candidate in Phase III (PF-06425090) that targets *C. difficile*; a combination medicine candi-

date in Phase III (avibactam/aztreonam) that targets carbapenem-resistant *Enterobacteriaceae* (CRE) (including MBLs producers); and a paediatric adaptation of its medicine ceftazidime/avibactam (Zavicefta®) in Phase IV, which targets Carbapenem-resistant *P. aeruginosa* (CRPA) and CRE. These pathogens are among those that have been identified as being critical and/or urgent R&D priorities for limiting AMR, by WHO and/or the US Centers for Disease Control and Prevention (CDC).

A.3 Two intellectual capital sharing initiatives

Pfizer has two intellectual capital sharing initiatives. The first initiative involves the sharing of compounds with WIPO Re:search consortium, and the second initiative provides research brochures and other clinical study information to PATH for the repurposing of medicines to treat diarrhoeal diseases. In addition, Pfizer reports that its surveillance programme ATLAS can be

used by researchers to track and study resistance patterns.

A.4 Access plans for all 5 projects and stewardship plans for 2 of 2 medicine projects

Pfizer has five late-stage R&D medicine and vaccine projects targeting priority pathogens. It reports intending to seek equitable pricing and supply chain commitments in place for three vaccines in clinical development, via a partnership with Gavi, the Vaccine Alliance and PATH. It is unknown whether equitable pricing plans also apply to its avibactam/aztreonam and ceftazidime/tazobactam (Zinforo®) combinations. Pfizer reports that its two late-stage R&D medicine projects are covered by portfolio-wide stewardship plans, including initiatives for surveillance (ATLAS) and research and education on AMR (via unrestricted grants).

B RESPONSIBLE MANUFACTURING Evaluated: antibacterials manufacturing (APIs and drug products)

B.1 Comprehensive environmental risk-management for own sites and suppliers

Pfizer reports a comprehensive strategy to minimise the environmental impact of wastewaters and solid waste from antibacterial manufacturing at its sites, with an aim to limit AMR. This includes risk-based audits, with a minimum frequency of three years. The company reports setting discharge limits for all antibacterials manufactured at its sites, based on PNECs to limit AMR (or more stringent PNECs), as published by the AMR Industry Alliance. Pfizer reports using a mass balance approach to assess whether discharge levels meet these limits, complemented by direct sampling and analytical testing, where needed.

Pfizer expects third-party suppliers of antibacterial APIs and drug products to follow the same standards, including limits. Suppliers are set to be audited at least every five years or less (as determined by AMR-related risk). The audit protocol includes verification of how antibacterials are quantified in suppliers' wastewaters. Pfizer

expects external private waste-treatment plants to comply with its environmental standards. The plants are set to be audited on the basis of risk, but are not required to set antibacterial discharge limits.

B.2 Publicly discloses some information on environmental risk management

Pfizer publishes some components of its environmental risk-management strategy. Further, it is a member of the AMR Industry Alliance, which publishes a list of recommended antibacterial discharge targets. The underlying methodology was summarised in an open-access journal article co-authored by Alliance members including Pfizer. Pfizer does not publish: (1) the results of environmental audits, whether conducted at its own sites, the sites of suppliers or external private waste-treatment plants; (2) a list of these suppliers and waste-treatment plants; or (3) the levels of antibacterial discharge from its own sites.

B.3 Has system to maintain production quality for own and suppliers' sites; regulator requested official corrective action

Pfizer reports having a system to maintain high-quality antibacterial production, consistent with international GMP standards. This includes internal audits and tracking of corrective actions. In 2018, FDA drug quality inspections identified non-conformities with cGMP at two Hospira sites (a Pfizer subsidiary), resulting in an official request for corrective action. At least one of these sites produces antibacterials. The company reports that the sites have taken corrective actions. The company reports requiring suppliers to abide by regulatory and company quality standards, as specified, e.g., in quality agreements. It reports conducting risk-based audits of suppliers and having the same expectations as for its sites in terms of corrective action implementation.

C APPROPRIATE ACCESS & STEWARDSHIP – ACCESS

Evaluated: access activities relating to antibacterial & antifungal medicines & vaccines in 102 access countries§

C.1.1 Filed to register four of 12 relevant on-patent products|| in 10+ access countries

Pfizer is a leading company when it comes to filing relevant on-patented products for registration. It files its relevant products in 11.7 access countries on average. Overall, 30% of its relevant on-patent products are filed in 10+ access countries. Its most widely filed on-patent product is the vaccine Pevnar 13®, for the prevention of pneumococcal disease, filed in 62 access countries. Pevnar 13® is followed by the antifungal

medicine Ecalta and vaccine Nimenrix, each filed by Pfizer for registration in 23 access countries.

C.1.2 Filed to register relevant off-patent products in 14.6 access countries on average

Pfizer is one of the leaders when it comes to filing relevant off-patent products for registration. It has filed 89% of its relevant products (8/9 antibacterial and antifungal medicines) for registration in access countries. Its most widely filed product in this analysis is the antifungal flu-

conazole (Diflucan®), used for diseases including those caused by *Candida* spp. Pfizer has filed its version of this product in 62 access countries. Fluconazole is followed by the antibacterials tigecycline (Tygacil®) and azithromycin (Zithromax®), filed by Pfizer for registration in 33 and 15 access countries respectively.

C.2.1 Takes socioeconomic factors into account when setting prices

When setting prices for on-patent products, Pfizer considers socioeconomic factors, namely

§ 102 low- and middle-income countries where better access to medicine is most needed. See Appendix VI.

|| See Appendix VII.

local economic conditions, average income of the population and GDP growth. Six products were included for analysis: 1 antibacterial medicine; 2 antifungal medicines; 3 vaccines. For its antibacterial medicine, ceftazidime/avibactam (Zavicefta®), it has a pricing strategy based on the factors above, which it applies in 30 access countries. For its vaccines, Pfizer has a six-tiered pricing policy based on GNI per capita, as well as other factors such as the vaccine's predicted impact on health, potential contribution to economic growth, and governments' commitment to birth-cohort coverage. Its policy includes tiers for countries supported by pooled-procurement agencies, such as Gavi the Vaccines Alliance. Pfizer does not disclose how it plans to increase the affordability of these products over the next five years.

C.2.2 Pricing strategies for off-patent products
Companies were not scored for this indicator as the available data was insufficient for a comparative analysis. Pfizer does report that it applies differential pricing policies in emerging markets. Pfizer states that it donates its antibacterial azithromycin (Zithromax®) to 39 countries, through the WHO-run SAFE strategy (Surgery, Antibiotics, Facial cleanliness, and Environmental improvements) with the aim of eliminating trachoma by 2020.

C.3 Several strategies to ensure the continuous supply of relevant products

Pfizer is a leading company compared to other large research-based pharmaceutical companies evaluated, when it comes to taking steps to ensure the continuous supply of its relevant products to access countries. It discloses some strategies for achieving this aim. It has 24 to 36-month forecasting to schedule produc-

tion, as well as a five-year long-range volume forecast (LRVF). Regular meetings are held to ensure inventory levels are maintained and it shares data with either the Food and Drug Administration (FDA) or with individual countries' Ministries of Health, to help prevent shortages. Pfizer is one of Zipline's partners helping to support the Government of Ghana with a delivery drone system that delivers medical products, including routine vaccines, to citizens in rural Ghana. Pfizer is a member of International Federation of Pharmaceutical Manufacturers and Associations' (IFPMA) 'Fight the Fakes' campaign, which aims to mitigate against falsified medicine reaching the supply chain. Pfizer also has other strategies, including an Online Pharmacy Disruption Program to tackle counterfeit sales, unique product identifiers to aid tracking and tracing and it has a counterfeit awareness page on its website.

C APPROPRIATE ACCESS & STEWARDSHIP – STEWARDSHIP

Evaluated: stewardship activities relating to antibacterial & antifungal medicines globally

C.4 Comprehensive strategy to mitigate COI for all educational programmes

The Benchmark analysed the top five AMR-related educational programmes for healthcare professionals (HCPs) from Pfizer. Pfizer reports a comprehensive COI mitigation for all five programmes: by providing financial resources to independent third parties to develop all programmes.

C.5 Adapts marketing materials and sales practices to address appropriate use

Pfizer engages in practices that aim to address the appropriate use of its antibacterial and/or antifungal medicines, both via its marketing practices and sales remuneration. At least some of Pfizer's marketing materials reflect emerging resistance trends and include guidelines for HCPs to raise awareness of AMR and address appropriate use: for all antibacterials and its antifungal isavuconazole (Cresemba®), by using data

from the ATLAS surveillance programme in the materials. Pfizer reports that it partly decouples incentives (that are based on national-level sales targets) for sales agents from sales volumes to help prevent the inappropriate use of such medicines. After the period of analysis, the company publicly announced that it would not reward its sales agents based on antibacterial volumes sold in the UK.

C.6 Adapts packaging to facilitate appropriate use; takes account of adherence to treatment

Pfizer adapts its packaging to facilitate appropriate use by patients of relevant products: namely its antibacterial azithromycin (Zithromax®). This adaptation takes account of adherence to treatment. Pfizer adapts the packaging of azithromycin, named the Z-Pak, which aims to facilitate patient adherence by organising the pill intake for each day, so that the patient knows exactly

which pill(s) to take on which day until the Z-Pak is completed.

C.7 Active in multiple AMR surveillance programmes; one openly shares raw data

Pfizer is active in multiple long-term AMR surveillance programmes, including the ATLAS programme. This is updated every six months with data from across 73 countries and is the only programme in the Benchmark that shares not only its results, but also its raw data in the AMR Register, an open-access data platform. The SENTRY programme, which is managed by JMI laboratories with support from Pfizer, collects isolates from 60 centres in 29 countries. Pfizer does not report making antibacterial and/or antifungal consumption data available to national governments or other public health authorities.

DIAGNOSTICS, ANIMAL HEALTH & AGRICULTURE

Activities in this area are not scored by the Benchmark. This information is provided given the importance of diagnostics, animal health and agriculture on the topic of AMR.

Pfizer reports that its programmes in diagnostics are primarily in 'companion' diagnostics development that are required by the FDA and other regulatory agencies for associated drug approvals. While Pfizer does not have its own diagnostics division, the company reports that it works with third parties to complement AMR product development with diagnostic tests whenever possible. Pfizer reports that it supports COMBACTE-CARE, a European network that addresses the diagnostic challenges for the

epidemiological and clinical studies of carbapenem-resistant bacteria. The company has also entered into collaborations with diagnostic manufacturers to support commercial availability of susceptibility tests for its new antibacterials.