Pharmaceutical research and development

Pharmaceutical research and development (R&D) is funded via a mix of private and public sources. Before COVID-19, governments mainly supported basic and early-stage research through budget allocations, research grants and public ownership of research and higher education institutions. The pharmaceutical industry funds R&D across all phases, but makes the largest contribution to translating and applying knowledge to develop products, and funds most pre-registration clinical trials – albeit often supported by R&D subsidies or tax credits. In 2018, governments in 33 OECD countries for which data are available collectively budgeted about USD 67 billion for health-related R&D. While this figure goes beyond pharmaceuticals, it understates total government support, as it excludes most tax incentives and funding for higher education and publicly owned enterprises. In the same year, the pharmaceutical industry spent around USD 114 billion on R&D across the same countries.

While most pharmaceutical R&D expenditure occurs in OECD countries, the non-OECD share is increasing (EFPIA, 2020[11]). In 2018, the industry spent over USD 14 billion on R&D in the People's Republic of China (0.06% of GDP) – more than in any OECD country except the United States (OECD, 2021[12]). Nearly two-thirds of spending in OECD countries occurred in the United States (Figure 9.9), where the industry spent about USD 75 billion (0.36% of GDP), while government budgets for health-related R&D were USD 44 billion (0.21% of GDP). Most of the remainder was spent in Europe and Japan, with industry spending as a share of GDP highest in Switzerland (0.8%), Belgium (0.5%) and Slovenia (0.4%) – smaller countries with relatively large pharmaceutical sectors.

While no official data are yet available, this pattern clearly changed in response to COVID-19. Governments mobilised tens of billions of dollars to fund entire R&D processes, including late-stage clinical trials – particularly for vaccines, but also for treatments. Governments also made large advance purchase commitments for COVID-19 vaccines before clinical trial data were available, effectively shifting much of the financial risks of R&D from firms to taxpayers. For example, by July 2021, the WHO Access to COVID-19 Tools Accelerator had raised USD 12 billion in funding for vaccines from various governments, including USD 1.7 billion in direct R&D support for projects selected by the Coalition for Epidemic Preparedness Innovations (WHO, 2021[13]). By late 2020, the US Government had allocated USD 12 billion to late-stage vaccine development and supply commitments (Bloomberg, 2020[14]). Preliminary OECD analyses of financial statements suggest that industry R&D expenditure also continued to grow, albeit with significant variability, as some firms reported a decline in R&D spending (OECD, 2021[15]).

The pharmaceutical industry remains R&D intensive: the industry spends, on average, over 13% of its gross value added on R&D – less than the electronics and optical industry, comparable to the air and spacecraft industries, but considerably higher than manufacturing as a whole (Figure 9.10). While R&D expenditure is a measure of R&D inputs, health systems are mainly interested in R&D outputs, which are more difficult to measure. The number of marketing approvals of new medicines is one output metric, but it does not account for the health benefits new products may or may not deliver. Between 2010 and 2020, the US Food and Drug Administration (FDA) approved on average 43 new medicines annually, with a clear upward trend from fewer than 30 approvals in 2010 to around 50 in recent years (Figure 9.11). Nearly a third were cancer and immunomodulatory products, 14% were anti-infectives and 10% each were products for the alimentary tract and metabolism and the nervous system.

Definition and comparability

Business enterprise expenditure on R&D (BERD) covers R&D by corporations regardless of source of funding. BERD is recorded in the country where the R&D activity takes place. National statistical agencies collect data primarily through surveys and according to the OECD Frascati Manual, but there is some variation in national practices. Pharmaceutical R&D refers to BERD by businesses classified in the pharmaceutical industry.

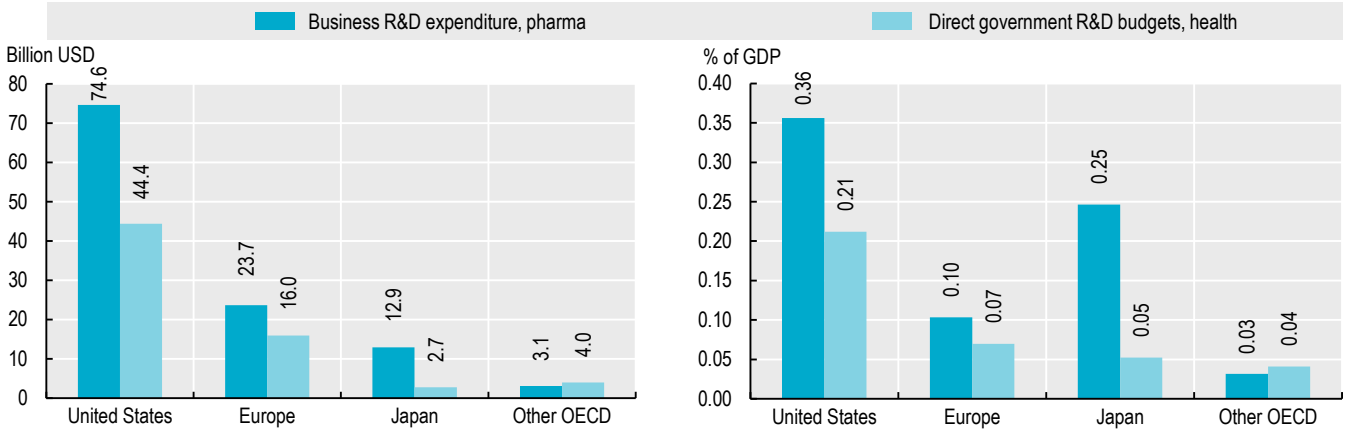
Government budget allocations for R&D (GBARD) capture R&D performed directly by government and amounts paid to other institutions for R&D. Health-related R&D refers to GBARD aimed at protecting, promoting and restoring human health, including all aspects of medical and social care, but excluding spending by public corporations or general university funding subsequently allocated to health.

Europe includes 21 EU Member States that are also OECD countries, Iceland, Norway, Switzerland and the United Kingdom. No data are available for Australia, Colombia, Costa Rica, Luxembourg or New Zealand.

The gross value added of a sector equals gross output less intermediate consumption. It includes wages costs, consumption of fixed capital and taxes on production. The OECD averages in Figure 9.10 show unweighted means of R&D intensity, based on 17 countries with data available for air and spacecraft; and on 31-34 countries for all other industries.

Figure 9.11 includes approvals of new molecular entities and new biological licence applications by the US FDA Center for Drug Evaluation and Research, and approvals of new biological licence applications related to vaccines, gene therapies and coagulation factors by the FDA Center for Biologics Evaluation and Research, but excludes other types of products approved by the FDA Center for Biologics Evaluation and Research. Therapeutic areas are based on the WHO ATC 1st level groups.

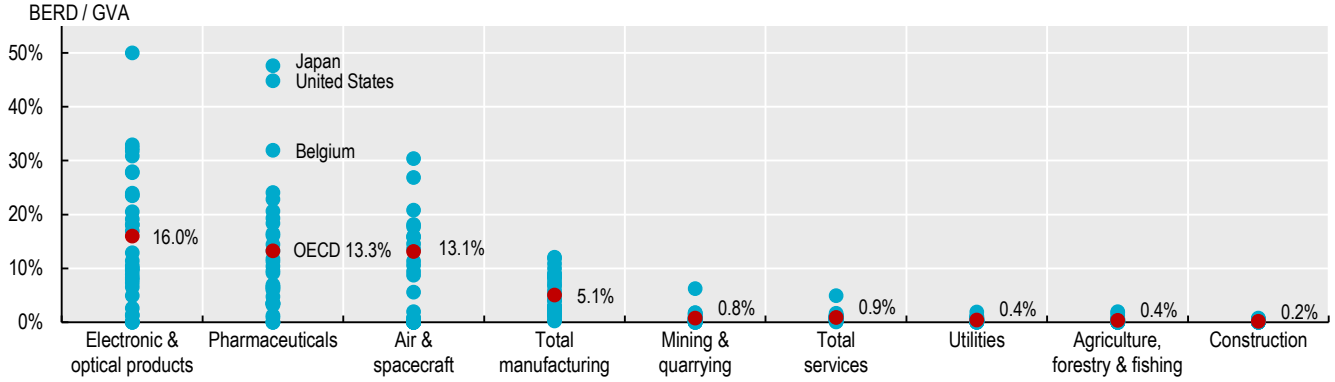
Figure 9.9. **Business enterprise expenditure on pharmaceutical R&D and government budgets for health-related R&D, 2018 (or nearest year)**



Source: OECD Main Science and Technology Indicators and Research and Development Statistics databases.

StatLink https://stat.link/x6f02a

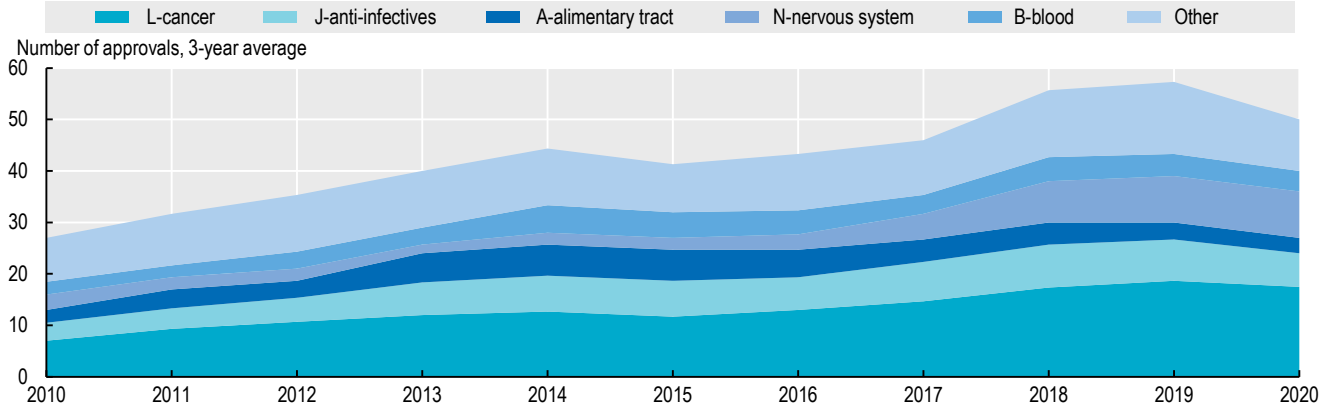
Figure 9.10. **R&D intensity by industry: Business enterprise expenditure on R&D as a share of gross valued added, 2018 (or nearest year)**



Source: OECD Analytical Business Enterprise R&D, Structural Analysis and System of National Accounts databases.

StatLink https://stat.link/q4x5lc

Figure 9.11. **Annual approvals of new medicines in the United States by therapeutic area, 2010-20**



Note: Other includes V-various, R-respiratory, D-dermatologicals, C-cardiovascular, M-musculoskeletal, S-sensory organs, G-genito-urinary system and sex hormones, H-systemic hormonal preparations, P-anti-parasitics, and missing or unknown.
Source: OECD analysis based on data published by the US FDA.

StatLink https://stat.link/467pj0

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