UNITED ARAB EMIRATES
MINISTRY OF HEALTH & PREVENTION

The Landscape of Health Research in the United Arab Emirates (2017–2022)

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Key findings

UAE health research is growing at three times the global rate

From 2017 to 2022, UAE's output in health-related fields increased by 25.2% annually

UAE international collaboration in health research is the strongest among the GCC countries

80% of UAE health research is published in international collaborations

UAE citation impact is above the World, GCC and G20 averages

UAE's field-weighted citation impact in health research was 1.74, meaning that it was cited 74% more than on average globally

19% of UAE's health research was in top 10% most cited output in Scopus

This is almost twice the global average and second only to Qatar among the GCC countries

Medicine was the top subject area for UAE's health-related research output

Followed by Biochemistry, Genetics and Molecular Biology; and Pharmacology, Toxicology and Pharmaceutics

Dentistry was the subject area with the strongest focus relative to the World

UAE's share of publications in Dentistry, out of all health research, was more than two times higher than the global share

UAE University and University of Sharjah were the largest contributors to health research

Both institutions published over 2,500 health-related publications from 2017 to 2022

Over 200 clinical trials covered more than 250 conditions

UAE's contribution to clinical studies was the second-largest among the GCC countries by the number of trials

Executive summary

Health-related research in the UAE is a major driver of research, contributing to 27% of the UAE's total research output. UAE's health-related research has a citation impact and share of highly cited publications that is much higher than the global average, which was clearly supported by the country's strong collaboration with international partners.

This report, commissioned by the National Center for Health Research of the UAE Ministry of Health and Prevention, presents a comprehensive overview of health research publications in the UAE, benchmarking the UAE with other countries and groups of countries such as the GCC and G20. The report aims to assess current trends, identify areas of strength and opportunity, recommend strategies for future development, and raise awareness of the current achievements of the UAE health-related research.

UAE research is growing at three times the global rate

UAE's output in health-related research had a compound annual growth rate of 25.2% from 2017 to 2022, which is more than three times higher than the global growth rate of health-related research. This performance even surpassed the country's growth rate of 20% CAGR for the total research output across all subjects.

While the UAE ranks high among the GCC countries with respect to the total number of scholarly outputs, the share of the country's health-related research of all research production is low relative to other GCC countries. Despite this lower share, UAE's citation impact is well above the World, GCC and G20 averages. At 1.74, it is also above some GCC countries, namely Oman and the Kingdom of Saudi Arabia. Judging by another metric of academic excellence—the share of publications in the top 10% most cited publications—UAE's performance is second only to Qatar's. The share of highly cited health-related publications was 19% for the UAE, almost twice the global average.

United Arab Emirates University and University of Sharjah were the largest contributors to the UAE health-related research by volume of output, while Khalifa University of Science and Technology had the most publications across all subjects. Notable was the fast rise of Ajman University—the first private university in the entire GCC region—rising from the tenth position by output to fourth in 2022.

International collaboration remains at the heart of UAE's research, with over 80% of UAE's health-related research co-published with international partners. In 2022, the UAE climbed to the first position among the GCC countries, according to this share. UAE's international research is highly impactful, with an FWCI higher than the global average.

UAE is a strong contributor to clinical trials

In 2017–2022, the UAE was involved in 208 trials that focused on over 250 conditions and involved over 270,000 participants. This involvement placed the UAE second among the GCC countries after the Kingdom of Saudi Arabia.

Medicine is the top subject area

Medicine is the main driver of research excellence within the subject areas of health-related research, having the highest share of publications and the highest FWCI. On the other hand, Dentistry and Pharmacology have the highest relative activity but the lowest FWCI. UAE's performance in health-related research may benefit from a broader disciplinary approach, including other relevant subjects such as Biochemistry, Immunology or Neuroscience.

Preface

H.E Abdulrahman Bin Mohamed Al Owais
Minister of Health & Prevention

We are pleased to present this study on the landscape of health research in the United Arab Emirates (UAE). The report provides an overview of the research productivity of the UAE's healthcare facilities and academic institutions, comparing it with other GCC countries, namely Bahrain, Kuwait, Oman, Qatar, and the Kingdom of Saudi Arabia. Additionally, the report draws comparisons with the health research performance of the G20 countries, which include Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Mexico, Russia, the Kingdom of Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, the United States, and Japan.

This report assesses the current state of health-related research in the UAE and identifies areas of strength and opportunities. The information is based on a comprehensive review of the quality and quantity of peer-reviewed publications, including articles, conference papers, and reviews, using common quantitative indicators such as the total and normalized count of publications. To assess the quality of research, the field-weighted citation impact (FWCI) indicator is reported both on the country level and for the top 10 organizations in the UAE by output.

Moreover, collaborative research is also reported between academic institutions, healthcare facilities, institutions within the UAE, and overseas institutions in research related to health and medical disciplines. Finally, the report highlights key indicators and performance of the UAE and GCC countries with regards to clinical trials.

We expect that these statistical data and analytical insights on health-related research will add valuable and reliable resources for policymakers, healthcare providers, researchers, research management professionals in relevant institutions, and members of the healthcare community.

We also hope that the provided information will help in understanding the performance of individual academic and healthcare institutions and raise awareness of the critical importance of health research in the UAE. Similarly, the report's findings may catalyze recommendations for further studies aimed at developing strategies focused on specific health research areas. These strategies can elevate the productivity of health research and facilitate the creation of appropriate programs to increase both the quantity and quality of research output in relevant health research fields, as well as clinical studies. Such advancements in research production are expected to enhance the UAE's competitiveness in global R&D indicators and foster increased investment in R&D.

We want to thank the team at the National Center for Health Research at the Ministry of Health and Prevention and the authors from Elsevier for their tremendous effort in producing this report.

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Introduction

As part of the National Health Research Strategy, "We the UAE 2031" vision and UAE Centennial 2071 vision, the UAE is committed to advancing its health research and fostering a collaborative research environment. This report, commissioned by the National Center for Health Research at the UAE Ministry of Health and Prevention, provides an overview of the country's performance in health research and its standing relative to the comparator countries.

The United Arab Emirates (UAE) places great importance on the health sector, continuously striving for improvements in the quality and accessibility of health services, including through fostering outstanding research in health-related science fields. One of the most recent strategic initiatives that lays out the UAE's vision for its health sector is the 2021 National Health Research Strategy (NHRS).

Focused on positioning the UAE as a hotspot for world-class health research and on facilitating a collaborative and productive research environment, the National Health Research Strategy sets strategic milestones and national health priorities that will define the course of the UAE's medical landscape in the foreseeable future.

Several other strategic documents have also set ambitious goals for the UAE with respect to its healthcare system. In particular, the "We the UAE 2031" vision aims to promote the UAE's quality of healthcare to enter the top 10 globally. Another even more long-term vision, the UAE Centennial 2071, seeks to accelerate the advancement of health sciences and improve the quality of life of UAE citizens.

Further development of these strategic visions as well as the overall implementation of UAE's health care policies largely falls into the hands of the Ministry of Health and Prevention of the UAE (MoHAP). Serving as the UAE's federal health authority, MoHAP is responsible for providing comprehensive healthcare to all citizens, improving the readiness of the healthcare system, and providing regulatory and oversight services to the health sector.

Positioning MoHAP as the responsible agency for national vision and strategy also resulted in the establishment of the National Center for Health Research (NCHR) and the launch of the UAE's first Scientific Conference on Health and Medical Research in December of 2022.

To inform further activities and gain a nuanced understanding of the UAE health research performance, MoHAP commissioned Elsevier to conduct an evaluation of UAE's healthcare research and benchmark the UAE's research performance with selected comparator countries (the GCC countries of Bahrain, Kuwait, Oman, Qatar, the Kingdom of Saudi Arabia) and regions (GCC, G20 and World).

The report contains two main chapters. The first chapter provides insights into the UAE's total research output and the share of its total research output that is health-related research. An institutional view complements this analysis by evaluating the performance of the top 10 most prolific UAE institutions publishing in health fields. Finally, the first chapter also provides an overview of research collaboration and contribution to clinical research studies.

The second chapter provides a more in-depth view of the UAE's performance in individual health-related subject fields, such as Medicine, and related subfields.

Data and methodology

Data sources

The main data source for this report is Scopus[1], an abstract and indexing database developed and owned by Elsevier (more details can be found in the Appendix). Additional data on clinical trials were extracted from ClinicalTrials.gov[2].

Analysis timeframe

The bibliometric assessment in this report covers the research performance of the UAE, benchmarks, and comparators from 2017 to 2022. It should be noted that Scopus data for 2022 is not fully complete at the time of writing but is estimated to cover more than 95% of the expected total output for the year.

Subject breakdown

The report focuses on the country's research activities in nine Scopus ASJC (All Science Journal Classification) subject fields selected by MoHAP. This classification system is created by in-house experts and used by Scopus to classify journals and conference proceedings based on their aims, scope, and content. For the purposes of this report, research in these fields is considered *health-related research.* The analysis thus draws both on research in individual subject fields and on the entire body of health-related research aggregated across individual subjects. The selected individual subject fields are listed below:

- Medicine
- Biochemistry, Genetics and Molecular Biology
- Pharmacology, Toxicology and Pharmaceutics
- Immunology and Microbiology
- Psychology
- Neuroscience
- Dentistry
- Nursing
- Health Professions

1 For more information, see https://www.elsevier.com/solutions/scopus?dgcid=RN_AGCM_Sourced_300005030
2 For more information, see: https://clinicaltrials.gov/ct2/about-site/background

Benchmarking

Comparing the UAE's performance in these fields with that of regional and global comparators provides a rich and detailed picture of the UAE's competitive advantages, but also potential gaps and areas of improvement. The comparators used in this report are both groups of countries and individual countries.

Most of the UAE's performance indicators used in this report are benchmarked against the world as well as GCC and G20 groups. For comparisons with individual countries, the focus is on the regional comparators represented by the GCC group, which includes Bahrain, Kuwait, Oman, Qatar, the Kingdom of Saudi Arabia[3] and, of course, the United Arab Emirates. The G20 countries are not analyzed individually but only as a group comprising Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, the Kingdom of Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, and the United States. It is worth noting that the G20 is not included in some charts in this report as the G20's performance often closely mirrors the global performance, which is already reflected in most charts.

Finally, to better understand the UAE's national research performance, the international comparisons are accompanied by an institutional view. Across all of the selected health-related fields, the report provides insights into the institutional actors driving the UAE's research productivity in a given area.

Publication types

All the figures reported in this document are based on publication sets limited to peer-reviewed research output, which includes articles, conference papers, and reviews. These three publication types are used because they are an important and integral part of the research cycle: conference papers result from conferences where research ideas are first presented; these may then lead to original research that is published in articles; finally, original research is collated and summarized in reviews.

Full counting

In this report, publications are assigned to an entity according to the full counting method. According to this method, co-authored publications are fully assigned to each co-author.

Normalization of country output

Analysis of journal articles, reviews, and conference papers provides useful insights into the comparative performance of a country's research base. However, using only the absolute numbers of publications would naturally rank countries by their size. Normalizing national scholarly output by total population, research expenditure (GERD[4]), or the number of researchers introduces a measure of productivity and gives some indication of the efficiency of a research base. Available sources for these indicators include the World Bank[5], OECD[6] or the United Nations[7]. Due to the limited availability of data on research expenditure and research staff in any of these sources, only the total population is used in this report. Although it is acknowledged that the total population is not directly related to research, it can be assumed that a correlation between total population and researcher population exists, and therefore can be used for normalization.

[3] Note that the official ISO code of the Kingdom of Saudi Arabia (SAU) is used in the charts in this report.
[4] Gross domestic expenditure on R&D
[5] https://data.worldbank.org
[6] https://stats.oecd.org
[7] http://data.un.org

Field-weighted citation impact

Throughout the report, when evaluating research performances according to citation impact, the analyses use the field-weighted citation impact (FWCI) indicator as the main metric. FWCI is a measure of citation impact that normalizes the citations received by an article against the World benchmark of citations received in the same field, publication type, and year of publication, thus also making values comparable across these three dimensions. The World FWCI is indexed to a value of 1.0, meaning that values above 1.0 indicate an above-average citation impact. For example, a value of 1.7 indicates a citation impact that is 1.7 times the average or 70% above average.

Share of output in the top 10% most cited publications

This is an indicator of the scholarly impact that is used throughout the report in a complementary manner to the field-weighted citation impact. It refers to the share of publications that fall within the top 10% most cited publications in a given period in the entire Scopus data universe. An entity's share of highly cited articles is thus treated as indicative of its research excellence.

Relative Activity Index (RAI)

Some sections of the report analyze the relative specialization of a country within a specific subject field. For this purpose, the Relative Activity Index is used. This indicator is calculated by dividing the share of an entity's output in a particular field relative to its total output by the share of the world's output in that same field relative to the world's total output. It, therefore, represents how concentrated an entity's output is in a particular area relative to the world average.

Collaboration

Publications with two or more authors are viewed as collaborations. Collaboration resulting in research publications is a useful measure to understand which researchers are working together to generate publications. Collaboration is assessed by analyzing the author affiliations associated with each publication and categorizing publications based on who has contributed as an author and what each author's affiliation is. For example, **institutional collaboration** is ascribed to publications where all authors are affiliated with the same institution; **national collaboration** is ascribed to publications where authors are affiliated with at least two different institutions but where all affiliations are within the same country; **international collaboration** is ascribed to publications where authors are affiliated with at least two different countries. These categories are mutually exclusive—if a publication is published by two authors from the same institution and a third author from a different institution and country, it is nevertheless considered internationally collaborative.

Chapter 1

Overview of the UAE performance in health-related research

1.1 UAE and global comparators

UAE's output in health-related research had a compound annual growth rate of 25.2% from 2017 to 2022, which is more than three times higher than the global growth rate of health-related research.

One of the most apparent indicators of a country's research performance comes from the analysis of the volume of published scholarly research, in particular journal articles, reviews, and conference proceedings. Particularly in health-related research, these three document types capture the most relevant research outputs. This chapter investigates the UAE's research performance with respect to its overall research output and the share of health-related output in comparison with key global benchmarks and comparators, which include G20 and GCC groups, as well as individual GCC countries.

Global health-related research, as defined in this study, has grown annually by 7.4% (CAGR[8]) from 2017 to 2022. This growth has slightly outpaced the total global research output, which grew by 5.4% annually over the same period. By 2022, the share of health-related research out of total global output grew to 38%. This share amounted to 1,374,166 health-related publications out of a total of 3,530,851 publications worldwide in 2022 (FIGURE 1-1).

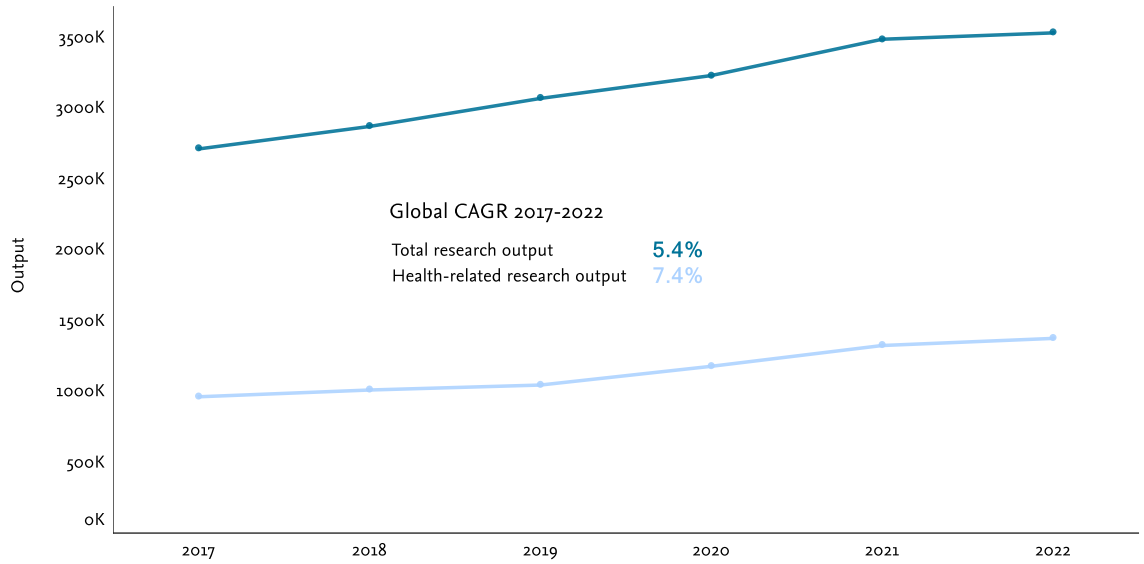

FIGURE 1-1
Total global research output and global health-related research output from 2017 to 2022.
Source: Scopus

[8] CAGR (Compound Annual Growth Rate) is defined as the year-over-year constant growth rate over a specified period of time.

A similar dynamic could be observed in the UAE, where health-related research has been growing at a faster rate than overall research output. From 2017 to 2022, the country has seen its health-related research grow at annual rate of 25.2%, from 1,411 publications in 2017 to 4,345 publications in 2022. The country's overall output has also been on the rise, but at a somewhat slower annual rate of 20.0% (FIGURE 1-2). Both growth rates demonstrate growth that is more than triple the global growth.

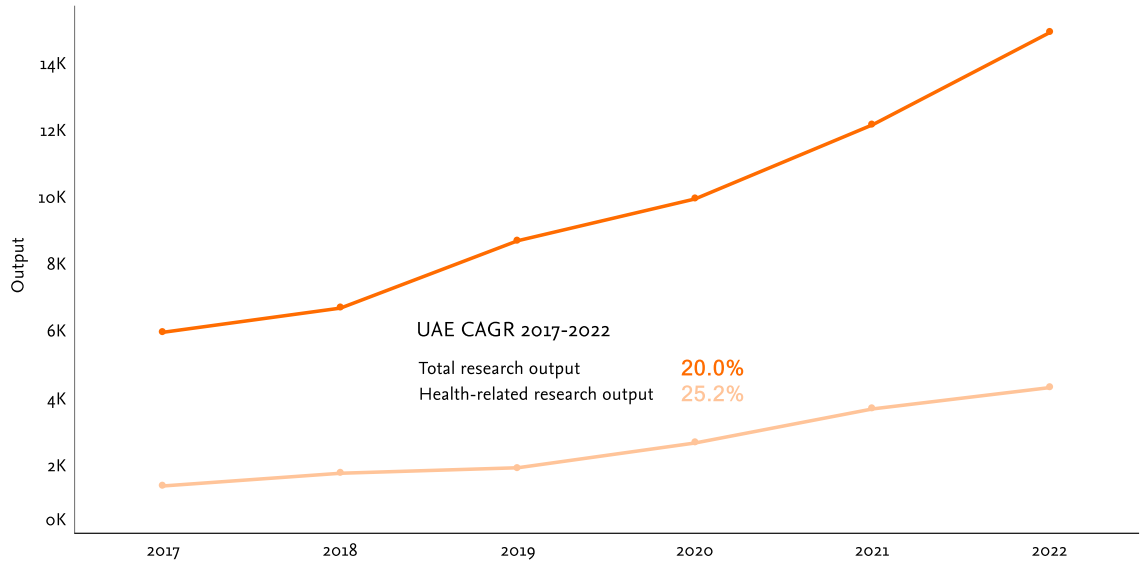

FIGURE 1-2
UAE's total research output and health-related research output from 2017 to 2022.
Source: Scopus

Within the GCC group, UAE's total output in health-related fields consistently occupied the second position above Qatar, Oman, Kuwait and Bahrain (FIGURE 1-3). The gap in total output between the UAE and these countries appears to be growing. The only GCC country that remains well above the UAE in its health-related output is the Kingdom of Saudi Arabia. For example, while UAE's total health-related scholarly output in 2022 amounted to 4,345 publications, the Kingdom of Saudi Arabia had about four times that amount with 18,896 publications in 2022. It is worth noting that the relative position of GCC countries remains almost identical when comparing them by total research output across all ASJC subject fields.

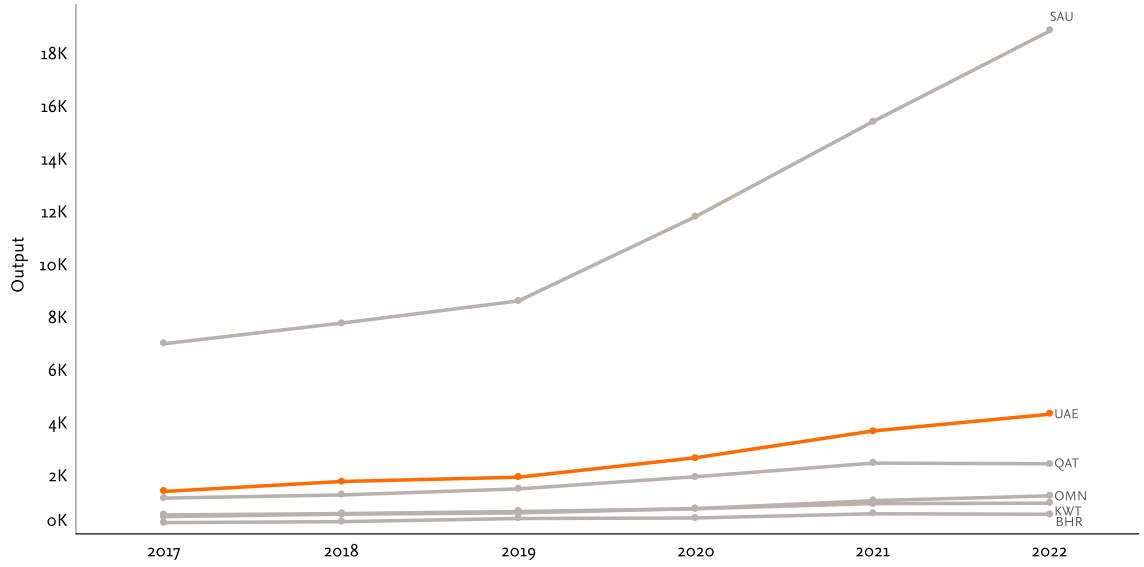

FIGURE 1-3
Annual health-related output for GCC countries from 2017 to 2022.
Source: Scopus

Some of the differences in the output of the GCC countries can be explained by their different sizes. Throughout the analysis timeframe, the Kingdom of Saudi Arabia had an average population of 35 million inhabitants, while the UAE had about 9 million. Bahrain, the smallest of the GCC countries, had only about 1.5 million.

To account for these differences, FIGURE 1-4 displays the health-related publication output per million inhabitants[9]. By these normalized output numbers, Qatar moves to the first position with a relatively big divide from other countries. The Kingdom of Saudi Arabia holds the second position and is followed by UAE and Bahrain. While the Kingdom of Saudi Arabia had 533 publications per million inhabitants in 2022, UAE reached 472 publications in 2022. UAE increased its output per million inhabitants each year, similar to the Kingdom of Saudi Arabia. Bahrain dropped in the most recent year but still holds the fourth position.

[9] As the population data were not available for each year, this report uses the average population across the period for the available data points.

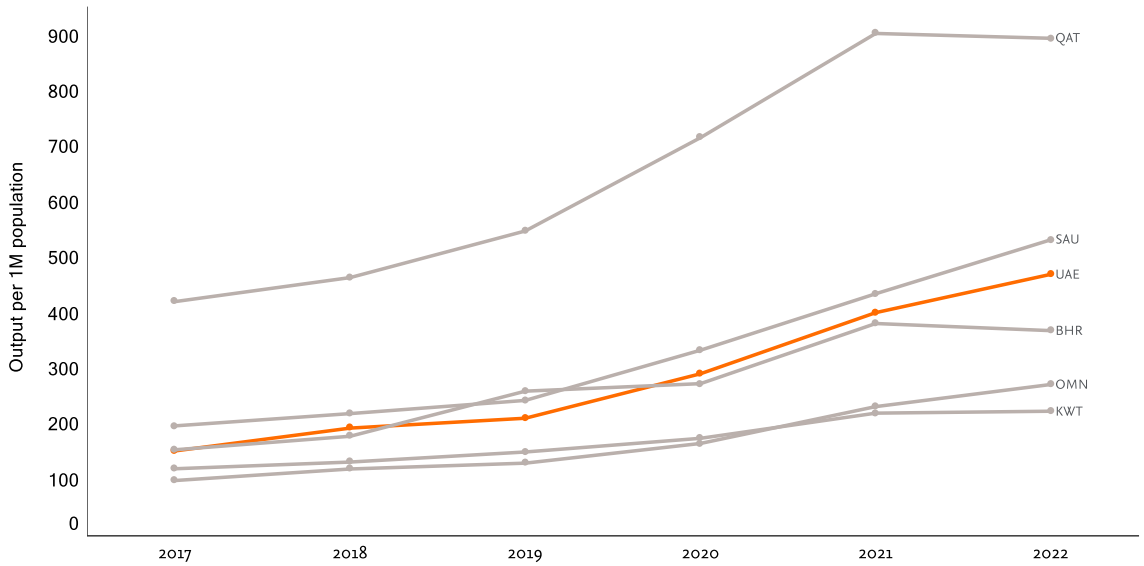

FIGURE 1-4
Annual health-related output for GCC countries from 2017 to 2022, normalized per 1 million inhabitants. *Source: Scopus*

While the UAE ranks high among the GCC countries with respect to the total number of scholarly outputs, the country's health-related research as a share of all its research production is low relative to other GCC countries (FIGURE 1-5). The UAE's share of health-related research is below the World level and that of all other GCC countries. While this indicator has been on the rise for the UAE since 2019 and stood at 29% in 2022, this is still substantially lower than, for example, Qatar, whose share of health-related research in 2022 was 42%. Bahrain was also above the world's average share of health-related research but dropped in the most recent year.

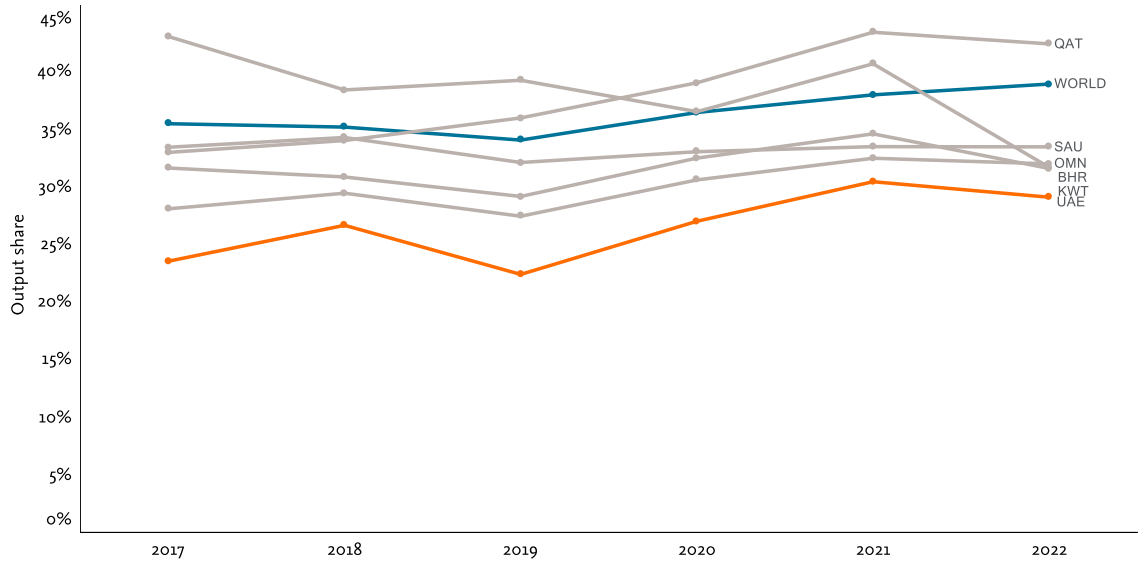

FIGURE 1-5
Annual share of health-related output out of total output for GCC countries and the world, 2017–2022. G20 and GCC groups are excluded for readability. *Source: Scopus*

When looking at the data from the analysis period, these differences between the UAE and comparators stand out (FIGURE 1-6). UAE's share of health-related outputs stands at 27% from 2017 to 2022, which is lower than the World, GCC and G20 averages as well as each individual GCC comparator country.

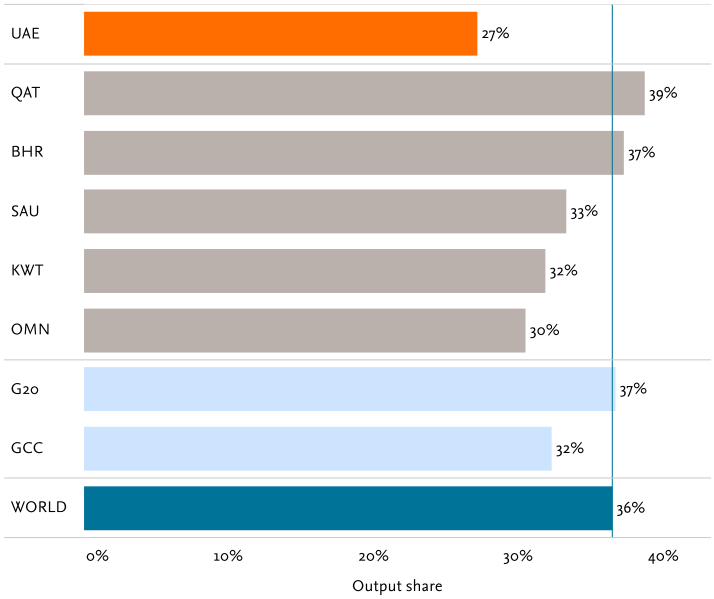

FIGURE 1-6
Share of health-related output of total output for UAE, comparators, and benchmarks for 2017–2022.
Source: Scopus

Although the share of the UAE's health-related research is lower than that of the comparators and benchmarks, the country performs well relative to the same comparators with respect to academic impact and research excellence. There are two metrics of impact and excellence used in this study, namely the field-weighted citation impact (FWCI) and the share of publications in the top 10% most cited publications in the Scopus data universe.

FWCI divides the number of citations received by a publication by the average number of citations received by publications in the same field, of the same type, and published in the same year, ensuring that field-dependent citation differences and other potential citation biases are accounted for. This approach makes FWCI a widely accepted normalized metric that enables comparisons across countries, institutions and other entities.

In turn, the share of publications in the top 10% most cited publications provides a complementary view on impact. For example, if an entity has several highly cited publications with a high FWCI score, this can lead to some skewness in the average FWCI score. This is especially noticeable with small publication numbers, wherein even a single highly cited publication can have a sizeable effect on the average FWCI value.

To balance this effect, it is advisable to view an entity's FWCI in combination with its share of publications in the 10% most cited. This approach makes it possible to estimate the relative volume of highly cited research, which might be having an effect on an entity's average FWCI value.

FIGURE 1-7 shows the average FWCI and share of the top 10% most cited publications for the UAE and the comparators for 2017–2022. Despite a lower share of health-related research, UAE's citation impact is well above the World, GCC and G20 averages. At 1.74, it is also above some of the GCC countries, namely Oman and the Kingdom of Saudi Arabia.

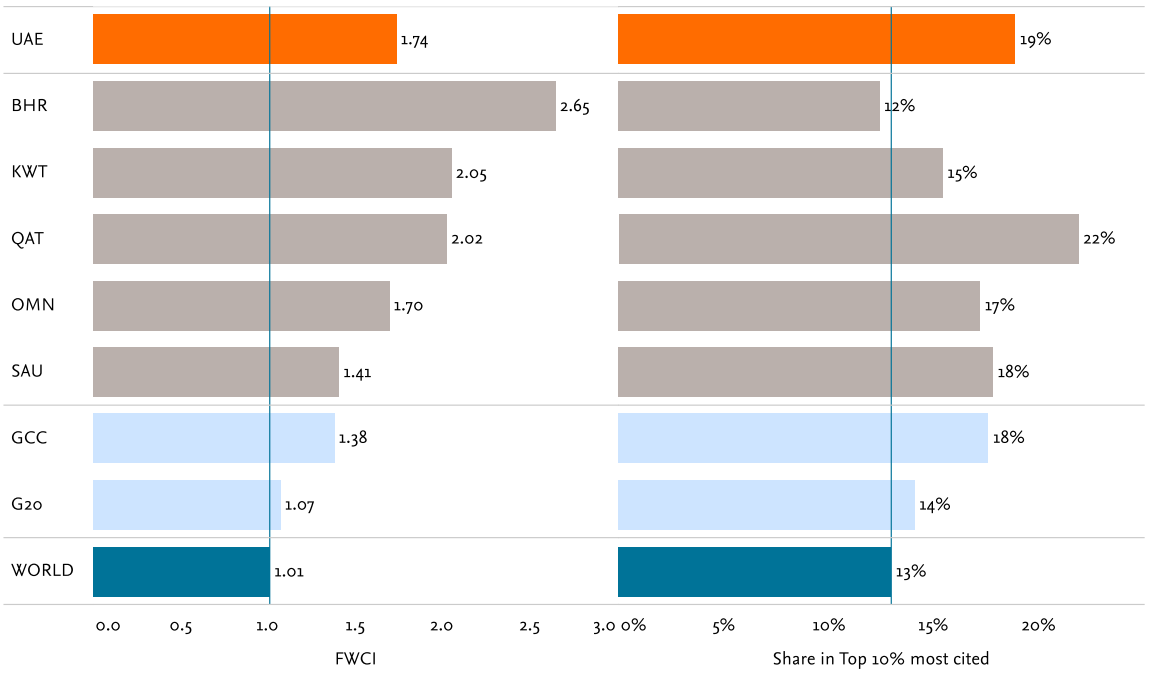

FIGURE 1-7
Average FWCI for health-related publications (left) and share of health-related publications in top 10% most cited Scopus publications globally (right) for the UAE and comparators (data for 2017–2022).
Source: Scopus

Furthermore, judging by another metric of academic excellence—the share of publications in the top 10% most cited publications—the UAE's performance is second only to Qatar's. The share of these highly cited health-related publications was 19% for the UAE and 22% for Qatar.

1.2 Institutional view

United Arab Emirates University and University of Sharjah were the largest contributors to the UAE health-related research by volume of output, while Khalifa University of Science and Technology had the most publications across all subjects.

This section provides an assessment of 10 selected UAE institutions that produced the highest number of outputs in all fields and in health-related fields, more specifically over the period of 2017–2022. FIGURE 1-8 shows the top 10 UAE institutions by their total output across all subject fields. The three largest contributors to UAE research by volume of output are Khalifa University of Science and Technology, United Arab Emirates University and University of Sharjah. For all of the top 10 institutions, the scholarly impact as measured by FWCI and the share of publications in the top 10% most cited was higher than the global average.

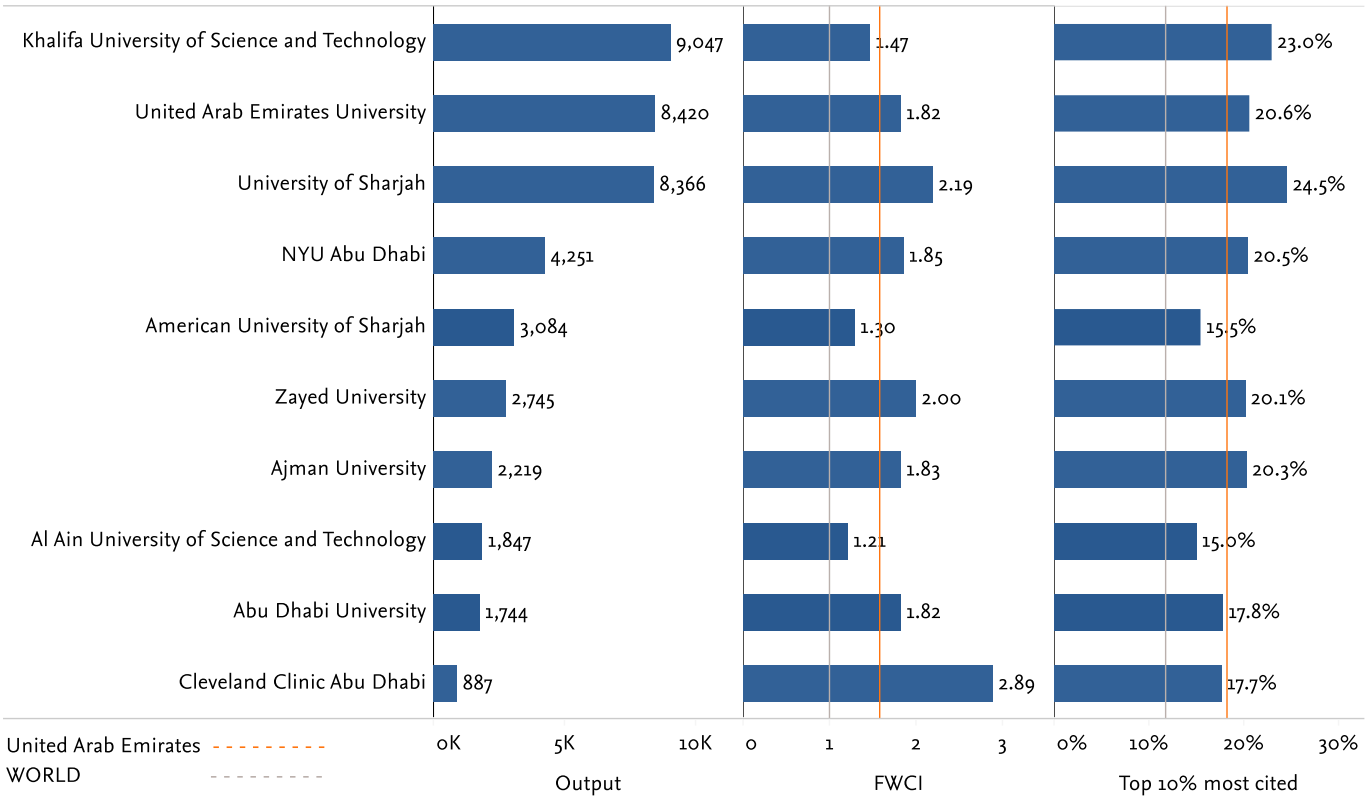

FIGURE 1-8

Top 10 UAE institutions by total research output for the period of 2017–2022. For each institution, the chart shows total output along with average FWCI and share of publications in top 10% most cited publications globally. Dotted lines indicate UAE (red) and global (gray) averages.
Source: Scopus

As shown in

FIGURE 1-9, the relative positions of these top-performing institutions changed throughout the years. For example, despite constant growth in output, Khalifa University of Science and Technology fell from the first position to the third one in 2022, while University of Sharjah climbed from the third position to the first at the same time. Another observation that stands out from this analysis is the fast rise of Ajman University—the first private university in the entire GCC region. Supported by its annual output growth rate of 92.3%, Ajman University climbed from the last place in 2017 to the fourth in 2022.

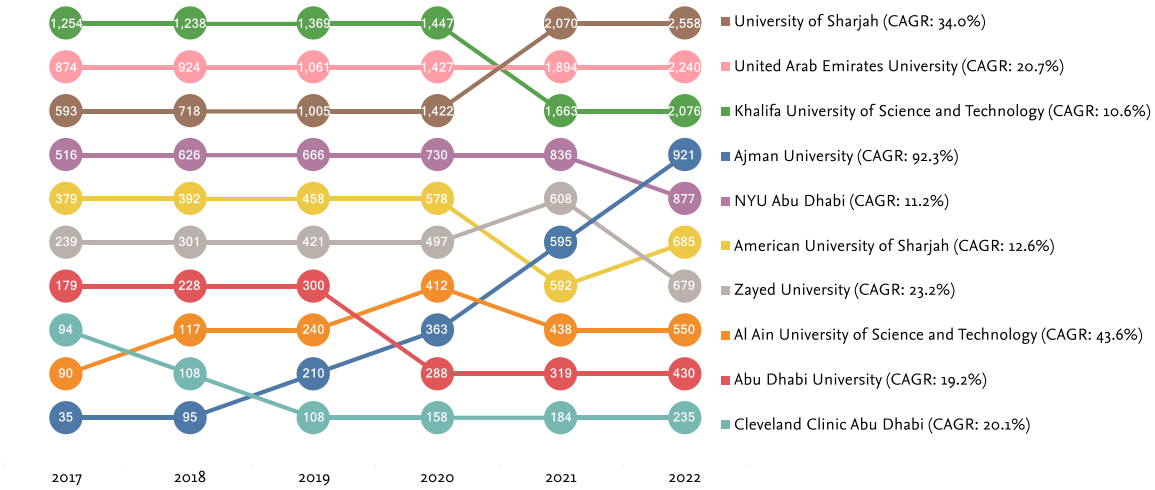

FIGURE 1-9
Top 10 UAE institutions by total research output for the period of 2017–2022 ranked according to their relative position annually. Numbers in dots indicate the publication output for the respective year. Numbers in parentheses indicate CAGR.
Source: Scopus

When analyzing top contributors to health-related research specifically, a slightly different picture emerges (FIGURE 1-10). The biggest contributor to the UAE's health-related research is the United Arab University, with almost 2,800 publications, followed closely by the University of Sharjah, with over 2,600 publications. For both universities, this output represents more than 30% of their total output throughout the reference period. This share is above the UAE average of 27% but somewhat below the World average (36%).

The share of output in health-related fields provides a basic measure of specialization across the institutions. For example, the Khalifa University of Science and Technology ranks first by total output among UAE institutions across all ASJC subject fields and third in health-related fields. However, due to a broad disciplinary spectrum, its share in health-related subjects is only 12% of all publications—the lowest among top 10 contributors to health-related fields.

Conversely, several top contributing institutions produce relatively fewer publications, but most of them are concentrated in health-related fields. These examples include highly specialized organizations such as the Dubai Hospital, with 96% of publications in health-related fields, Cleveland Clinic Abu Dhabi (93%), Gulf

Medical University (87%), and Mohammed Bin Rashid University of Medicine and Health Sciences (89%). For these institutions, the share of health-related research is far above the UAE and World averages.

Notably, one university with a broad disciplinary focus has a high share of outputs in health-related fields, which is above the UAE and World averages, and that is Ajman University.

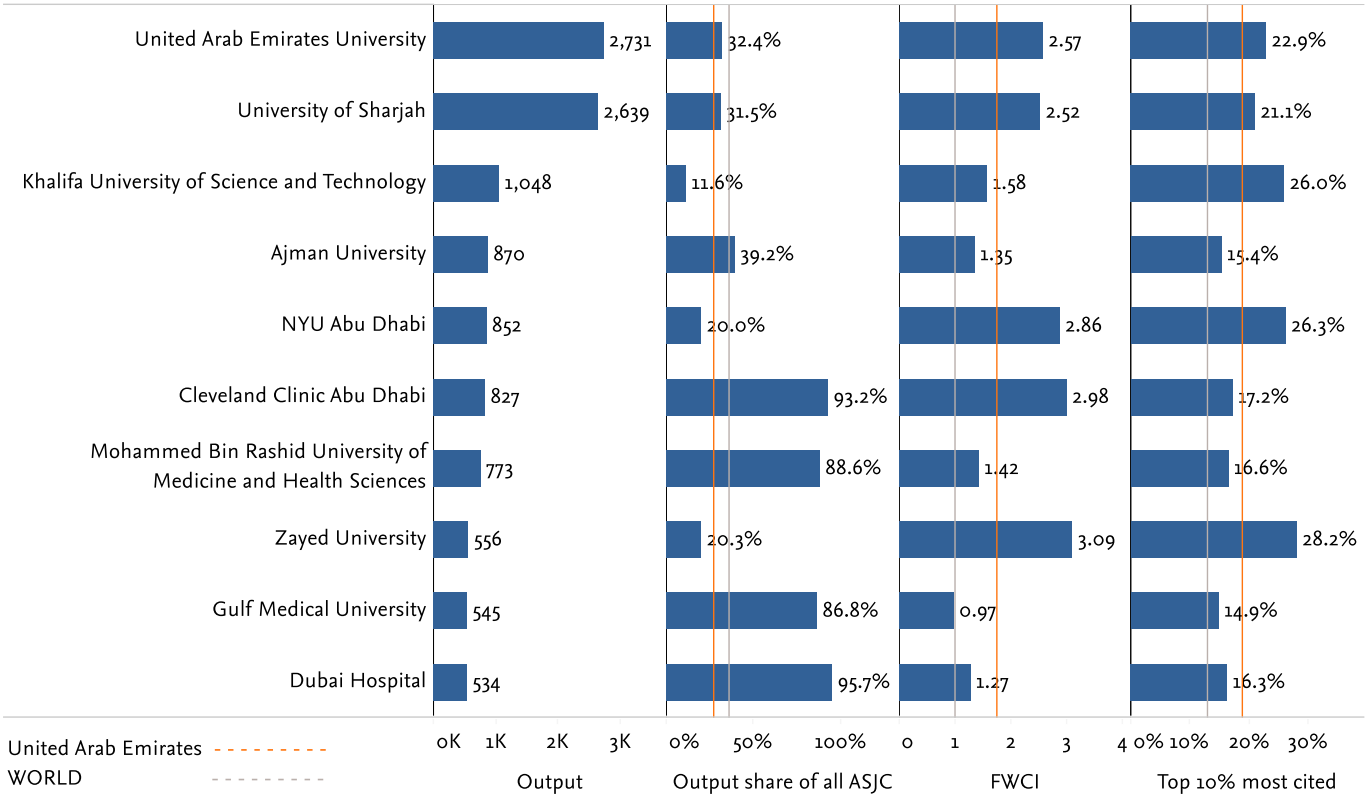

FIGURE 1-10
Top 10 UAE institutions by health-related output for the period of 2017–2022. For each institution, the chart shows the volume of health-related output, share of total institutional output, average FWCI and share of health-related publications in top 10% most cited publications globally. Dotted lines indicate UAE (red) and global (gray) averages.
Source: Scopus

Furthermore, Ajman University's output in health-related fields also experienced a quick rise from 2017 to 2022 (FIGURE 1-11), with a CAGR of 75.6%. Among the top health research contributors throughout the entire period, Ajman University ascended from tenth position in 2017 to fourth position in 2022 shortly after reaching the third position in 2020. The University of Sharjah also increased its output quite significantly during the analyzed period, with a CAGR of 38.1%, which enabled it to climb to the first rank in 2022. On the other hand, some institutions, such as NYU Abu Dhabi, did not demonstrate much growth during the period (CAGR 6.7%), which resulted in its fall from third to eighth place.

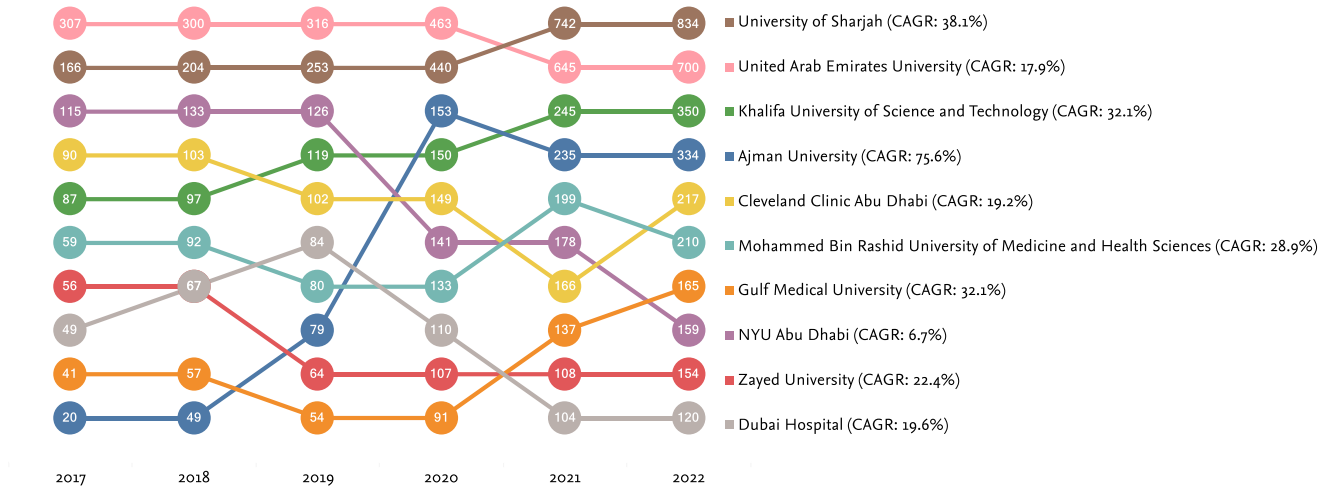

FIGURE 1-11

Top 10 UAE institutions by health-related output for the period of 2017–2022 ranked according to their relative position throughout the period. Numbers in dots indicate the publication output for the respective year. Numbers in parentheses indicate CAGR.

Source: Scopus

1.3 Research collaboration

Over 80% of UAE's health research was published in international collaborations. In 2022, the UAE climbed to the first position among the GCC countries, according to this share. UAE's international research is highly impactful, with an FWCI higher than the global average in 2017–2022.

Collaboration is at the heart of research excellence and innovation. Research assessments and independent scholarly studies consistently show that collaborative research is more impactful both within and outside of academia. In particular, international collaboration is considered among the most sought-after forms of research collaboration associated with these positive effects. At the same time, it is important to account for field-specific differences and, for example, more locally relevant research that can sometimes benefit from other forms of collaboration, such as national and institutional collaboration.

Collaboration is an inherent and mutually beneficial part of research, transcending borders, disciplines, and communities. The pervasiveness of low-cost travel, high-speed Internet connectivity, mobile technology, social media, public engagement, and funding programs all encourage scholars, communities, and policymakers to expand their networks beyond their immediate working environments and traditional spheres of influence.

For this study, we adopt a publication-level approach to collaboration, distinguishing between the following mutually exclusive collaboration types:

- Institutional collaboration: all authors in a publication are from the same institution.
- National collaboration: a minimum of two authors in a publication are from different institutions in the same country.
- International collaboration: at least two authors in a publication are affiliated with two different countries.

As noted earlier, internationally co-authored articles are, on average, more impactful and associated with a higher FWCI than those co-authored institutionally or nationally. Therefore, special attention is paid to the share of publications with international collaboration when comparing performance between UAE and the comparators.

As seen in FIGURE 1-12, UAE's health-related output showed different collaboration patterns from its output across all subject areas during the analyzed period. Notably, the share of UAE's publications with international collaboration is higher for health-related output than for its total output (82% vs. 73%). This higher share of international collaboration comes at the expense of lower institutional collaboration and single authorship levels for health-related research.

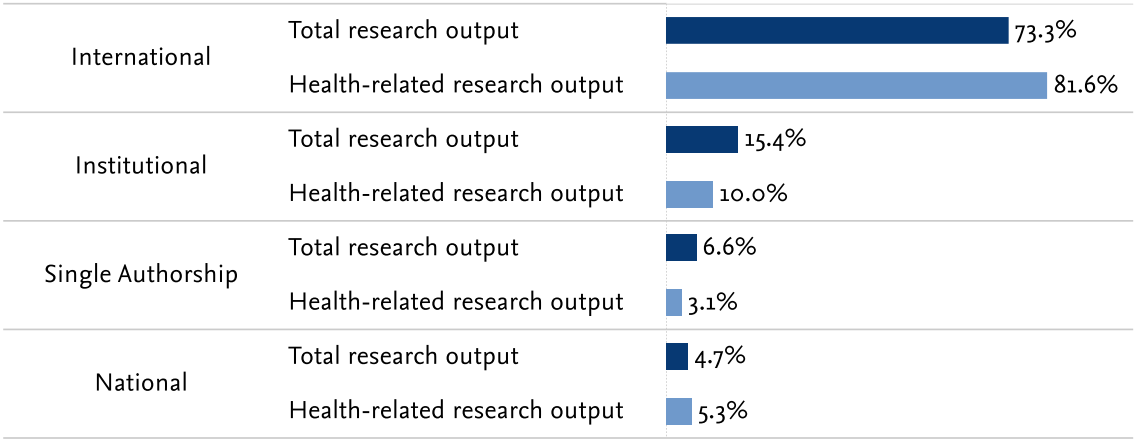

FIGURE 1-12
UAE share of output with different collaboration types for publications across all ASJC fields and publications in health-related ASJC fields in 2017–2022.
Source: Scopus

The share of UAE's publications with international collaboration, as well as other types of collaboration, has remained relatively constant over the years with only minor fluctuations. However, this is not the case for most of UAE's comparators from the GCC group (FIGURE 1-13). In fact, UAE's stable share of health-related publications with international collaboration and Qatar's gradual decline of this share have enabled UAE to take the lead among GCC countries in 2021 for the first time.

Globally, the average international collaboration share (not shown in the figure for readability) is at a relatively low level (23%)—this may be due to several reasons, including the tendency of major research powerhouses like the United States and China to collaborate heavily on the national level.

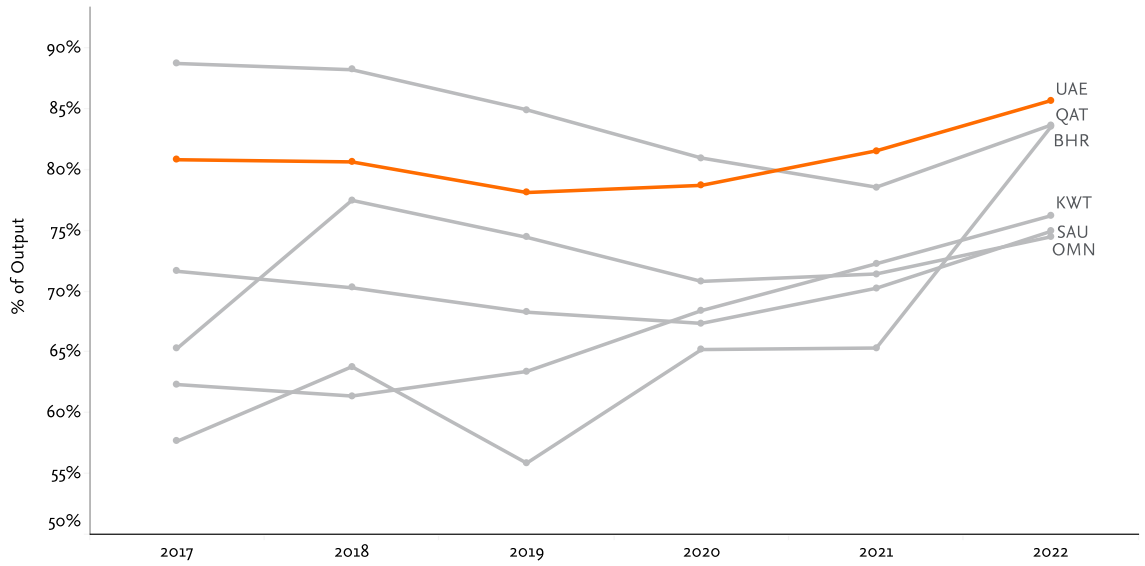

FIGURE 1-13
Share of health-related publications with international collaboration across UAE and comparators, 2017–2022.
Source: Scopus

The correlation between international collaboration and citation impact is clearly visible in FIGURE 1-14. For all comparators, international collaboration shows the highest FWCI. For Bahrain, the value of 3.78 may be an effect of outliers, as Bahrain has relatively few publications and extremely highly cited publications may distort the picture[10]. The effect can be more pronounced the fewer publications an entity has, and therefore Kuwait may well benefit from outliers.

UAE's health-related research with international collaboration displays a high FWCI of 1.95, well ahead of the World and the Kingdom of Saudi Arabia. Across the whole period, Qatar still has the highest share of international collaboration, closely followed by UAE. But as seen in FIGURE 1-13, the UAE has overtaken Qatar in this share only recently—therefore, it may be expected that UAE's continuous efforts to increase international collaboration will have significant effects on its research performance in the near future.

10 In particular, participation in the Global Burden of Disease studies with more than 1,000 authors from many countries show these effects in the health-related subject areas.

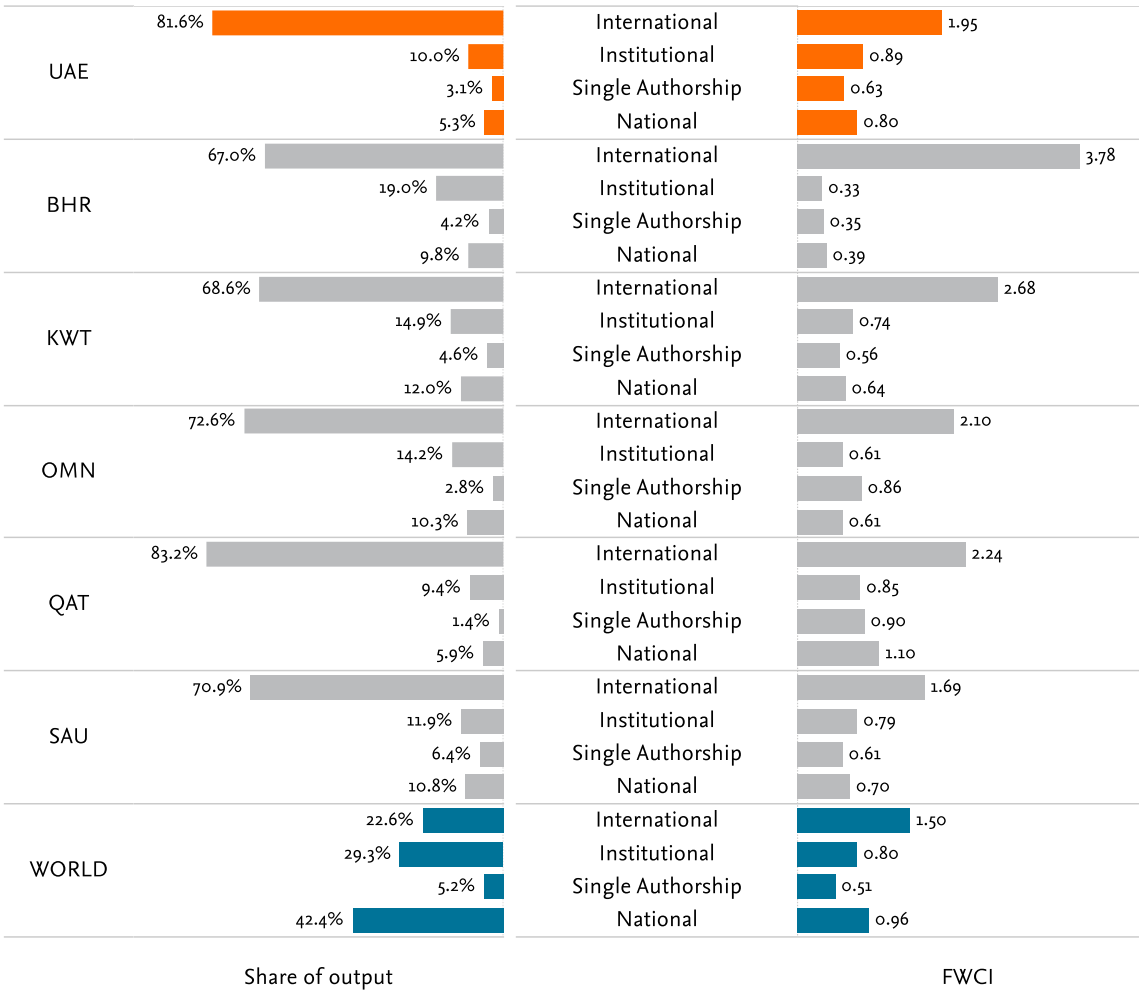

FIGURE 1-14
Share of health-related output with different collaboration types (left) and corresponding FWCI (right) for the UAE and comparators in 2017–2022.
Source: Scopus

The strong international focus of UAE's health-related research is proven by an institutional view. Not surprisingly, UAE's institutions with the highest share of international collaborations are the New York University Abu Dhabi (NYU Abu Dhabi) and the Cleveland Clinic Abu Dhabi, with almost all of their publications stemming from international co-authorship (FIGURE 1-15).

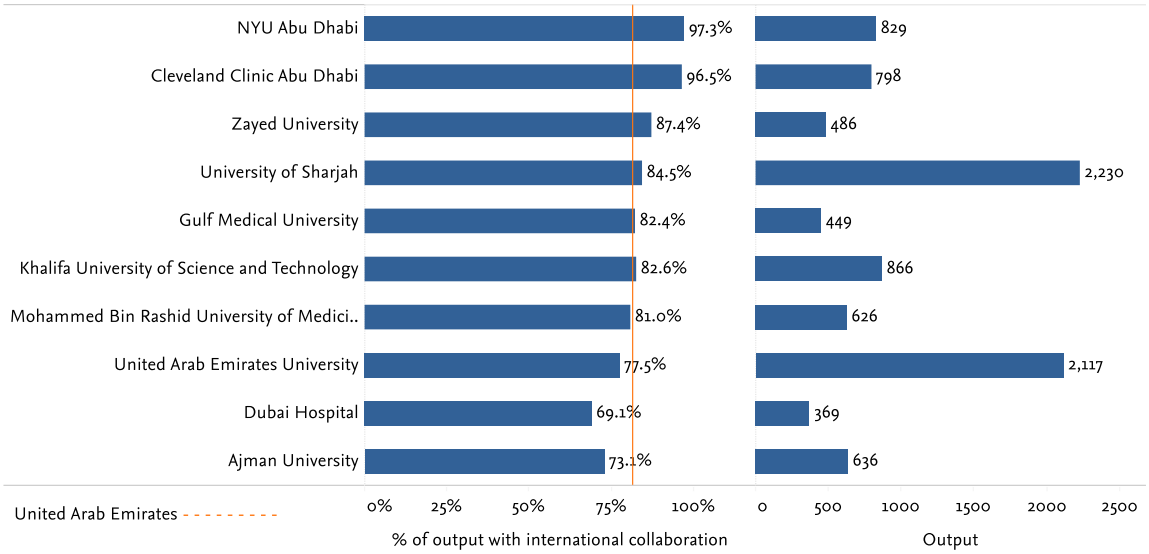

FIGURE 1-15

Top 10 institutions by output in all health-related ASJC categories ranked by their share of publications with international collaboration (left panel) and the total number of internationally co-authored publications (right panel), 2017–2022. Red dotted line indicates UAE average.

Source: Scopus

1.4 Clinical trials

In 2017–2022, the UAE was involved in 208 trials that focused on over 250 conditions and involved more than 270,000 participants. This active involvement placed the UAE in second place among the GCC countries after the Kingdom of Saudi Arabia.

This section covers clinical trials data that were collected for the UAE and the GCC comparators from ClinicalTrials.gov. This source contains the world's largest registry of clinical trials and is curated by the US National Institutes of Health.

Analyzing clinical trials data makes it possible to evaluate national contributions to medical knowledge related to the treatment, diagnosis and prevention of diseases. These contributions can, for example, lead to the improvement of medical interventions, development of new vaccines or lifestyle recommendations, and methods for identifying health risks and conditions. Therefore, a country's active involvement in clinical trials can serve as a proxy for its impact on clinical practices and medical knowledge.

In ClinicalTrials.gov, clinical studies are assigned to countries based on organizations involved in the trials. Similarly to scholarly publications, each clinical trial can have multiple contributing organizations across multiple countries. The following analysis covers all clinical trials with a start date falling within the report's timeframe of 2017–2022.[11] According to ClinicalTrials.gov, the start date of a clinical trial is the actual date on which the first participant is enrolled in a study. In most cases, trials address specific diseases, disorders, syndromes, illnesses or injuries. In ClinicalTrials.gov data, this information is provided under the umbrella of studied conditions.

FIGURE 1-16 shows the overall number of clinical trials for each of the GCC countries with a start date within 2017–2022, along with the corresponding number of enrolled participants and distinct studied conditions.

During the studied period, UAE organizations have contributed to more than 200 clinical trials, which focused on 269 distinct medical conditions. In the GCC region, this performance is second only to the Kingdom of Saudi Arabia, which has contributed to nearly three times more trials covering more conditions. However, the number of enrolled participants recruited by UAE trials was 100,000 lower than that in the Kingdom of Saudi Arabia (about 270,000 and 377,000, respectively).

[11] It was decided to include trials by start date, acknowledging the fact that the following figures may include closed and ongoing trials. The final number of results of a trial (or of the enrolled patients) may change in the course of the trial, therefore this analysis provides only a snapshot of the then actual status.

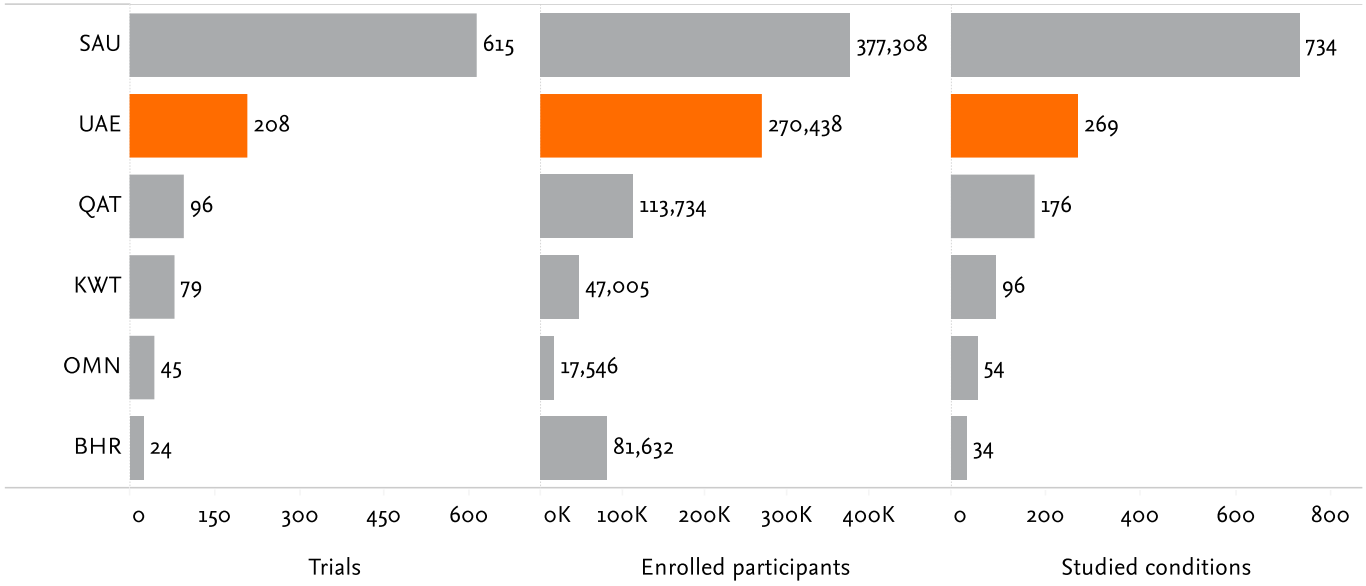

FIGURE 1-16
Number of clinical trials that commenced during 2017–2022 (left), corresponding number of enrolled participants (center) and studied conditions (right) for GCC countries. The countries are sorted according to the number of trials in the data. *Source: ClinicalTrials.gov*

Normalized by population size, the Kingdom of Saudi Arabia loses its top position to Qatar. The UAE remains in second place with 23 trials per million inhabitants (FIGURE 1-17). It is interesting to see that Bahrain remains in the fifth position by number of trials per million inhabitants but takes the lead in number of enrolled patients.

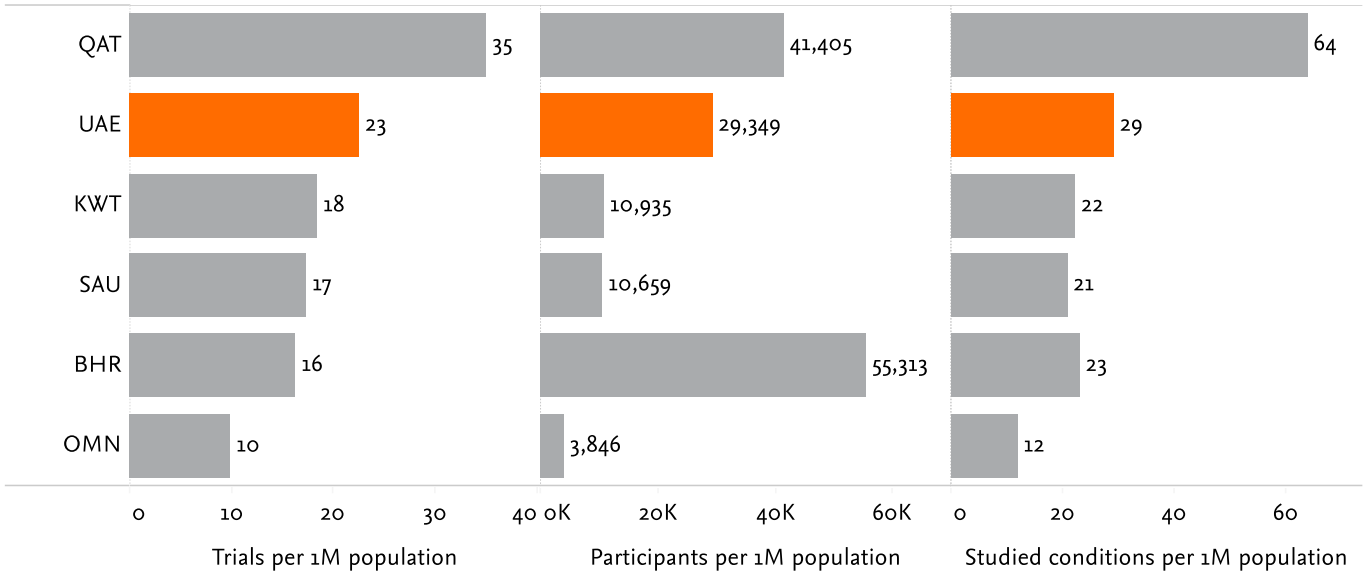

FIGURE 1-17
Number of clinical trials that commenced during 2017–2022 (left), corresponding number of enrolled participants (center) and studied conditions (right) normalized per 1 million inhabitants for GCC countries. The countries are sorted according to the normalized number of trials in the data. *Source: ClinicalTrials.gov*

The annual trend data (FIGURE 1-18) shows that UAE's involvement in clinical trials has increased slightly since 2017, with 25 trials starting in 2017 and 36 trials starting in 2022. Most notably, the Kingdom of Saudi Arabia's involvement in clinical trials experienced a steep rise from 2017 to 2020 before falling to below 2017 levels in 2022.

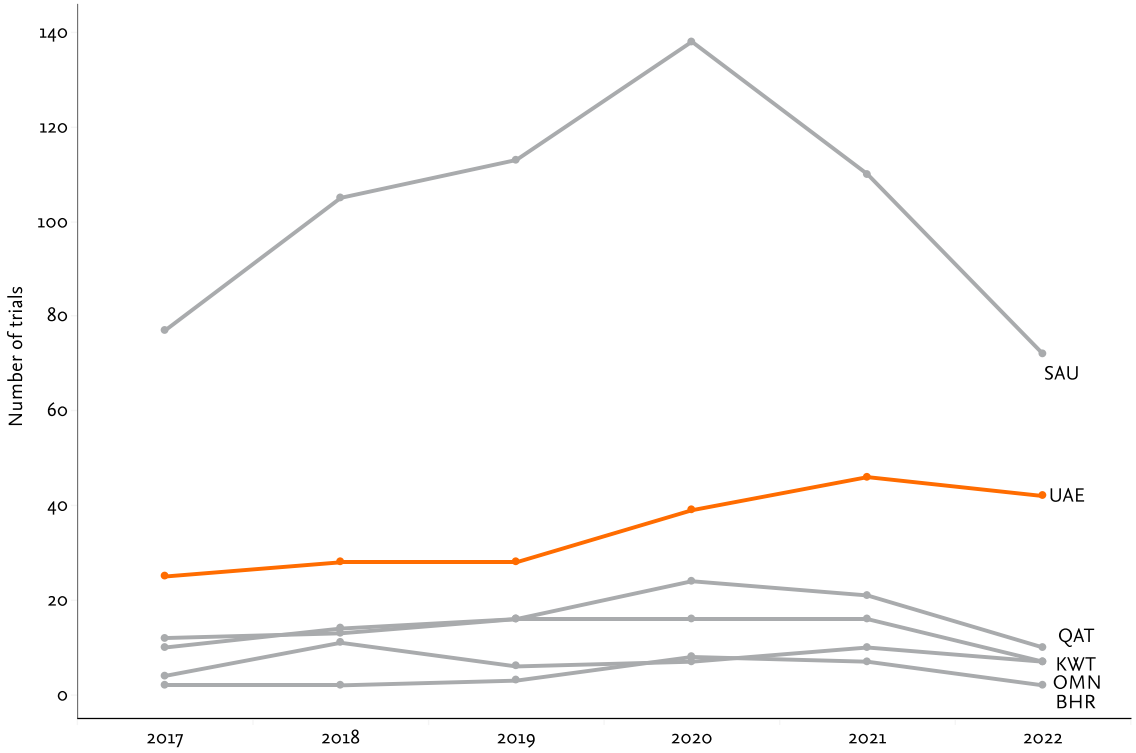

FIGURE 1-18
Annual number of clinical trials started in GCC countries from 2017 to 2022.
Source: ClinicalTrials.gov

Looking at the annual trends normalized per million inhabitants draws a slightly different picture (FIGURE 1-19). While Qatar takes the lead for the whole period, it becomes obvious that UAE is on a steady increase while the comparators are dropping in the most recent years. In particular, Qatar peaked in 2020 with more than nine trials per million inhabitants but dropped to fewer than four in the most recent years.

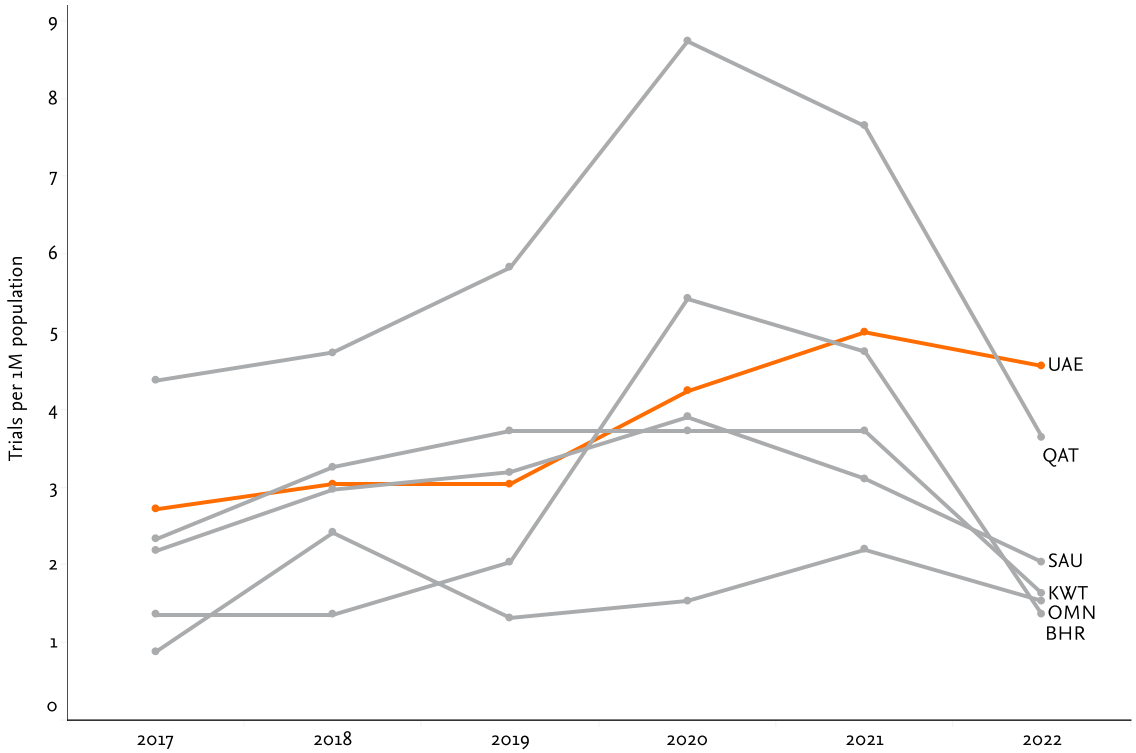

FIGURE 1-19
Annual number of clinical trials started in GCC countries from 2017 to 2022 normalized per 1 million inhabitants.
Source: ClinicalTrials.gov

ClinicalTrials.gov data also lend themselves to the examination of other important characteristics of clinical trials, such as the proportion of observational and interventional studies, clinical study phases, and target groups (e.g., male or female), among others. Understanding these characteristics helps delineate whether a given country has a specific national focus.

The proportion of observational and interventional studies for the GCC countries (FIGURE 1-20) shows that over 50% of all UAE's studies starting throughout the analysis timeframe were observational, which is higher than in any other country in the region.

Interventional studies are those in which participants are assigned to groups that either receive or do not receive an intervention, enabling researchers to establish the effects of the intervention on health outcomes. In turn, in observational studies, researchers observe participants under their current treatment plan or lifestyle to track health outcomes without directly assigning them to groups.

An important caveat with respect to this type of analysis is that while nearly all interventional studies are required to be registered, the same does not necessarily apply to observational studies. Therefore, the apparent regional differences may be at least partially attributed to differences in reporting of observational studies.

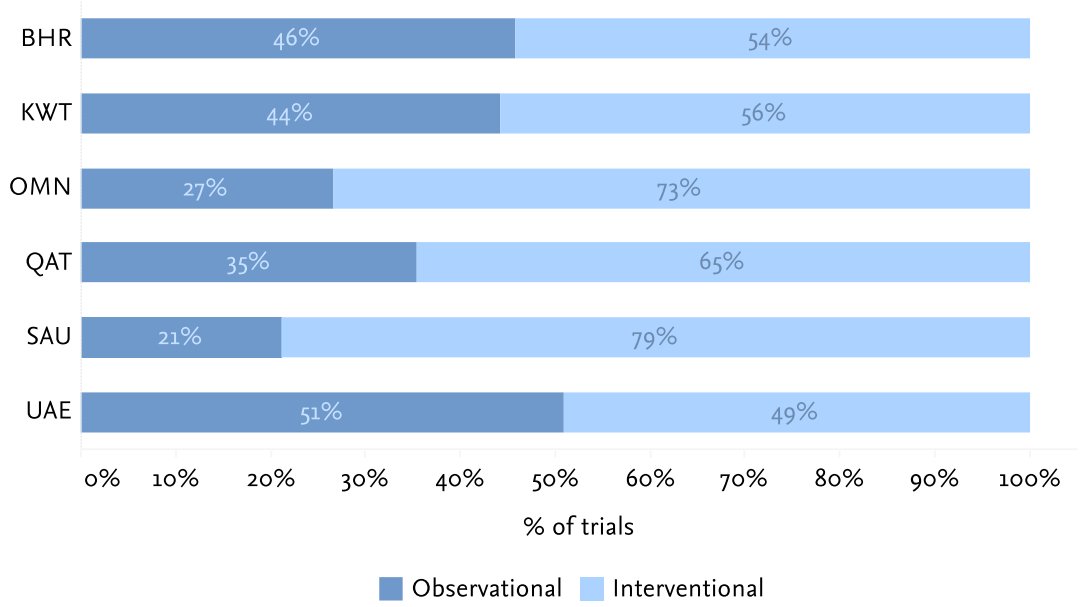

FIGURE 1-20
Relative share of observational and interventional trials among GCC countries. The chart includes all trials with a start date between 2017 and 2022.
Source: ClinicalTrials.gov

Another important feature of any clinical study is the trial phase, as it defines the proximity of the studied intervention (e.g., drug or treatment) to the market. There are five possible phases in the ClinicalTrials.gov database: *Early Phase 1, Phase 1, Phase 2, Phase 3 and Phase 4.* For example, while *Early Phase 1* involves mostly exploratory research with highly limited human exposure to the intervention, *Phase 4* refers to the last stage, which occurs after the intervention has been extensively tested in humans and approved for marketing. More information on different trial stages and their interpretation can be found in the ClinicalTrials.gov glossary[12].

FIGURE 1-21 shows the distribution of trials with different phases across the GCC comparator countries. It is important to note that in some cases, more than one phase was assigned to a single clinical trial in the ClinicalTrials.gov database. Nevertheless, the figure below makes it possible to assess the prevalence of trials with different phases in the GCC countries.

[12] https://clinicaltrials.gov/ct2/about-studies/glossary

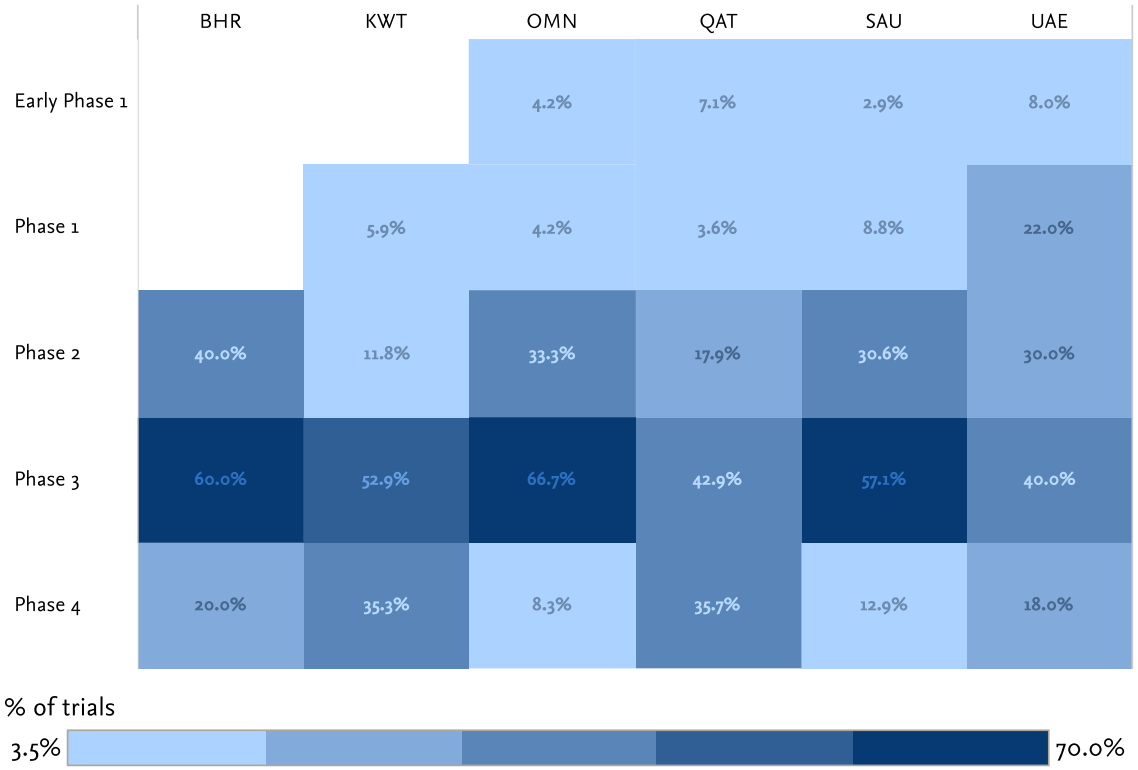

FIGURE 1-21
Distribution of clinical trials with different phases in GCC countries. The chart includes all trials with a start date between 2017 and 2022 and in which information about the trial phase was available/applicable. It is important to note that some trials in the ClinicalTrials.gov database were assigned with more than one phase, therefore in some cases the same trial can be counted multiple times (once per phase, but multiple times across different phases).
Source: ClinicalTrials.gov

Finally, another characteristic of clinical studies that shows variation across the GCC countries is the relative number of trials focusing on either male or female population (or both) (FIGURE 1-22). In this regard, the UAE has the highest share of clinical studies focusing exclusively on female population (21%), together with Bahrain (21%). In other GCC countries, the studies seem to be more focused on both sexes and male population. For example, in Oman, 9% of studies addressed male population only, 87% addressed both male and female, and only 3% focused on females only.

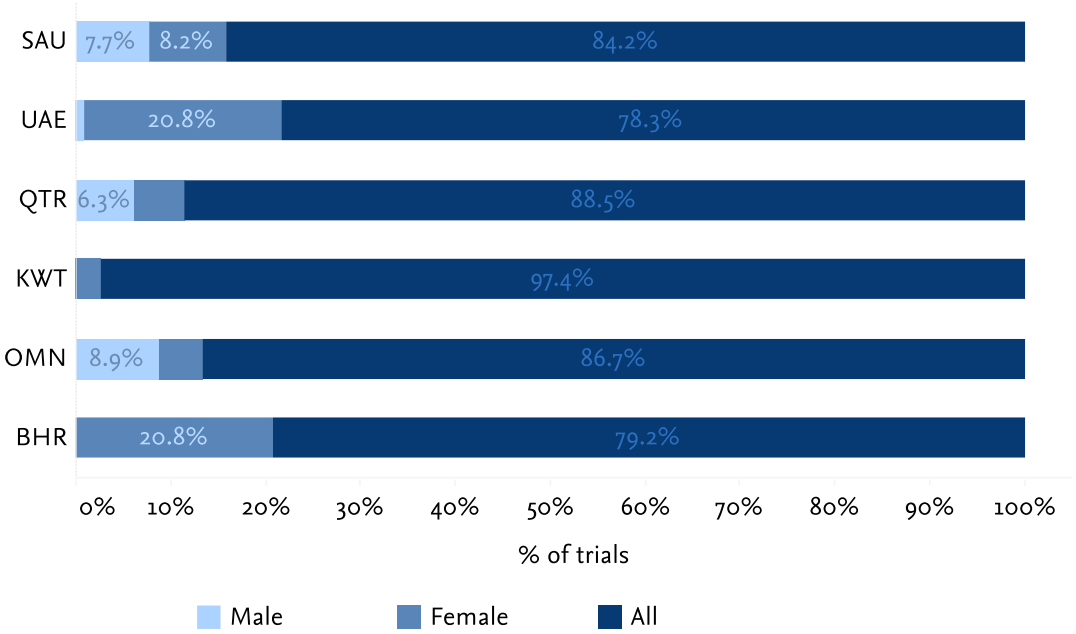

FIGURE 1-22
Relative share of trials addressing *male*, *female* and *all* participants among GCC countries. The chart includes all trials with a start date between 2017 and 2022.
Source: ClinicalTrials.gov

Chapter 2

Health research fields

2.1 Breakdown by subject field

Medicine is the main driver of research excellence within the subject areas of health-related research, having the highest share of publications and the highest FWCI. On the other hand, Dentistry and Pharmacology have the highest relative activity, but the lowest FWCI.

This chapter provides an overview on the underlying research fields comprising health-related research. Health-related research in this report is defined as an aggregation of nine subject categories in the Scopus All Science Journal Classification (ASJC). The underlying subject categories are:

- Medicine
- Biochemistry, Genetics and Molecular Biology
- Pharmacology, Toxicology and Pharmaceutics
- Immunology and Microbiology
- Psychology
- Neuroscience
- Dentistry
- Nursing
- Health Professions

A closer look into the underlying subject areas can give insights into UAE's specific focus areas and strengths in health research.

Health-related research in UAE follows the general trends with the biggest part of research stemming from Medicine, followed by Biochemistry, Genetics and Molecular Biology (FIGURE 2-1). The shares of UAE's research follow the global and G20 trends, while the GCC countries display some differences in their subject distribution.

The shares in Medicine range from 56% for the Kingdom of Saudi Arabia to almost 80% for Bahrain, while in Biochemistry the shares range from 18% for Bahrain to 34% the Kingdom of Saudi Arabia. Compared to other GCC countries, there is no clear focus area for UAE's health-related research. The Kingdom of Saudi Arabia and UAE are the main drivers for GCC overall shares, as these countries are the largest contributors.

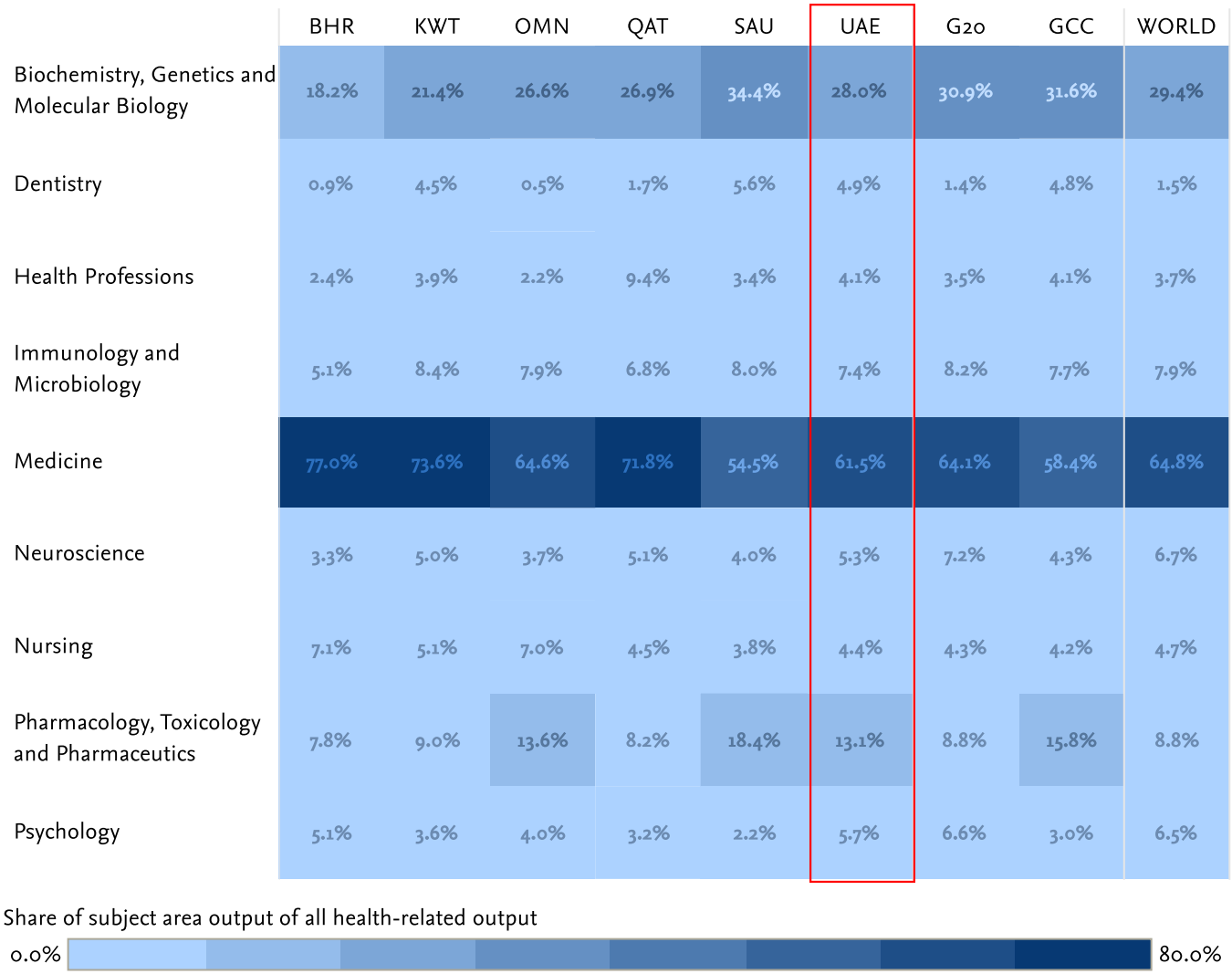

FIGURE 2-1
Subject area shares of all health-related research for UAE and comparators, 2017–2022. Shares per comparator do not add up to 100% as publications may be assigned to multiple subject areas. Color-coding and numbers refer to the subject area shares.
Source: Scopus

A complementary view of the relative contribution of the comparator countries to the health-related subject fields can be obtained with the use of the relative activity index (RAI)[13], which shows a country's specialization in a given field relative to the global level.

The data show that the UAE (and the Kingdom of Saudi Arabia) appear to have a focus on Dentistry, compared to global activity levels (FIGURE 2-2). For all other subjects within health-related research, the relative activity compared to global averages is at or below 1, which indicates subjects of lesser focus.

[13] RAI is defined as the share of a country's article output in a subject relative to the global share of articles in the same subject. A value of 1.0 indicates that a country's research activity in a field corresponds exactly with the global activity in that field; a value higher than 1.0 implies a greater emphasis; and a value lower than 1.0 suggests a lesser focus.

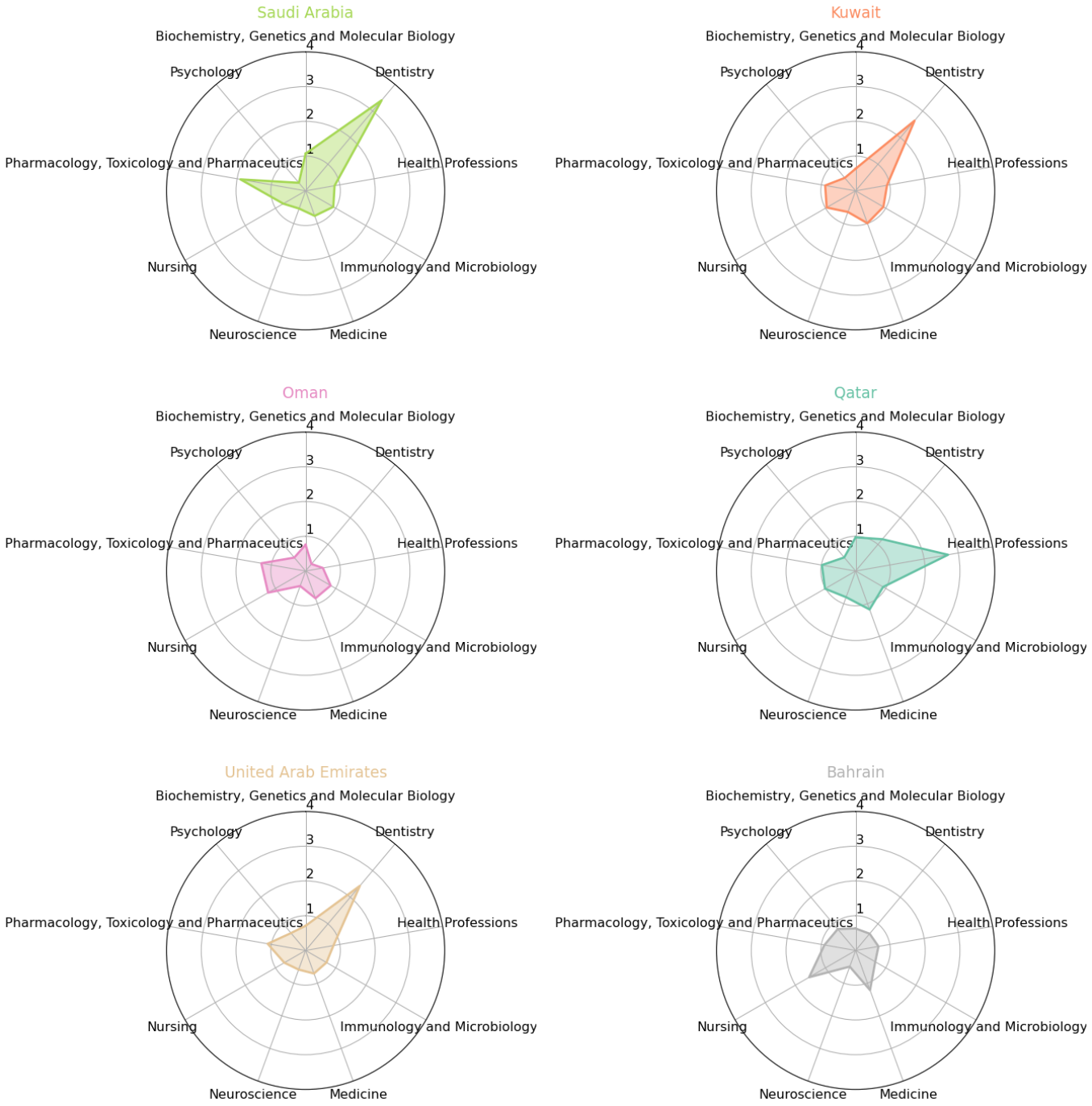

FIGURE 2-2
Relative activity index for health-related subject areas for UAE and other GCC countries, 2017–2022.
Source: Scopus

All subject areas within health-related research display a citation impact above global averages, with Medicine, Health Professions, and Psychology and Nursing being the drivers of research performance (FIGURE 2-3). Dentistry and Pharmacology, Toxicology & Pharmaceutics are the subject areas within UAE's research with the lowest FWCI. This is in line with global trends, although GCC countries display a wide distribution of citation impact across the subject areas.

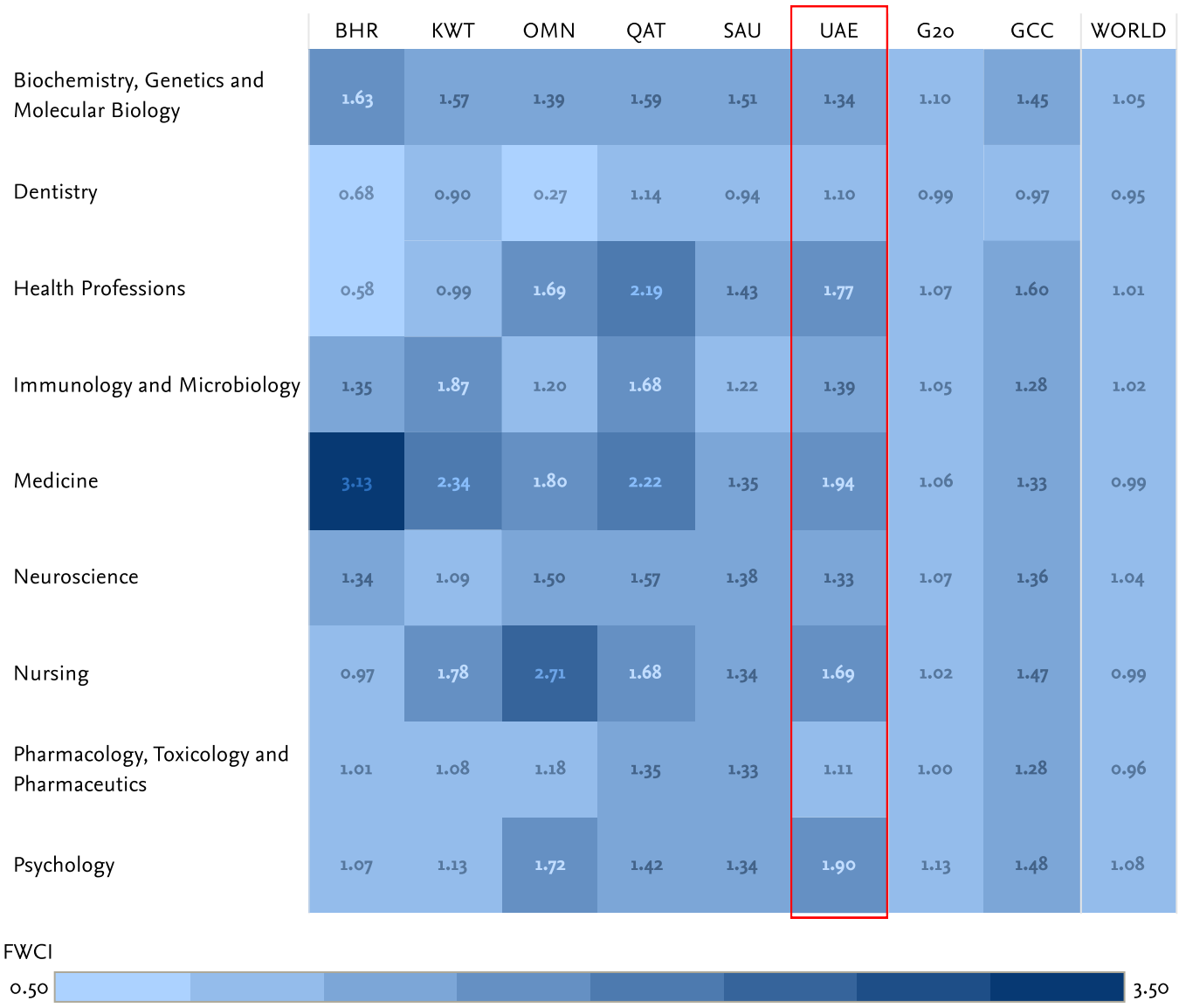

FIGURE 2-3
Citation impact (FWCI) for health-related subject areas for UAE and GCC countries, 2017–2022.
Source: Scopus

A scatter plot of UAE's RAI against the respective citation impact reveals a balanced picture of impact and specialization (FIGURE 2-4). The subject areas with the highest RAI, Dentistry and Pharmacology, Toxicology & Pharmaceutics, are the ones with the lowest citation impact, while Medicine, with an average RAI, is the main driver of citation impact, and also the subject area with the highest number of publications. It should be noted, however, that all subject areas have an FWCI above the global average.

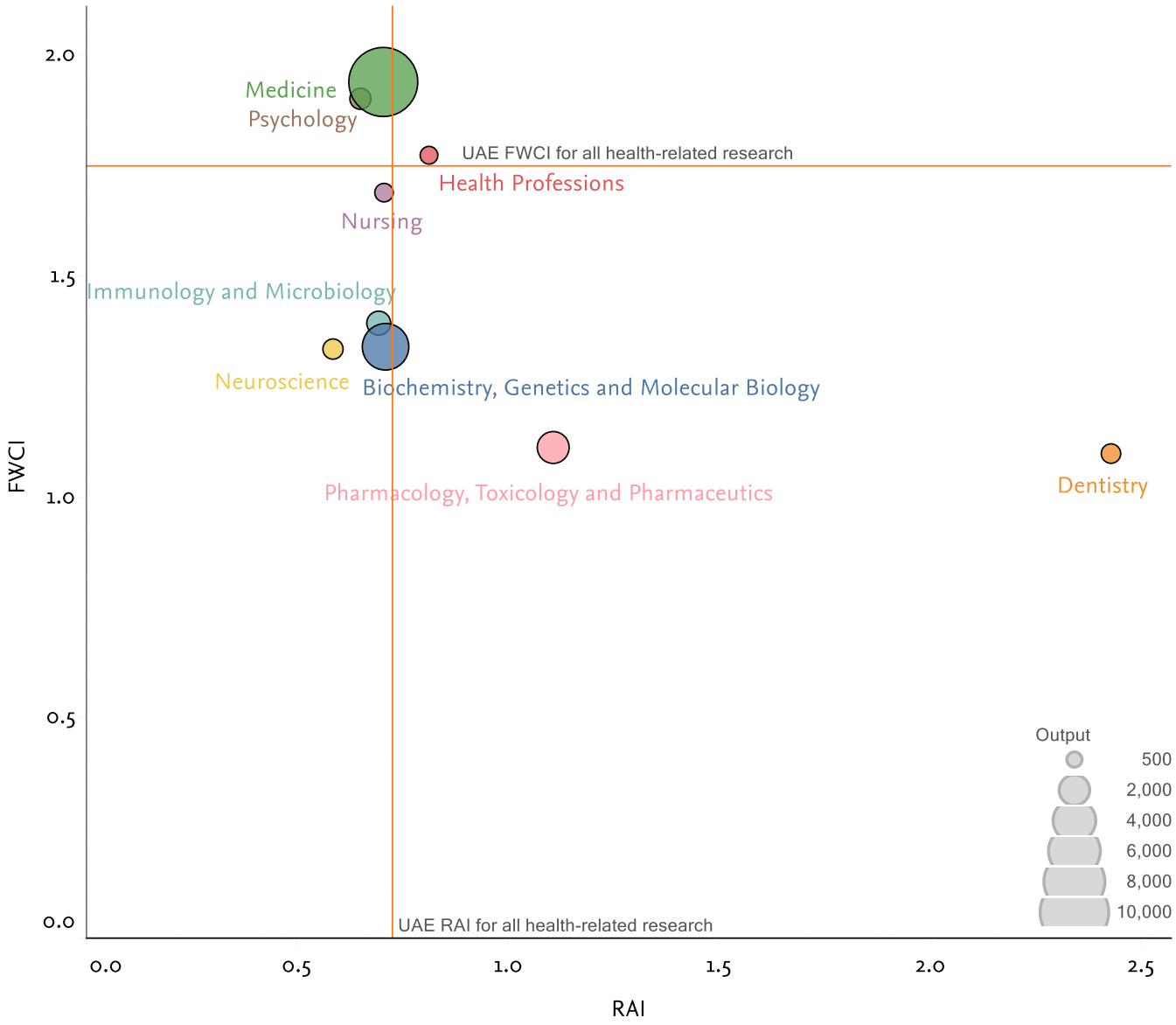

FIGURE 2-4
Relative activity index for health-related subject areas for UAE, 2017–2022.
Source: Scopus

The following sections provide brief overviews of the individual subject areas and their underlying subject categories (based on, in total, 334 subject categories within ASJC's second level). The chapters are sorted by the number of UAE outputs in the respective subject area, starting with Medicine as the most prolific subject area.

2.2 Medicine

Medicine is the largest subject area within health-related research, but UAE's share of Medicine publications out of its health-related output is second lowest of all comparators. The spread of subcategories signals a broad distribution, but research in Endocrinology, Diabetes & Metabolism seems to receive more attention.

UAE's share of publications in Medicine, out of its total health-related output, was below the global average and most of the GCC countries' level in the period 2017–2022 (FIGURE 2-5). Only the Kingdom of Saudi Arabia displayed a lower share. In absolute values, this subject area, however, is by far the most prolific for the UAE with almost 10,000 publications.

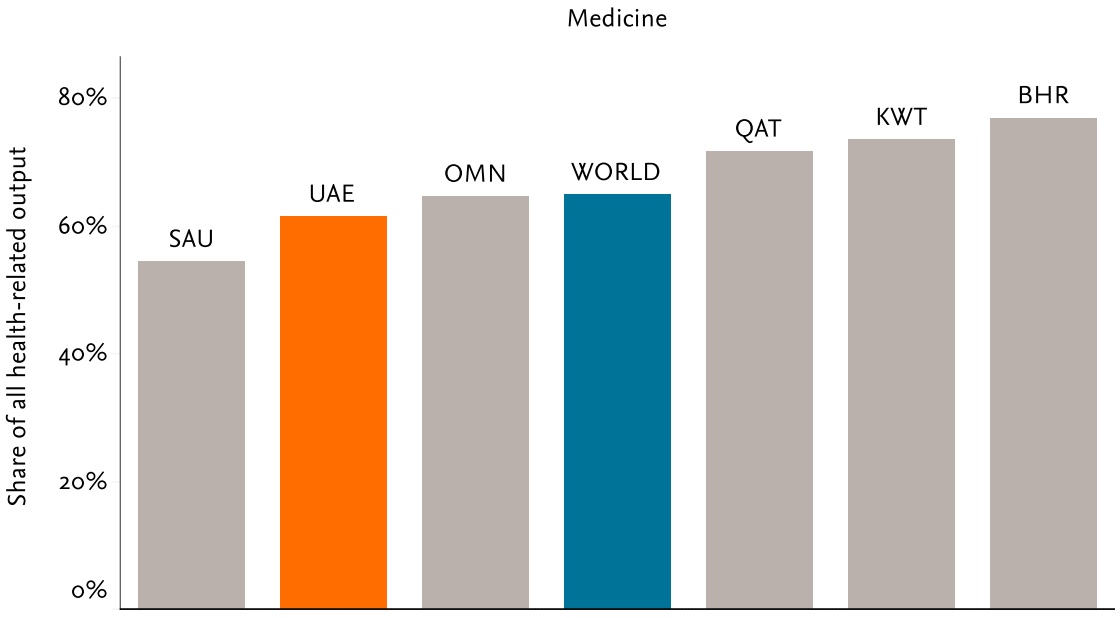

FIGURE 2-5
Share of Medicine publications of total health-related output for UAE and comparators, 2017–2022.
Source: Scopus

Similar to the overall collaboration pattern described in CHAPTER 1.3, international collaboration shows the highest FWCI for all comparators (FIGURE 2-6). For Bahrain, the value of 4.71 may be an effect of outliers, as Bahrain has relatively few publications and extremely highly cited publications may distort the picture. The

effect can be more pronounced the fewer publications an entity has. Therefore, in addition to Bahrain, Kuwait may also benefit from outliers.

UAE's Medicine research with international collaboration displays a high FWCI of 2.20, well ahead of the World and the Kingdom of Saudi Arabia.

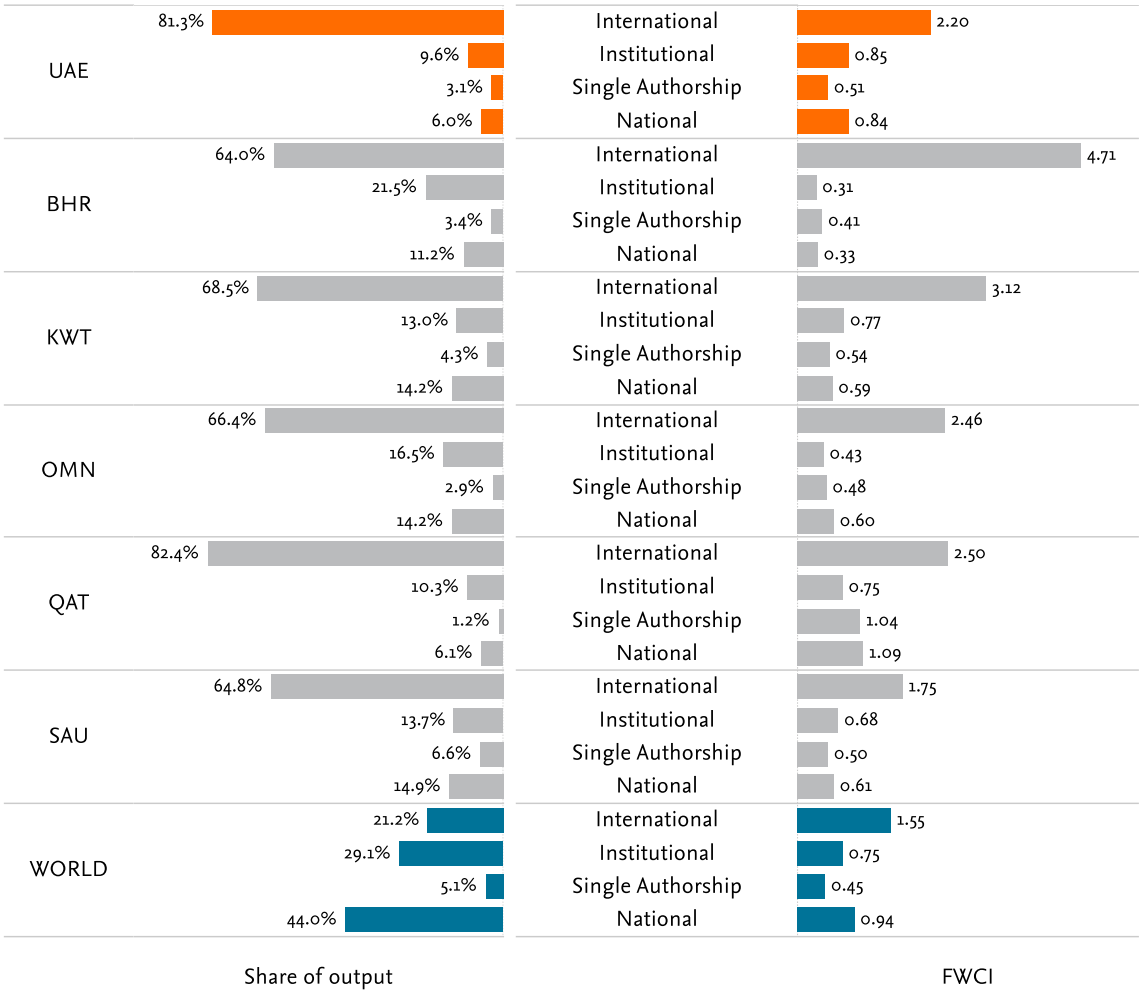

FIGURE 2-6
Share of Medicine output with different collaboration types (left) and corresponding FWCI (right) for the UAE and comparators in 2017–2022.
Source: Scopus

The subject of Medicine with its many subcategories (FIGURE 2-7) shows a wide variations of publication shares. The UAE's shares for Health Informatics and Endocrinology, Diabetes & Metabolism are notable, with each at least twice the global shares and well above the GCC averages.

	BHR	KWT	OMN	QAT	SAU	UAE	G20	GCC	WOR..
Anatomy	0.8%	0.3%	0.5%	0.3%	0.6%	0.5%	0.3%	0.6%	0.4%
Anesthesiology and Pain Medicine	1.3%	0.5%	1.5%	0.7%	0.6%	0.6%	0.9%	0.7%	0.9%
Biochemistry, medical	0.8%	0.7%	0.3%	0.6%	0.6%	0.4%	0.6%	0.6%	0.6%
Cardiology and Cardiovascular Medicine	3.2%	2.5%	3.6%	4.0%	2.0%	3.0%	3.7%	2.4%	3.6%
Clinical Neurology	2.3%	5.1%	3.0%	2.6%	2.3%	2.3%	3.9%	2.4%	3.7%
Complementary and alternative medicine	0.4%	0.2%	0.6%	0.2%	0.9%	0.5%	0.8%	0.7%	0.8%
Critical Care and Intensive Care Medicine	1.2%	0.6%	0.7%	0.9%	0.5%	0.9%	0.8%	0.6%	0.8%
Dermatology	1.0%	1.3%	0.7%	0.9%	1.0%	0.9%	1.2%	1.0%	1.2%
Drug guides					0.0%	0.0%	0.0%	0.0%	0.0%
Embryology	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Emergency Medicine	1.1%	0.5%	0.5%	1.2%	0.4%	1.4%	0.7%	0.7%	0.7%
Endocrinology, Diabetes and Metabolism	5.5%	5.2%	1.6%	4.5%	1.9%	3.9%	2.1%	2.5%	2.1%
Epidemiology	0.9%	1.1%	1.5%	1.0%	0.7%	1.0%	1.0%	0.8%	0.9%
Family Practice	0.3%	0.2%	0.1%	0.2%	0.2%	0.1%	0.3%	0.2%	0.3%
Gastroenterology	0.9%	1.2%	0.5%	0.7%	0.6%	0.9%	1.5%	0.6%	1.4%
General Medicine	23.6%	10.7%	16.3%	9.7%	8.8%	7.4%	6.3%	9.4%	7.7%
Genetics(clinical)	0.7%	2.2%	1.6%	1.7%	1.3%	2.0%	1.2%	1.4%	1.1%
Geriatrics and Gerontology	0.5%	0.4%	0.2%	0.6%	0.3%	0.2%	0.8%	0.3%	0.8%
Health Informatics	5.6%	2.9%	2.3%	3.0%	3.0%	4.8%	1.9%	3.4%	2.0%
Health Policy	2.0%	2.5%	1.5%	2.1%	1.6%	2.1%	1.7%	1.7%	1.8%
Hematology	0.8%	2.3%	2.3%	1.2%	1.3%	0.6%	1.3%	1.2%	1.3%
Hepatology	0.7%	0.5%	0.4%	0.6%	0.2%	0.4%	0.7%	0.3%	0.7%
Histology	0.5%	0.5%	0.5%	0.5%	0.7%	0.5%	0.6%	0.6%	0.6%
Immunology and Allergy	1.8%	4.0%	1.6%	2.4%	1.6%	2.1%	2.3%	1.8%	2.3%
Infectious Diseases	4.1%	4.2%	6.2%	4.5%	4.0%	3.8%	3.3%	4.0%	3.3%
Internal Medicine	2.0%	2.1%	1.0%	2.1%	0.8%	2.0%	1.2%	1.1%	1.2%
Medicine (miscellaneous)	2.3%	1.6%	1.6%	2.2%	1.9%	2.0%	2.4%	2.0%	2.3%
Microbiology (medical)	2.0%	2.9%	4.0%	1.8%	2.2%	2.2%	1.9%	2.3%	1.9%
Nephrology	0.7%	0.8%	0.8%	0.3%	0.5%	0.6%	0.6%	0.5%	0.6%
Obstetrics and Gynaecology	1.3%	1.5%	1.1%	1.6%	0.7%	1.3%	1.6%	1.0%	1.8%
Oncology	2.3%	3.3%	2.9%	4.3%	3.0%	2.5%	5.5%	3.1%	5.1%
Ophthalmology	0.7%	0.7%	1.5%	0.5%	1.5%	1.7%	1.4%	1.4%	1.4%
Orthopedics and Sports Medicine	1.1%	1.4%	1.3%	8.0%	1.1%	1.9%	2.8%	2.0%	2.7%
Otorhinolaryngology	0.7%	1.0%	0.8%	0.5%	1.1%	0.9%	1.2%	1.0%	1.2%
Pathology and Forensic Medicine	0.9%	1.1%	0.4%	1.1%	1.1%	1.1%	1.4%	1.1%	1.4%
Pediatrics, Perinatology, and Child Health	2.5%	3.1%	2.6%	3.3%	2.1%	2.5%	2.8%	2.3%	2.8%
Pharmacology (medical)	3.3%	2.9%	3.3%	3.6%	3.5%	3.6%	2.9%	3.4%	2.9%
Physiology (medical)	0.4%	0.8%	0.7%	2.1%	0.5%	0.8%	1.3%	0.7%	1.2%
Psychiatry and Mental health	1.8%	2.6%	2.0%	2.3%	1.4%	2.4%	3.5%	1.7%	3.4%
Public Health, Environmental and Occupational Health	6.5%	7.7%	7.5%	6.1%	6.4%	5.9%	5.5%	6.3%	5.7%
Pulmonary and Respiratory Medicine	0.8%	1.4%	0.9%	0.8%	0.9%	1.2%	1.5%	0.9%	1.4%
Radiology Nuclear Medicine and imaging	1.5%	3.5%	1.1%	2.5%	2.1%	2.5%	3.7%	2.3%	3.5%
Rehabilitation	0.4%	0.8%	0.4%	1.0%	0.6%	0.7%	0.8%	0.6%	0.8%
Reproductive Medicine	0.5%	0.5%	0.5%	0.8%	0.4%	0.8%	0.6%	0.5%	0.6%
Reviews and References, Medical				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rheumatology	0.5%	0.9%	0.4%	0.5%	0.4%	0.6%	0.6%	0.4%	0.6%
Surgery	3.3%	6.5%	3.0%	4.6%	4.0%	4.9%	5.7%	4.3%	5.5%
Transplantation	0.5%	1.1%	0.6%	0.2%	0.6%	0.4%	0.5%	0.5%	0.5%
Urology	0.9%	1.2%	0.5%	1.6%	0.9%	0.7%	1.0%	0.9%	1.0%

Share of output of all health-related ASJC

0.0% 25.0%

FIGURE 2-7

Share of subcategory publications within Medicine for UAE and comparators out of all health-related output, 2017–2022. Empty (white) cells signify that a country/region has no research output in a given field.

Source: Scopus

United Arab Emirates University was the largest contributor to the UAE research output in Medicine, closely followed by University of Sharjah (FIGURE 2-8). However, not surprisingly, the more specialized institutions such as Dubai Hospital, Cleveland Clinic Abu Dhabi, and Sheikh Khalifa Medical City have almost all of their publications in this subject. The FWCI of some of the contributors is very high, which may be accounted to participation in the Global Burden of Disease Study or similar studies with outstanding citation rates.

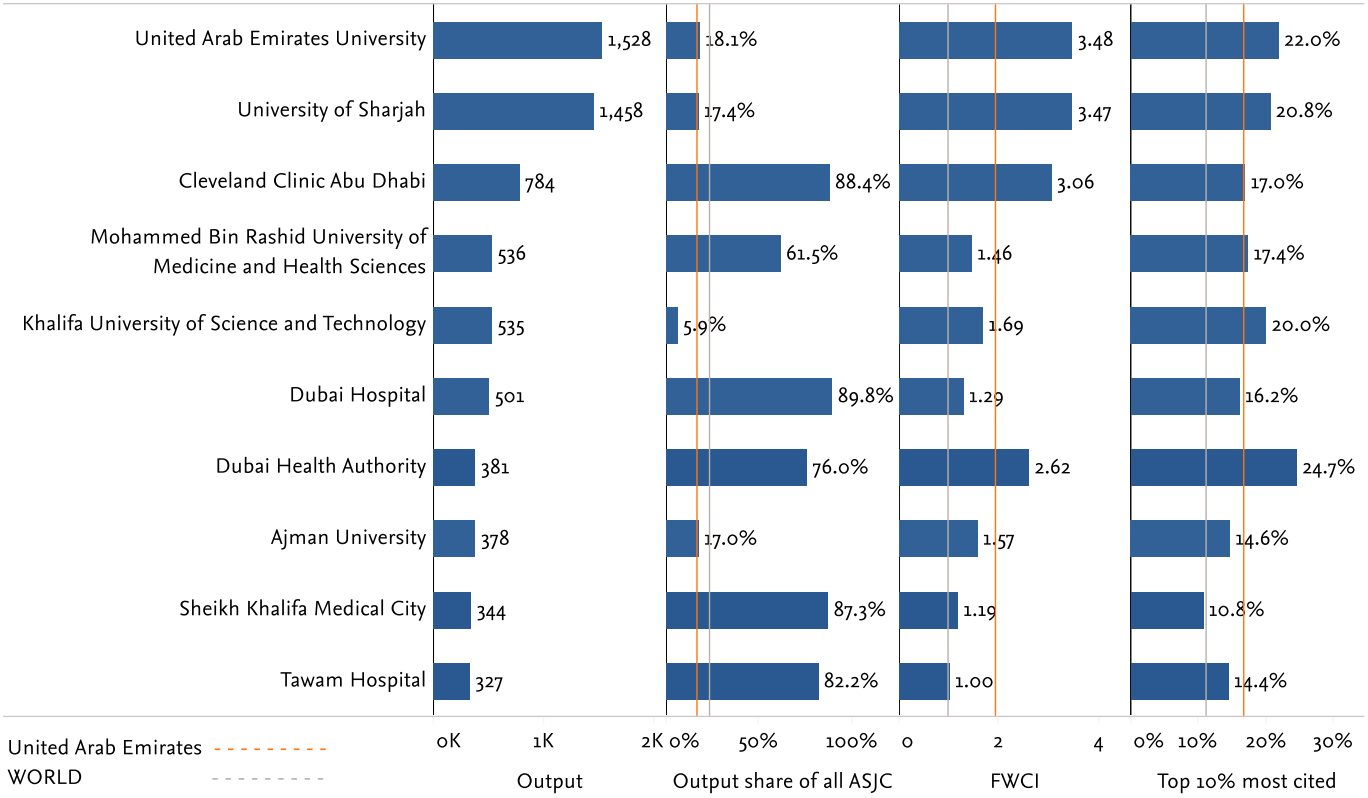

FIGURE 2-8
Top ten UAE institutions by scholarly output within Medicine, share of total output, FWCI and share in top 10% most highly cited publications, 2017–2022.
Source: Scopus

Throughout the period, University of Sharjah held the second position by output in Medicine, but the annual trend reveals that the university surpassed United Arab Emirates University in 2021 with annual growth of almost 40% (FIGURE 2-9). It is interesting to see, though, that the highly specialized institutions such as Dubai Hospital, Dubai Health Authority and Tawam Hospital all lost places in recent years, mainly due to Khalifa University of Science and Technology and Ajman University's higher growth rate. And this despite that fact that both institutions have a broader focus.

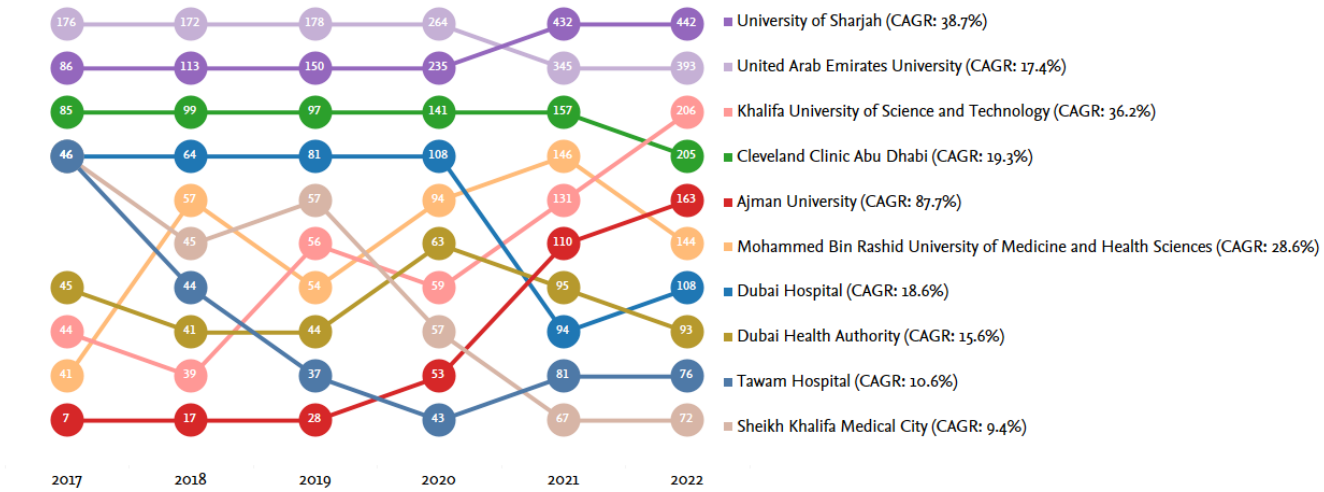

FIGURE 2-9
Top 10 UAE institutions by Medicine output for the period of 2017–2022 ranked according to their relative position throughout the period. Numbers in dots indicate the publication output for the respective year. Numbers in parentheses indicate CAGR. Some institutions have the same publication output and therefore dots may overlap.
Source: Scopus

2.3 Biochemistry, Genetics & Molecular Biology

UAE's share of publications in Biochemistry, Genetics & Molecular Biology was below the global average, but above most other GCC countries. United Arab Emirates University was the most prolific institution, but its share in this subject fell behind that of more health-targeted institutions.

UAE's share of publications in Biochemistry, Genetics & Molecular Biology of its total health-related output was below global average in the period of 2017–2022, but above all other GCC countries except the Kingdom of Saudi Arabia (FIGURE 2-10). Only the Kingdom of Saudi Arabia displayed a share above the world average in that period. The total number of publications (4,453) for the UAE in this subject area was the second highest of all subject areas, however.

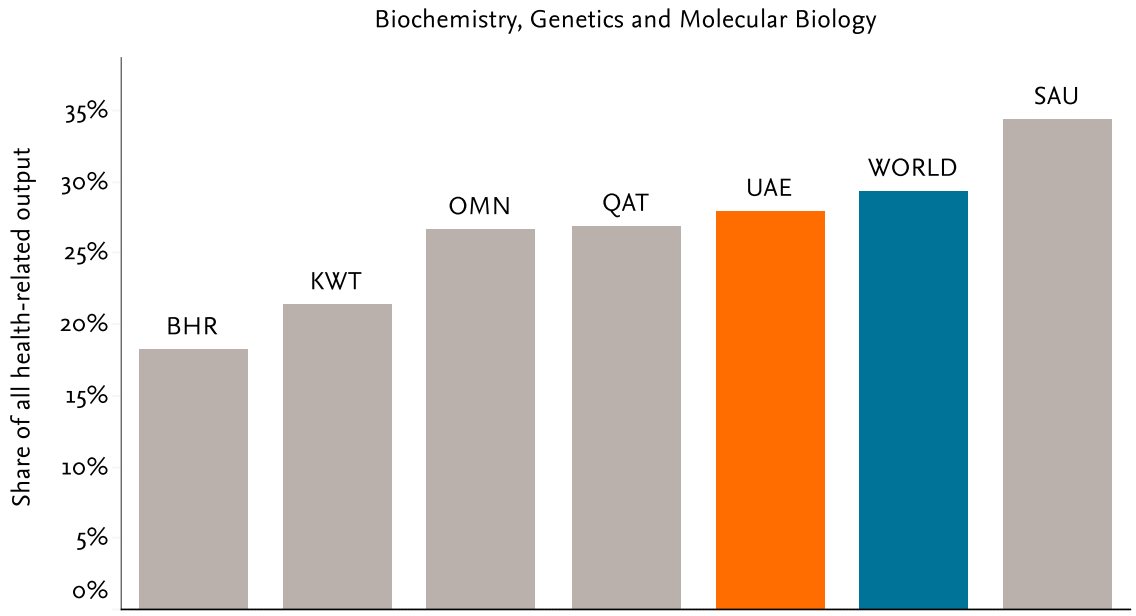

FIGURE 2-10
Share of Biochemistry, Genetics & Molecular Biology publications of total health-related output for UAE and comparators, 2017–2022.
Source: Scopus

The collaboration analysis for Biochemistry, Genetics & Molecular Biology shows the same pattern as for overall health-related research and Medicine (FIGURE 2-11). It is striking, however, that the FWCI is not as high as within Medicine, especially for the smaller countries like Bahrain and Kuwait. This may be accounted for by the fact that within Biochemistry, Genetics & Molecular Biology there are fewer

exceptional large-scale publications[14] that could skew the FWCI. UAE displays an average FWCI at the World level for its international collaborations.

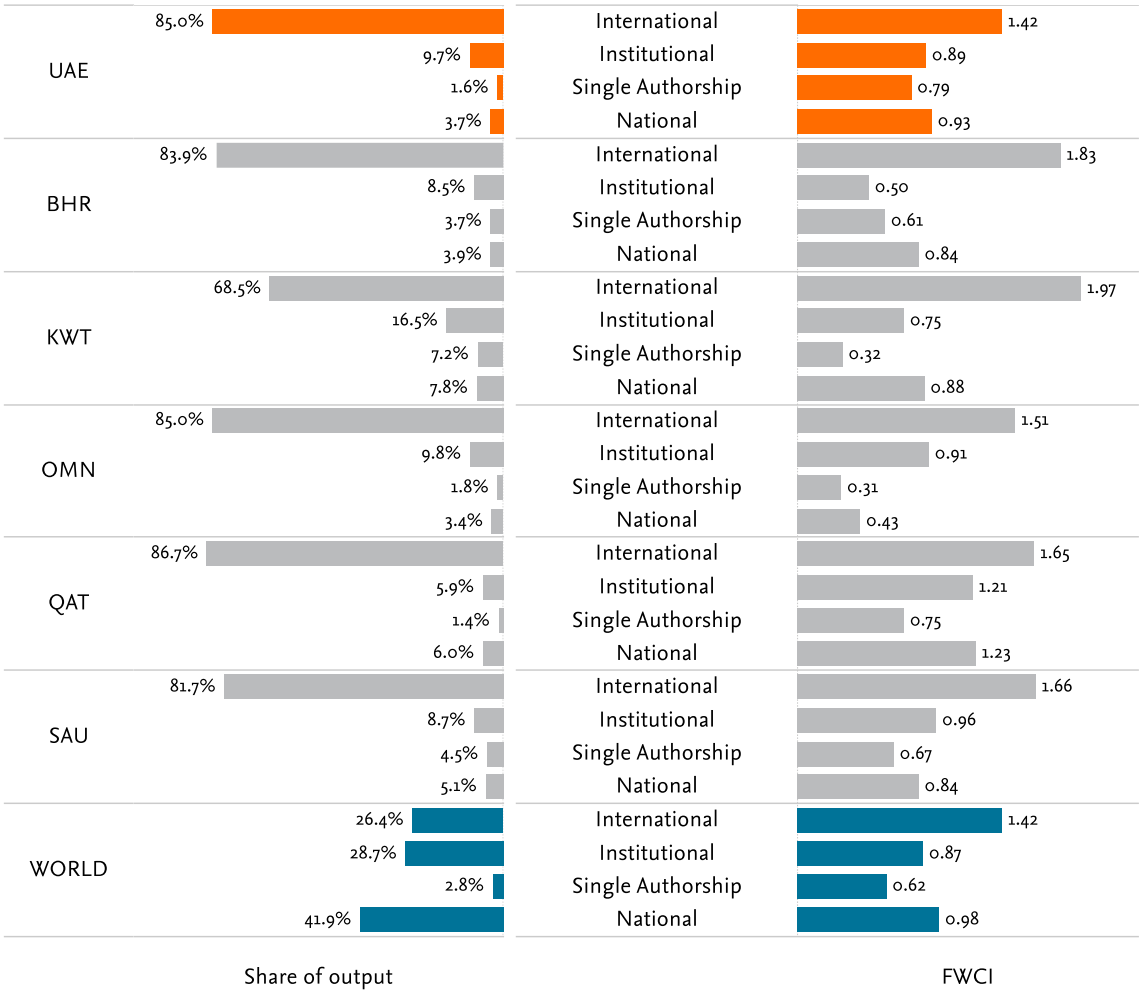

FIGURE 2-11
Share of Biochemistry, Genetics & Molecular Biology output with different collaboration types (left) and corresponding FWCI (right) for the UAE and comparators in 2017–2022.
Source: Scopus

Biochemistry was the underlying subject category with the highest share (6.7%), following global and GCC trends (FIGURE 2-12). In line with general observations on the higher level, most of the subject categories showed a lower share than GCC or world averages with the exception of the Genetics subcategory. For this category, UAE had the highest share of all the GCC comparators. Molecular Medicine was higher than the World average, but still below the GCC average.

14 For example, the Global Burden of Disease study is not included in Biochemistry but belongs only to Medicine in general.

	BHR	KWT	OMN	QAT	SAU	UAE	G20	GCC	WORLD
Ageing	0.4%	0.2%	0.5%	0.6%	0.4%	0.4%	0.5%	0.4%	0.5%
Biochemistry	3.8%	5.0%	7.1%	5.9%	10.4%	6.7%	7.8%	9.0%	7.4%
Biochemistry, Genetics and Molecular Biology (miscellaneous)	0.1%	0.1%	0.4%	0.4%	0.6%	0.4%	0.4%	0.5%	0.4%
Biophysics	0.5%	1.3%	1.3%	1.2%	2.1%	1.3%	1.9%	1.8%	1.7%
Biotechnology	1.9%	1.7%	4.2%	2.4%	4.3%	3.3%	3.5%	3.9%	3.4%
Cancer Research	1.5%	2.4%	1.6%	3.3%	2.1%	1.9%	3.9%	2.1%	3.5%
Cell Biology	1.1%	1.8%	2.0%	2.8%	3.2%	2.3%	3.8%	2.9%	3.5%
Clinical Biochemistry	1.2%	1.5%	1.3%	1.7%	2.0%	1.4%	1.7%	1.8%	1.7%
Developmental Biology	0.4%	0.4%	0.2%	0.6%	0.4%	0.7%	0.9%	0.5%	0.8%
Endocrinology	2.4%	1.7%	0.6%	1.8%	0.8%	1.9%	1.2%	1.1%	1.2%
General Biochemistry, Genetics and Molecular Biology	3.5%	2.8%	3.9%	3.8%	5.3%	4.3%	4.2%	4.8%	4.0%
Genetics	2.1%	4.2%	3.1%	3.4%	3.4%	4.2%	4.4%	3.5%	4.0%
Molecular Biology	2.8%	3.8%	5.1%	5.7%	6.2%	5.4%	6.5%	5.9%	6.1%
Molecular Medicine	1.8%	2.3%	2.9%	1.9%	5.0%	3.6%	2.8%	4.2%	2.6%
Physiology	0.8%	1.3%	1.9%	2.4%	1.6%	1.5%	2.3%	1.7%	2.2%
Structural Biology	0.4%	0.4%	0.7%	0.7%	1.4%	0.7%	0.7%	1.1%	0.7%

Share of output of all health-related ASJC

0.0% 10.0%

FIGURE 2-12
Share of subcategory publications within Biochemistry, Genetics & Molecular Biology for UAE and comparators out of all health-related output, 2017–2022.
Source: Scopus

United Arab Emirates University was the most prolific institution in the UAE within Biochemistry, Genetics & Molecular Biology with 1,000 publications between 2017 and 2022 and a share of health-related publications of 12%. Not surprisingly, however, more specialized institutions such as the Gulf Medical University had a much higher share of health-related output with close to a quarter of their total output (FIGURE 2-13).

FWCI and share of publications in the top 10% most highly cited publications showed a large variation among the institutions with Zayed University having the highest FWCI and the highest share of most highly cited publications (although with a very small base of just 125 publications).

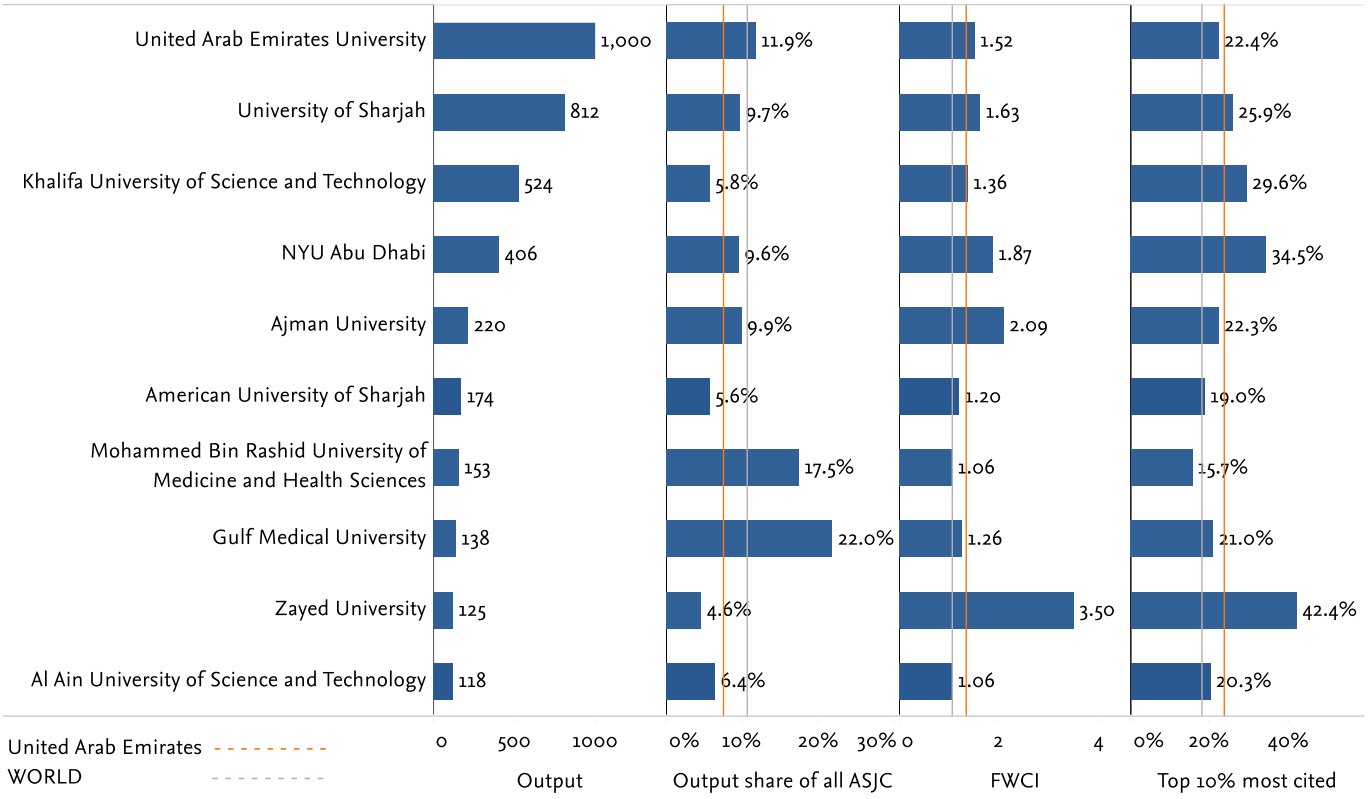

FIGURE 2-13
Top ten UAE institutions by scholarly output within Biochemistry, Genetics & Molecular Biology, share of total output, FWCI and share in top 10% most highly cited publications, 2017–2022.
Source: Scopus

The annual trends within the subject area Biochemistry, Genetics & Molecular Biology make it even clearer that this subject is much more reliant on broadly focused institutions such as University of Sharjah, United Arab Emirates University, Khalifa University of Science and Technology and Ajman University (FIGURE 2-14). The smaller, much more specialized institutions such as Dubai Hospital or Tawam Hospital do not even appear on this list, although they were quite prominent in Medicine.

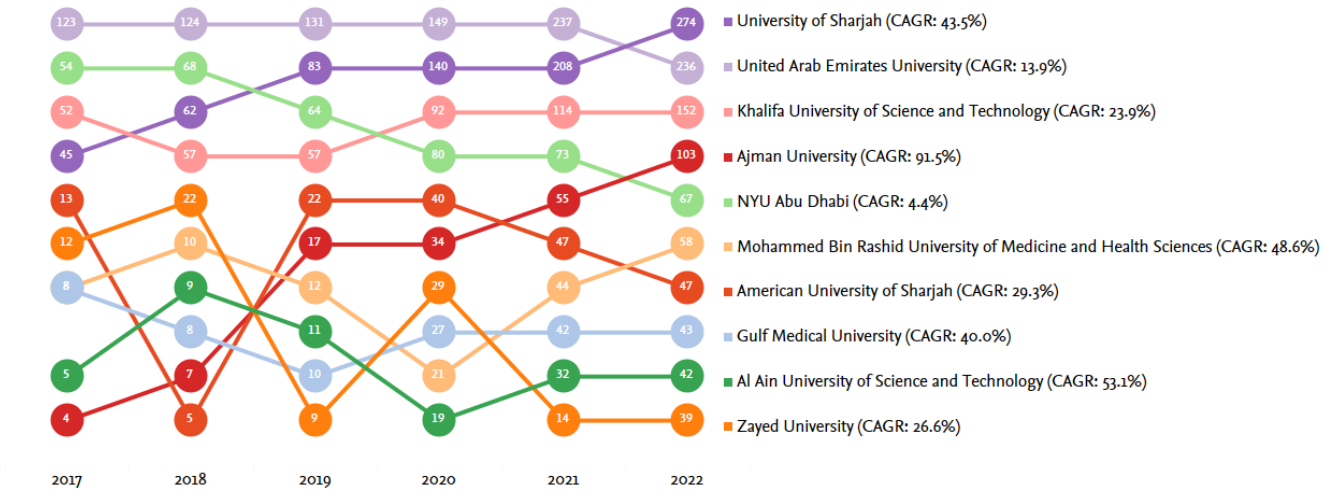

FIGURE 2-14
Top 10 UAE institutions by Biochemistry, Genetics & Molecular Biology output for the period of 2017–2022 ranked according to their relative position throughout the period. Numbers in dots indicate the publication output for the respective year. Numbers in parentheses indicate CAGR. Some institutions have the same publication output and therefore dots may overlap.
Source: Scopus

2.4 Pharmacology, Toxicology & Pharmaceutics

Pharmacology, Toxicology & Pharmaceutics seems to be one of the focus areas for UAE, with a share well above the global average. University of Sharjah and United Arab Emirates University are the single largest contributors to this subject area.

More than 13% of all health-related publications of UAE are within Pharmacology, Toxicology & Pharmaceutics, placing it well above the global average of 9% (FIGURE 2-15). This high share is topped by the Kingdom of Saudi Arabia and Oman, however, pulling the GCC average to almost 16%.

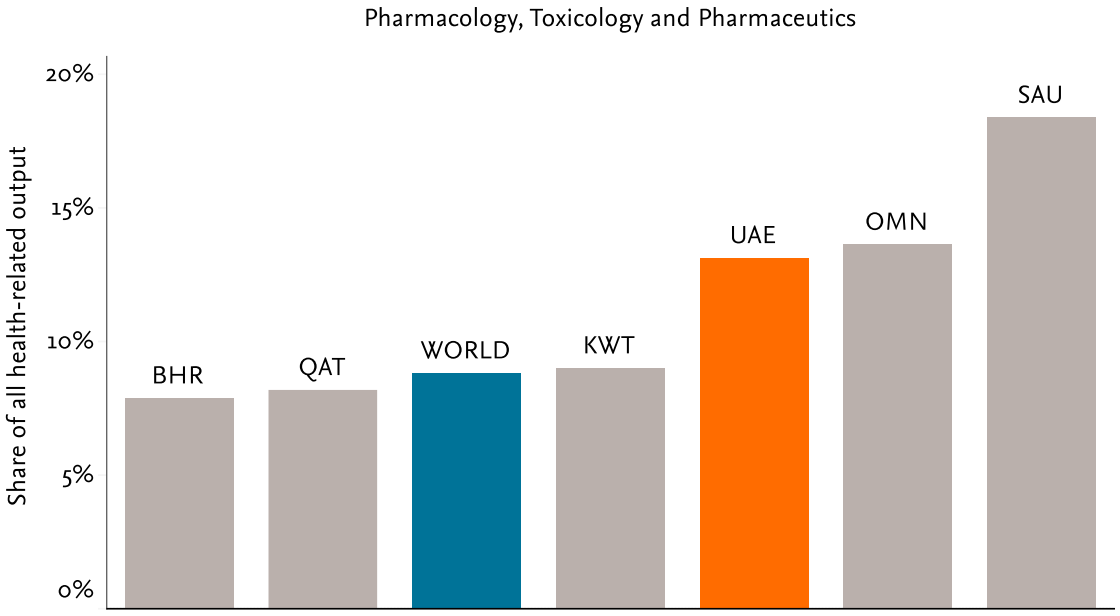

FIGURE 2-15
Share of Pharmacology, Toxicology & Pharmaceutics publications out of total health-related output for UAE and comparators, 2017–2022.
Source: Scopus

As expected, international collaboration is connected with the highest citation impact for all comparators, with the only notable exception being single authorship for Kuwait (FIGURE 2-15). It seems that there are at least one or a few exceptional publications that are outliers among overall relatively few publications, which pull the FWCI. UAE's performance is short of the global average in this subject, across most collaboration types, except for single-authored publications.

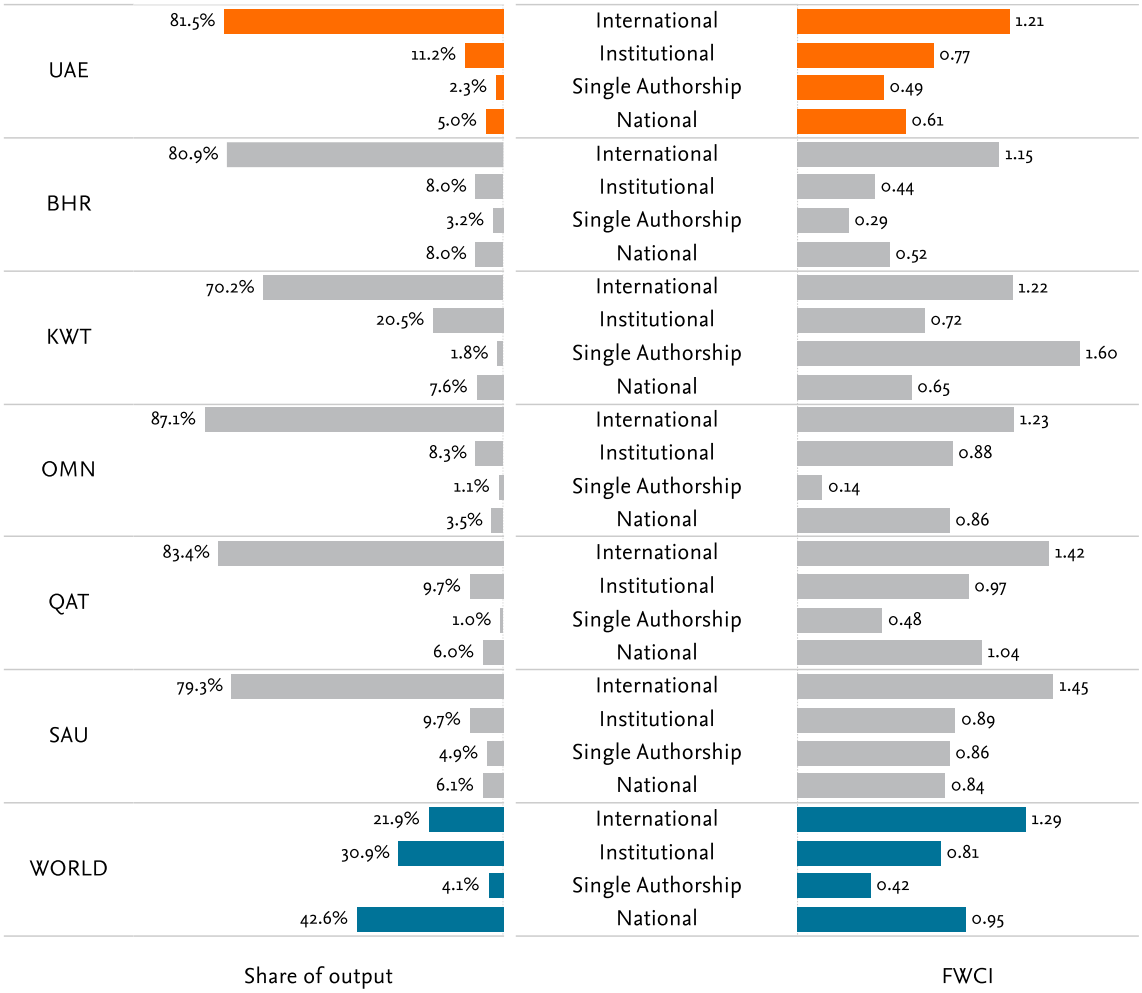

Figure 2-16
Share of Pharmacology, Toxicology and Pharmaceutics output with different collaboration types (left) and corresponding FWCI (right) for the UAE and comparators in 2017–2022.
Source: Scopus

All subcategories of Pharmacology, Toxicology & Pharmaceutics except Toxicology are well above the global averages (FIGURE 2-17). Notably, the performance in Drug Discovery and Pharmaceutical Science seems particularly strong.

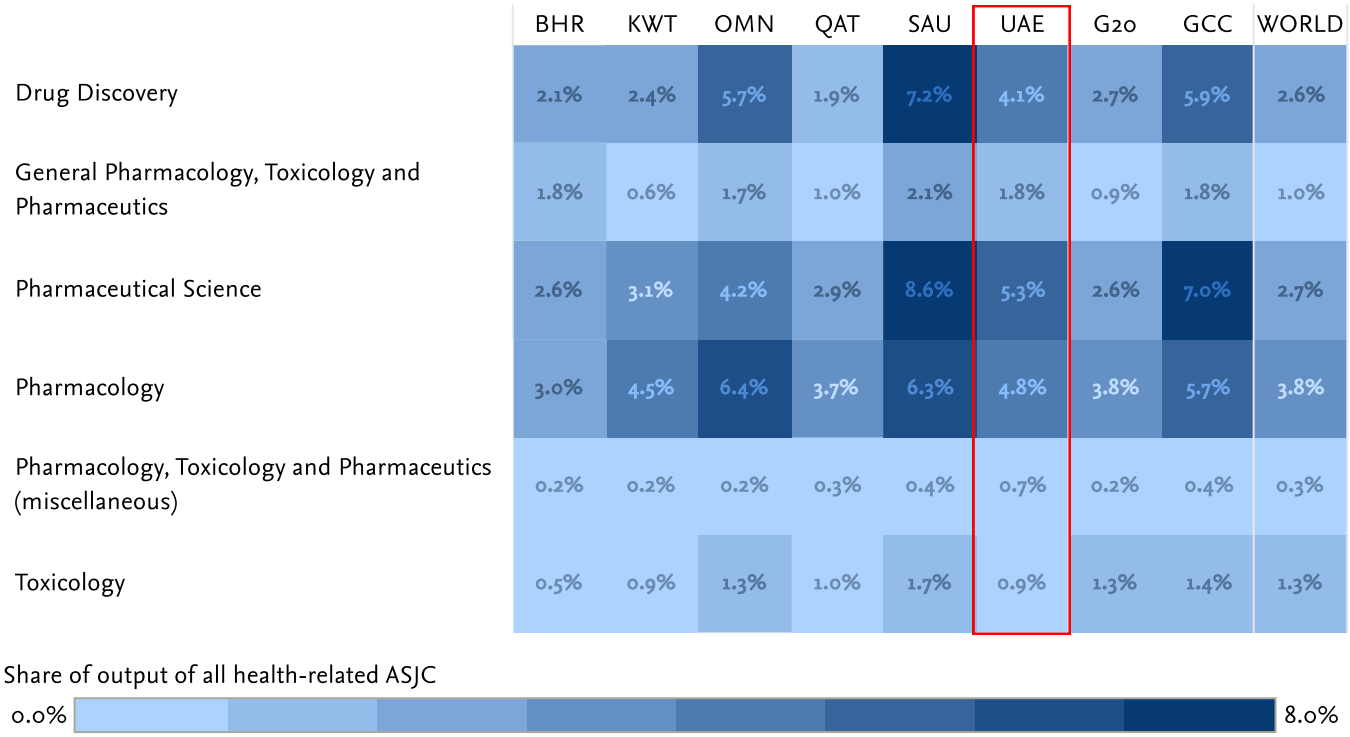

FIGURE 2-17
Share of subcategory publications within Pharmacology, Toxicology & Pharmaceutics for UAE and comparators out of all health-related output, 2017–2022.
Source: Scopus

Again, University of Sharjah and United Arab Emirates University are the main contributors to this subject area, both with around 400 publications in the period (FIGURE 2-18). Dubai Pharma College, not surprisingly, had the highest publications share of all institutions with almost two-third of its publications in Pharmacology.

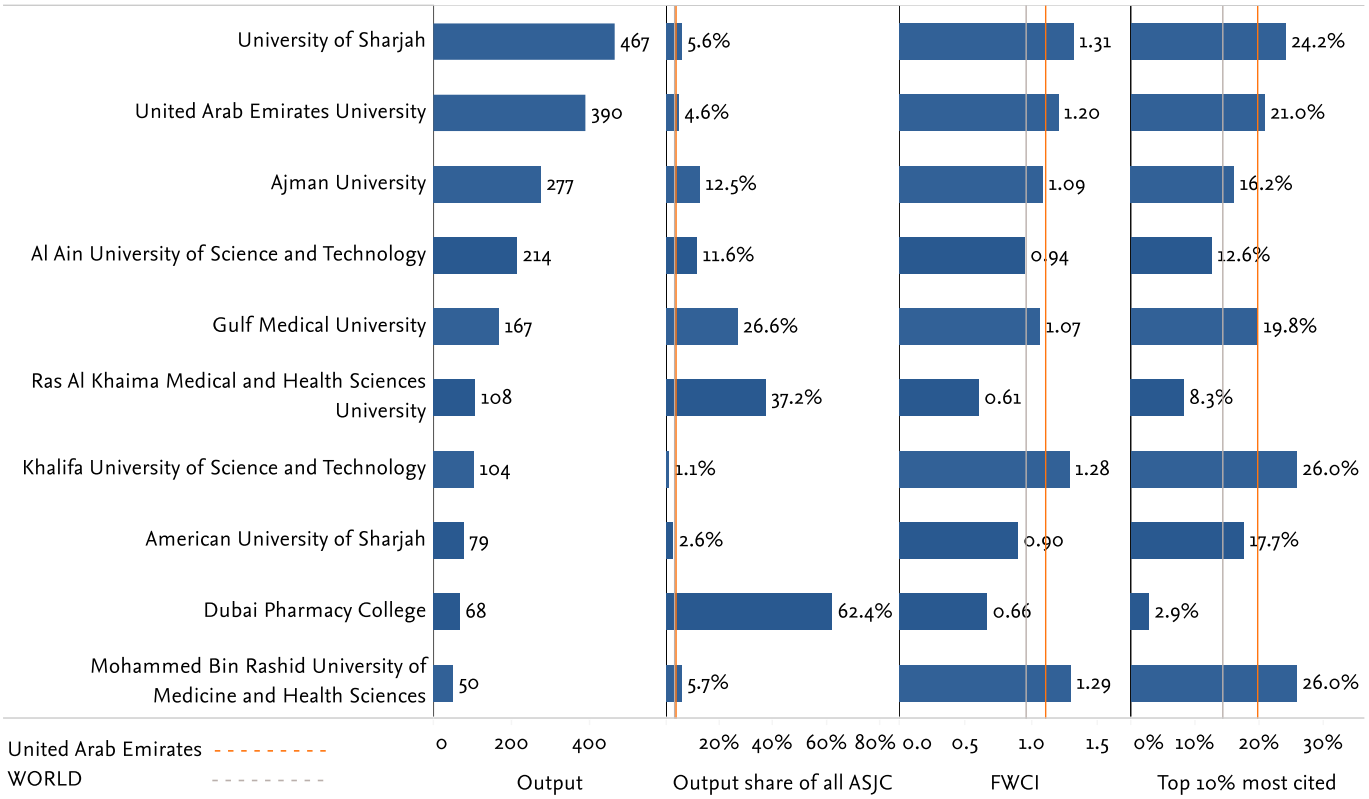

FIGURE 2-18
Top ten UAE institutions by scholarly output within Pharmacology, Toxicology & Pharmaceutics, share of total output, FWCI and share in top 10% most highly cited publications, 2017–2022. Dotted lines indicate UAE (red) and global (gray) averages.
Source: Scopus

The annual ranking trends in this subject are quite patchy due to overall relatively small numbers (FIGURE 2-19), but University of Sharjah, United Arab Emirates University and Ajman University held the leading positions during the analyzed period.

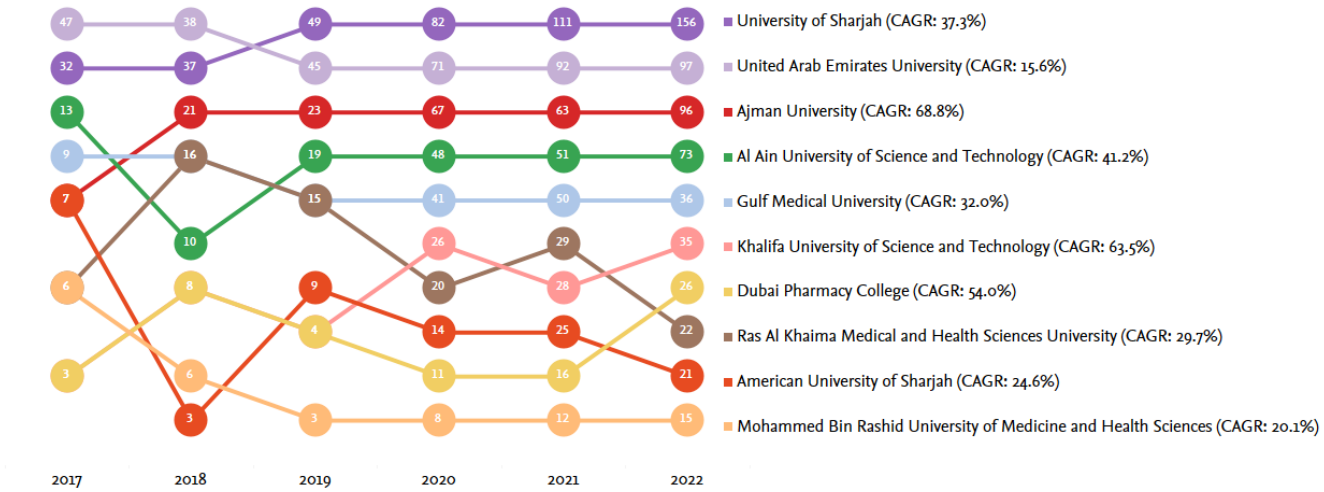

FIGURE 2-19
Top 10 UAE institutions by Pharmacology, Toxicology & Pharmaceutics output for the period 2017–2022 ranked according to their relative position throughout the period. Numbers in dots indicate the publication output for the respective year. Numbers in parentheses indicate CAGR. Some institutions have the same publication output and therefore dots may overlap.
Source: Scopus

2.5 Immunology and Microbiology

UA's share of publications in Immunology and Microbiology was below the global average, and below most other GCC countries. United Arab Emirates University and University of Sharjah were the most prolific institutions, but only one institution of the top 10 most active had a share above 10%.

UAE's share of publications in Immunology and Microbiology of its total health-related output was below the global average and most of the GCC countries' level in the period 2017–2022 (FIGURE 2-20). Only Bahrain and Qatar displayed a lower share. In total, UAE's researchers published 1,171 outputs in this subject area.

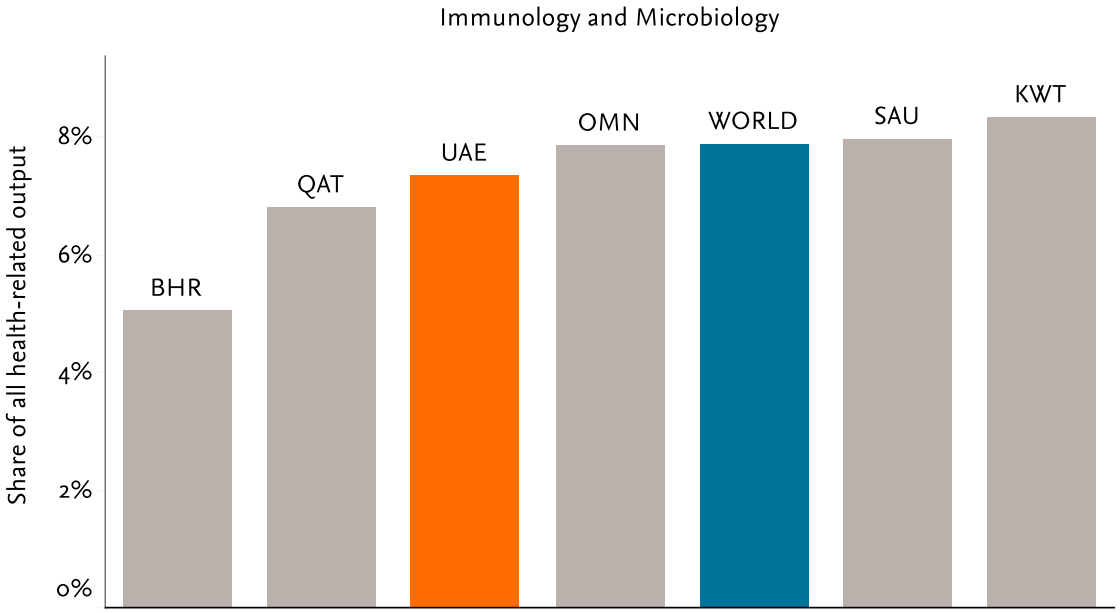

FIGURE 2-20
Share of Immunology and Microbiology publications of total health-related output for UAE and comparators, 2017–2022
Source: Scopus

Given the overall numbers in this subject being relatively low, the collaboration analysis is highly susceptible to outliers, but the general trend remains the same (FIGURE 2-21). The highest FWCI is achieved with international collaboration for all comparators.

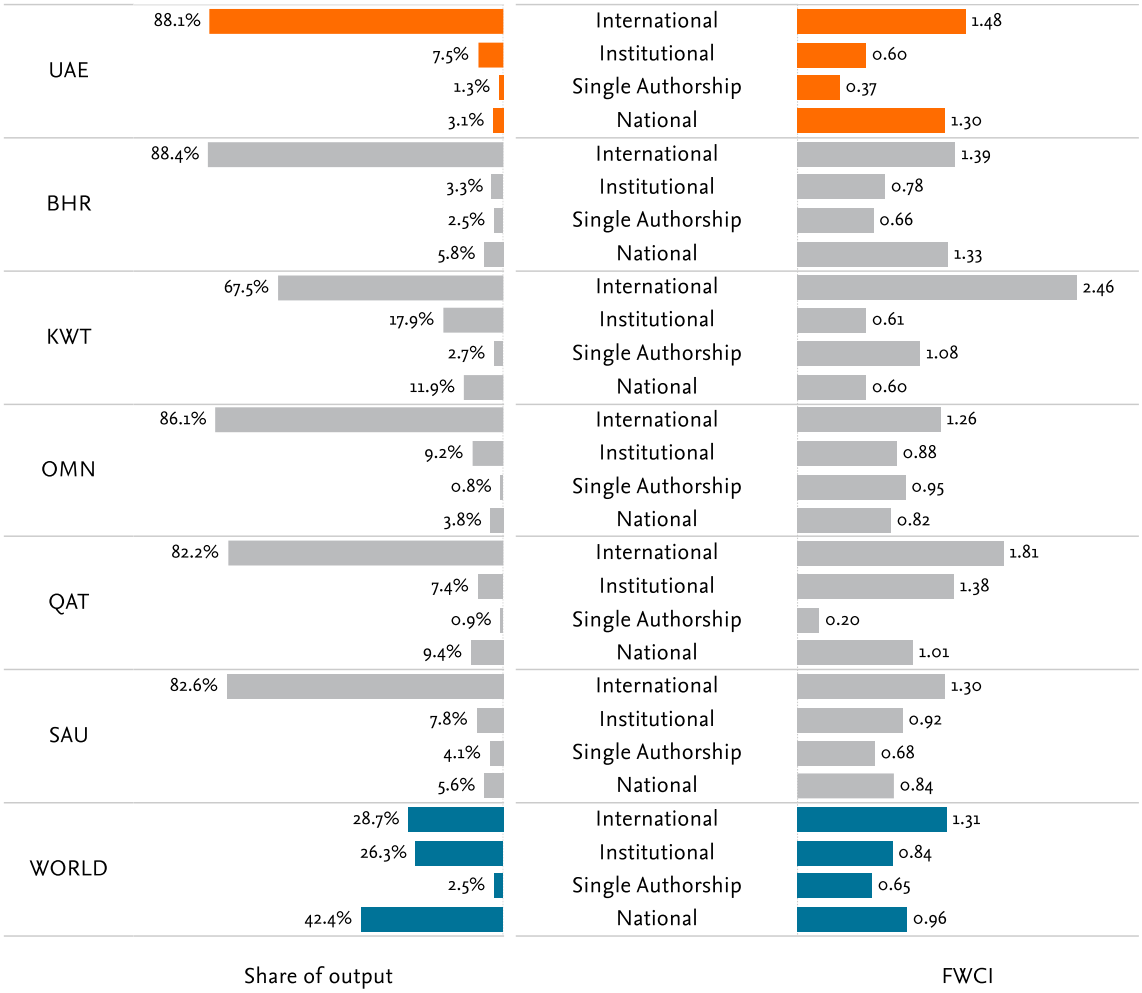

FIGURE 2-21
Share of Immunology and Microbiology output with different collaboration types (left) and corresponding FWCI (right) for the UAE and comparators, 2017–2022.
Source: Scopus

For all underlying subcategories, UAE's share of total health-related output was below global averages (FIGURE 2-22). Only in Virology and Immunology did the country surpass the GCC average, while for all other subcategories the share was at or below the GCC averages. Qatar and Kuwait display a relatively high share for publications in Immunology.

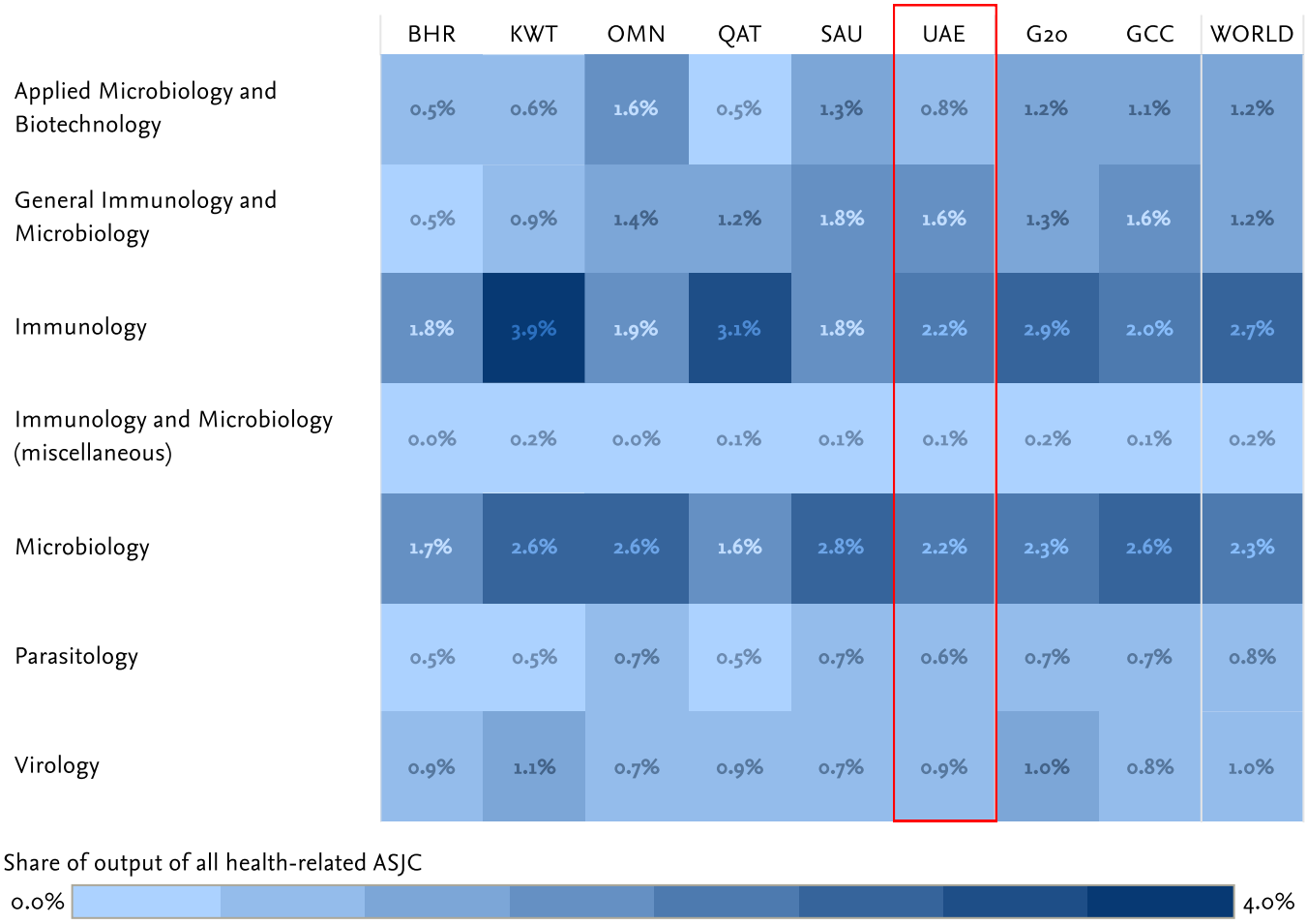

FIGURE 2-22
Share of subcategory publications within Immunology and Microbiology for UAE and comparators out of all health-related output, 2017–2022.
Source: Scopus

University of Sharjah was the most prolific institution in the UAE within Immunology and Microbiology with 271 publications between 2017 and 2022, followed closely by the United Arab Emirates University. Mohammed Bin Rashid University of Medicine and Health Sciences had the highest share of publications in this subject (more than 10%), and it displayed the highest FWCI of all institutions as well (FIGURE 2-23). Dubai Hospital had the second-highest FWCI, but with only few publications.

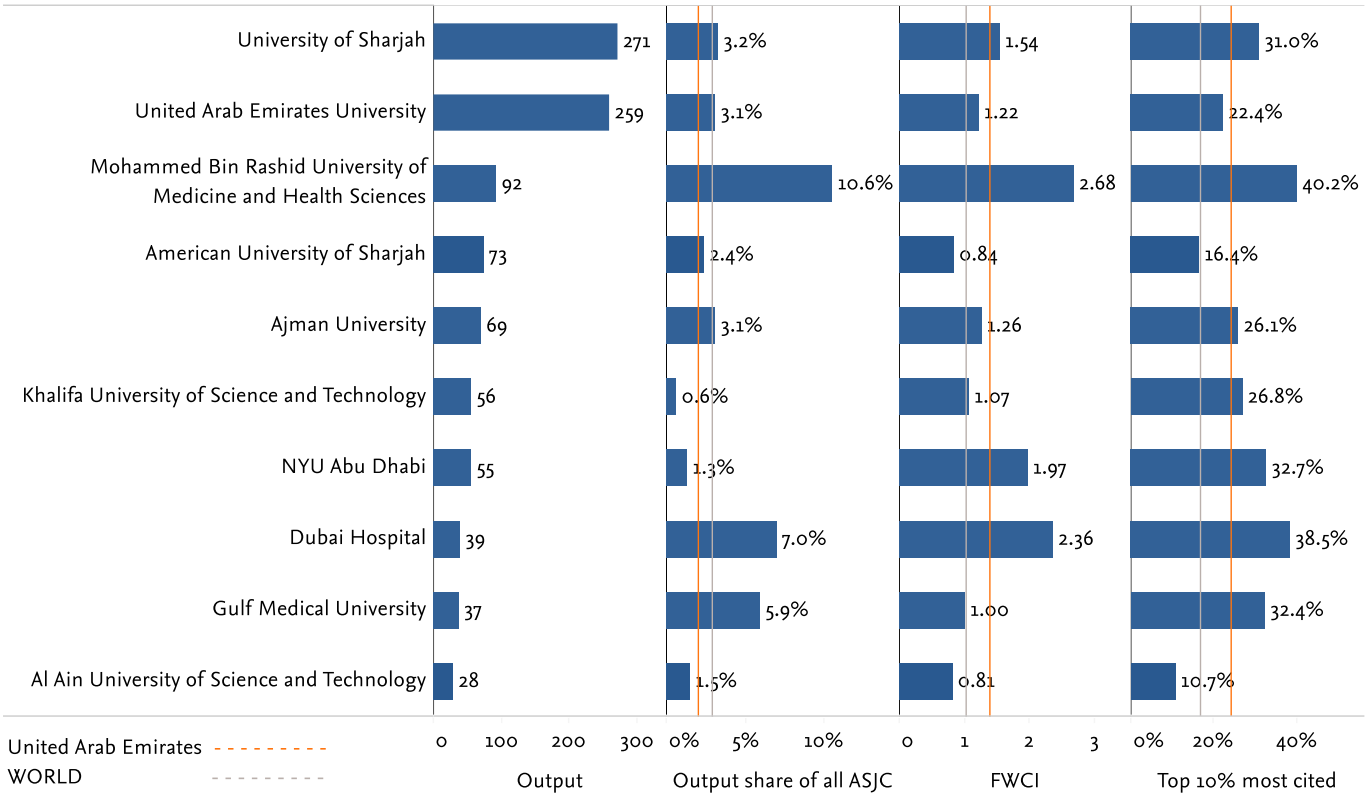

FIGURE 2-23
Top ten UAE institutions by scholarly output within Immunology and Microbiology, share of total output, FWCI and Share in top 10% most highly cited publications, 2017–2022.
Source: Scopus

Annual trends are not displayed within this subject due to small numbers. Most of the institutions have less than 20 publications per year, with only University of Sharjah and United Arab Emirates University having a higher annual publication output in Immunology and Microbiology.

2.6 Psychology

UAE had the highest share of publications in Psychology of all GCC countries, which nevertheless was still below the global average. This was due to the UAE's below-average share in the Psychology subcategory of Clinical Psychology. The most prolific UAE organization in Psychology was NYU Abu Dhabi with 206 publications.

In Psychology, UAE's share of the national health-related output amounted to 6%, which was the highest of all GCC countries (FIGURE 2-24). Nevertheless, this value was still below the World average of 7%. In total, 912 publications in UAE were focused on Psychology.

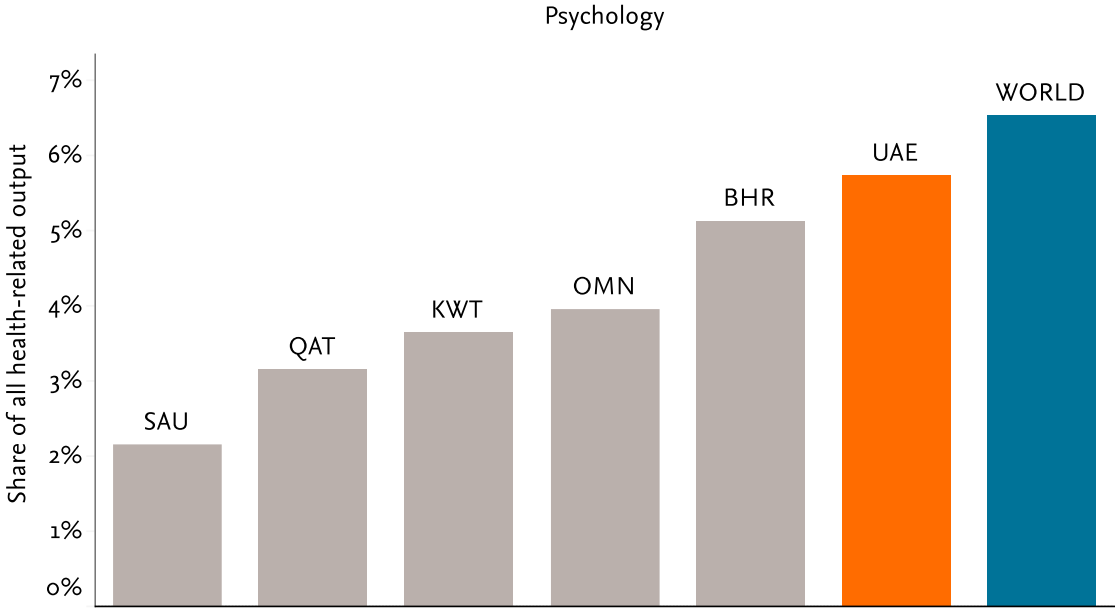

FIGURE 2-24
Share of Psychology publications of total health-related output for UAE and comparators, 2017–2022.
Source: Scopus

The eight Psychology subcategories (FIGURE 2-25) show significant variation in shares of health-related output across the countries and regions. UAE's output in Psychology appears to be relatively evenly spread across the different subcategories with contributions to Applied Psychology, Clinical Psychology, Developmental and Education Psychology, Experimental and Cognitive Psychology, General Psychology and Social Psychology. In most of these subcategories, UAE's share was similar or close to the global average. The only subcategory in which UAE had a noticeably lower share than the global average was Clinical Psychology.

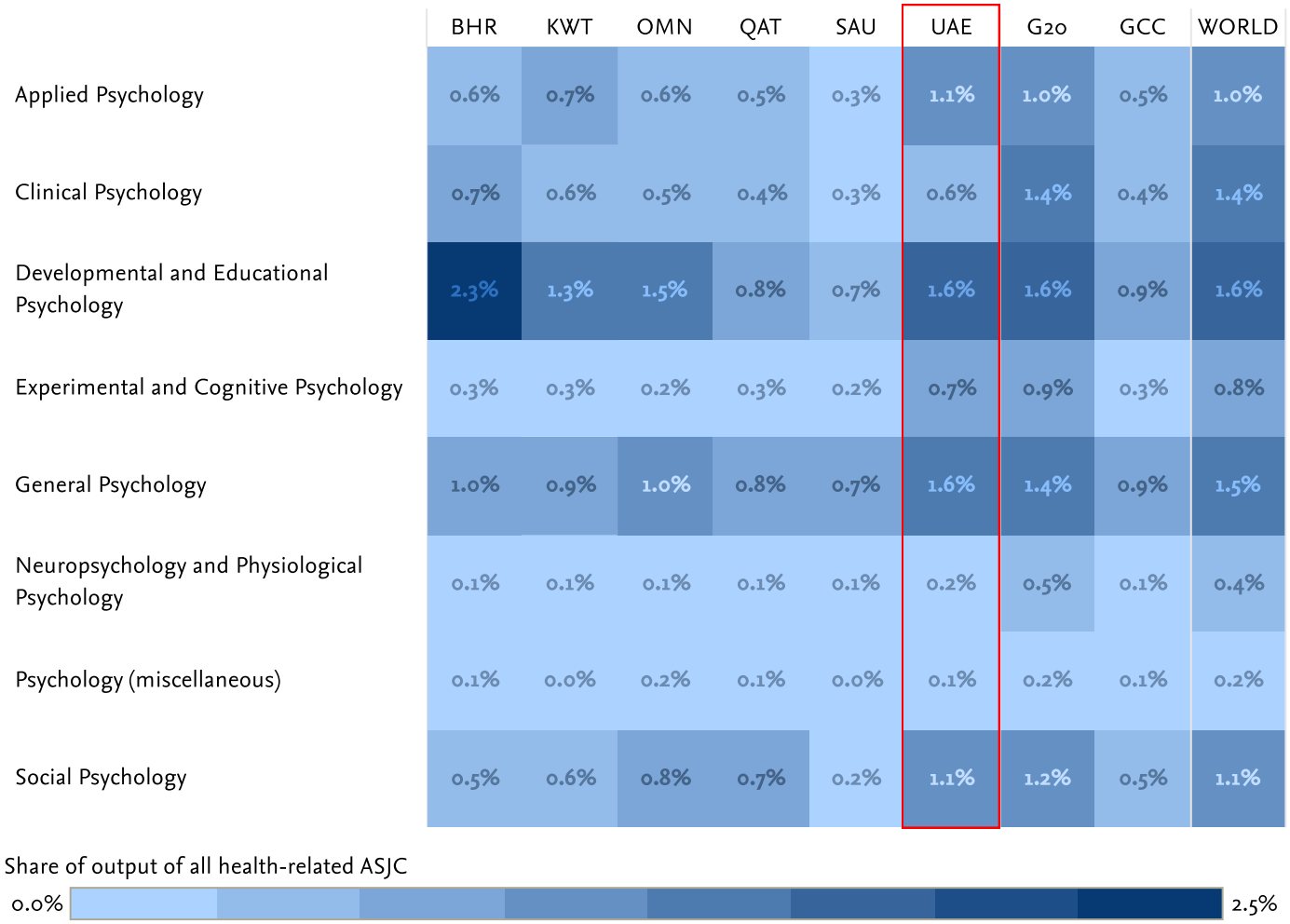

FIGURE 2-25
Share of subcategory publications within Psychology for UAE comparators out of all health-related output, 2017–2022.
Source: Scopus

Among UAE's research institutions, the NYU Abu Dhabi, United Arab Emirates University and Zayed University were the most prolific organizations publishing in the field of Psychology (FIGURE 2-26). Their FWCI and share of top 10% cited publications in the field was higher than the global average, although the share of Psychology publications out of their total output ranged from only 2% to 5%. The only organization for which Psychology publications constituted a significant share of total output was the Emirates College for Advanced Education with 44% of its publications being in Psychology.

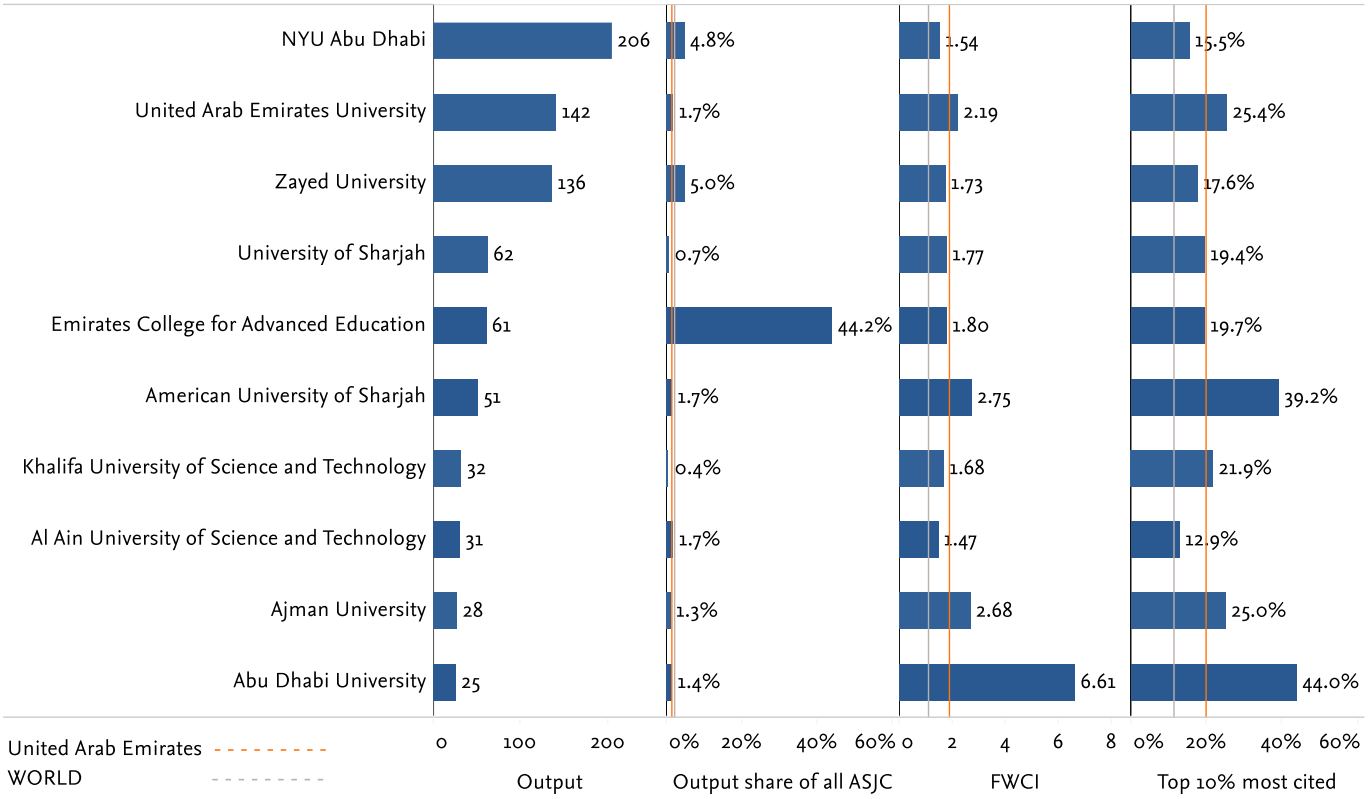

FIGURE 2-26
Top ten UAE institutions by scholarly output within Psychology, share of total output, FWCI and share in top 10% most highly cited publications, 2017–2022. Dotted lines indicate UAE (red) and global (gray) averages.
Source: Scopus

2.7 Neuroscience

In Neuroscience, Qatar and UAE are the leading contributors (by share of publications) of all GCC countries, but with relatively few publications overall. Among the GCC countries, UAE leads in the subcategory of Cognitive Neuroscience with the highest share. NYU Abu Dhabi is the largest contributor to this field in UAE.

For Neuroscience, UAE's share of health-related research is on par with Qatar and well above most GCC countries (FIGURE 2-27). But all of the GCC countries are below the global average in this still trending subject area.

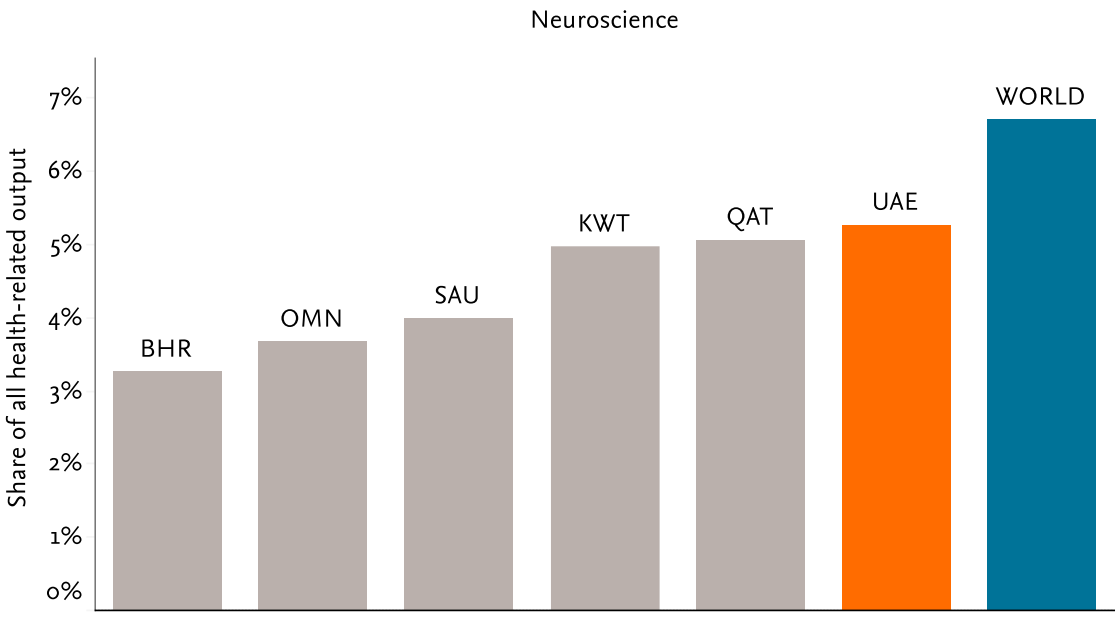

FIGURE 2-27
Share of Neuroscience publications of total health-related output for UAE and comparators, 2017–2022.
Source: Scopus

For the subcategories within Neuroscience, the picture is almost the same (FIGURE 2-28). Only for Cognitive Neuroscience is UAE's share of all health-related publications above the global average, and only by 0.1%. Cognitive Neuroscience is also the subcategory for which the UAE leads among the GCC countries.

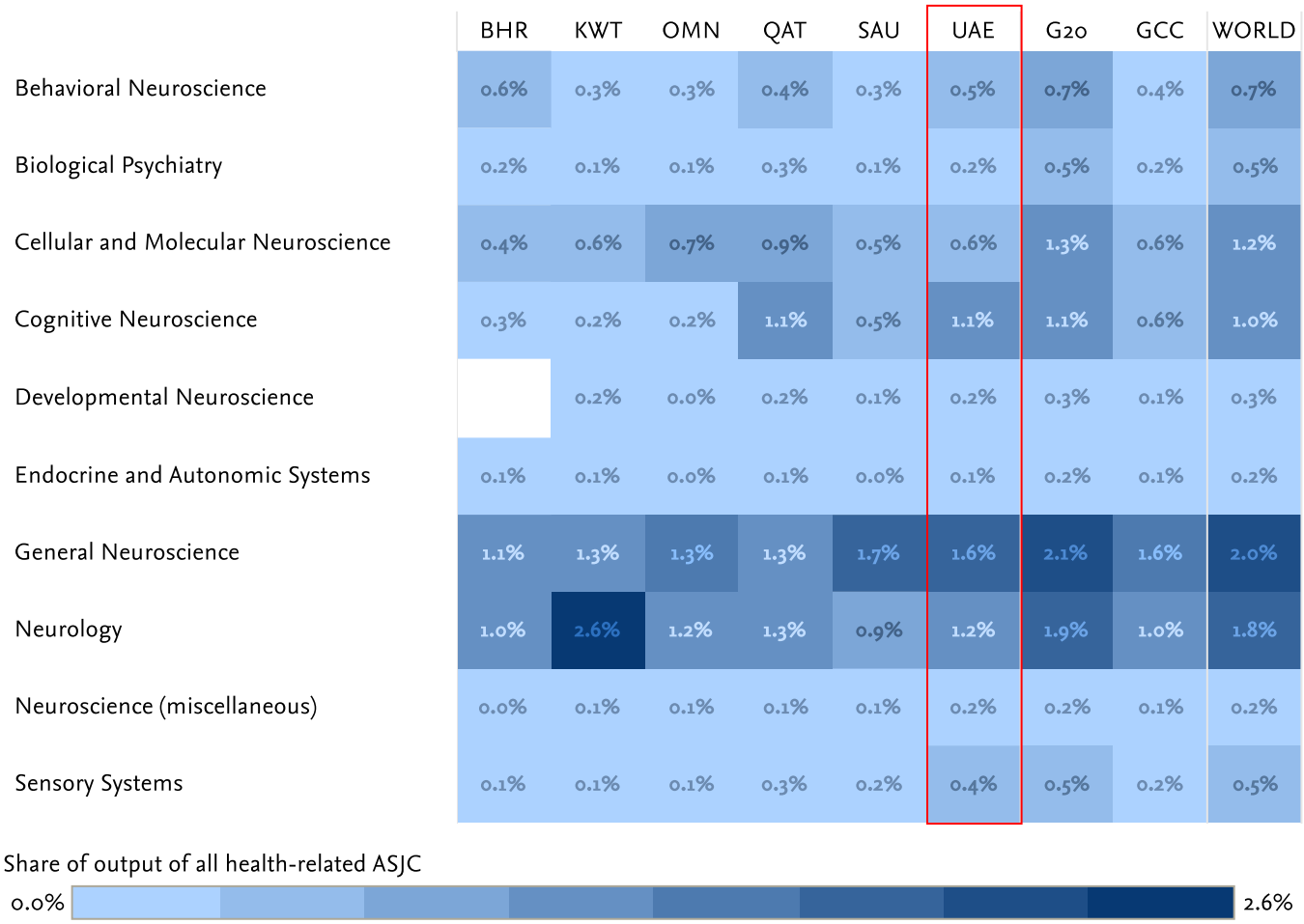

FIGURE 2-28
Share of subcategory publications within Neuroscience for UAE and comparators out of all health-related output, 2017–2022. Empty (white) cells signify that a country/region has no research output in a given field.
Source: Scopus

In terms of institutional contributions, New York University Abu Dhabi has the most publications in this subject, although still only with 154 publications (FIGURE 2-29). Cleveland Clinic Abu Dhabi, Dubai Hospital, and Inception Institute of Artificial Intelligence lead by share of publications. The citation impact shows a mixed picture, but since it is based on only a few publications, the high FWCI for some of the institutions is likely biased by outliers.

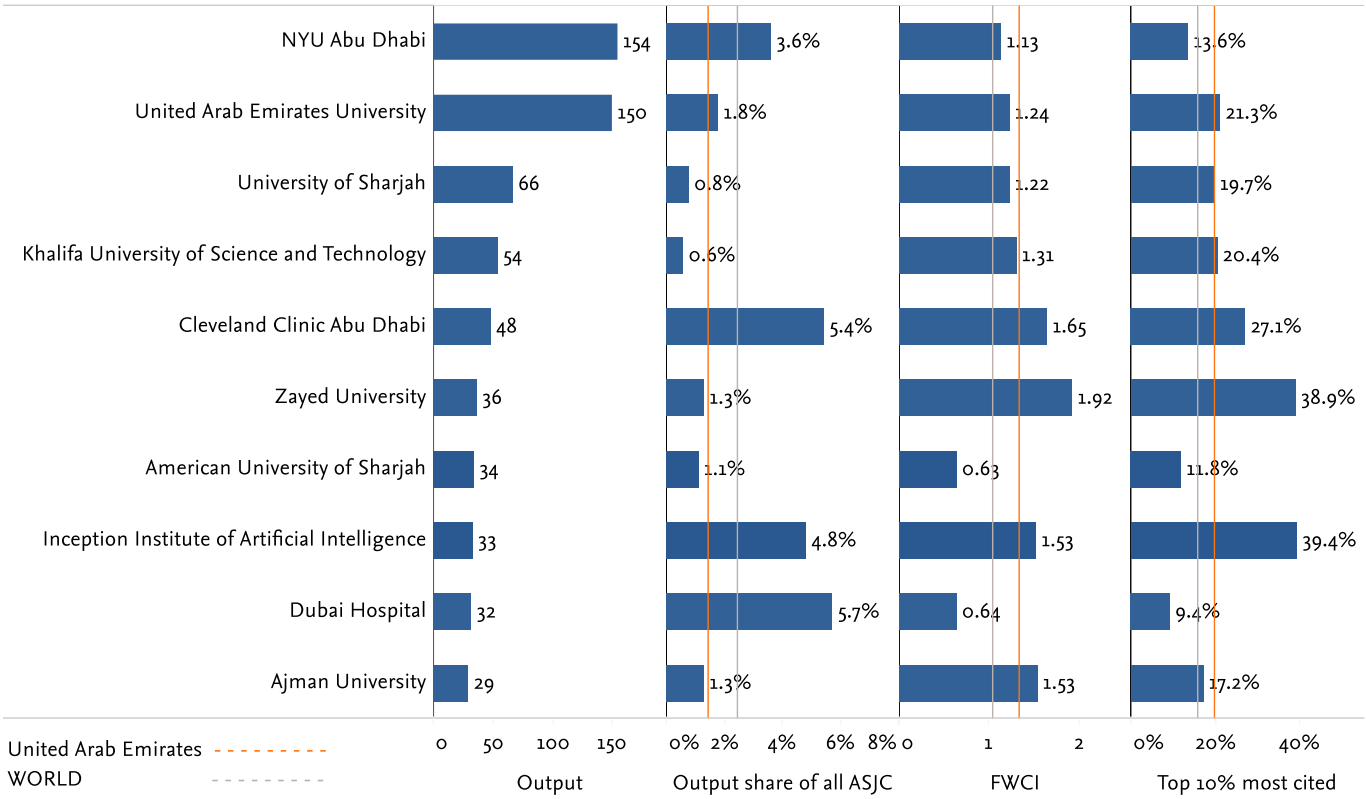

FIGURE 2-29
Top ten UAE institutions by scholarly output within Neuroscience, share of total output, FWCI and share in top 10% most highly cited publications, 2017–2022. Dotted lines indicate UAE (red) and global (gray) averages.
Source: Scopus

2.8 Dentistry

The share of UAE's Dentistry publications was above the global average and higher than in most GCC countries, except the Kingdom of Saudi Arabia. In Orthodontics, one of the Dentistry subcategories, UAE's share was the highest among the GCC countries. The University of Sharjah and Ajman University were the most prolific UAE institutions in Dentistry.

The share of UAE's Dentistry publications out of all health-related publications was almost five times higher than the world average (5% vs. 1%), and above most of the GCC countries, with the only exception the Kingdom of Saudi Arabia (FIGURE 2-30). In total, UAE had 774 publications in Dentistry from 2017 to 2022, which was also second only to the Kingdom of Saudi Arabia during the same period. Among the GCC counties, Kuwait also deserves to be mentioned as its share of Dentistry publications was above the world level and only slightly below that of UAE. Kuwait's total output in this field, however, was noticeably lower.

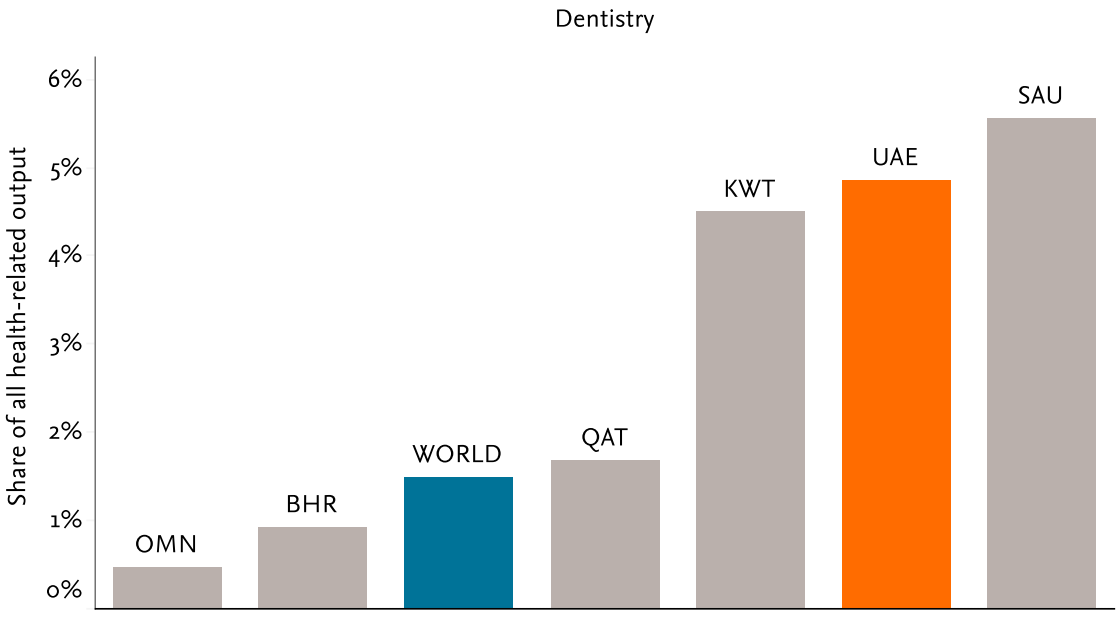

FIGURE 2-30
Share of Dentistry publications of total health-related output for UAE and comparators, 2017–2022.
Source: Scopus

The subject field of Dentistry has seven subcategories (FIGURE 2-31) , most of which did not attract a significant share of health-related publications across the comparators. The highest share of publications for all comparators, including UAE, was concentrated in the General Dentistry subcategory. in Orthodontics, the share of UAE's publication out of its health-related output was 0.6% (93 publications in total), which is six times higher than the world level, and also higher than for all other comparators, including the Kingdom of Saudi Arabia.

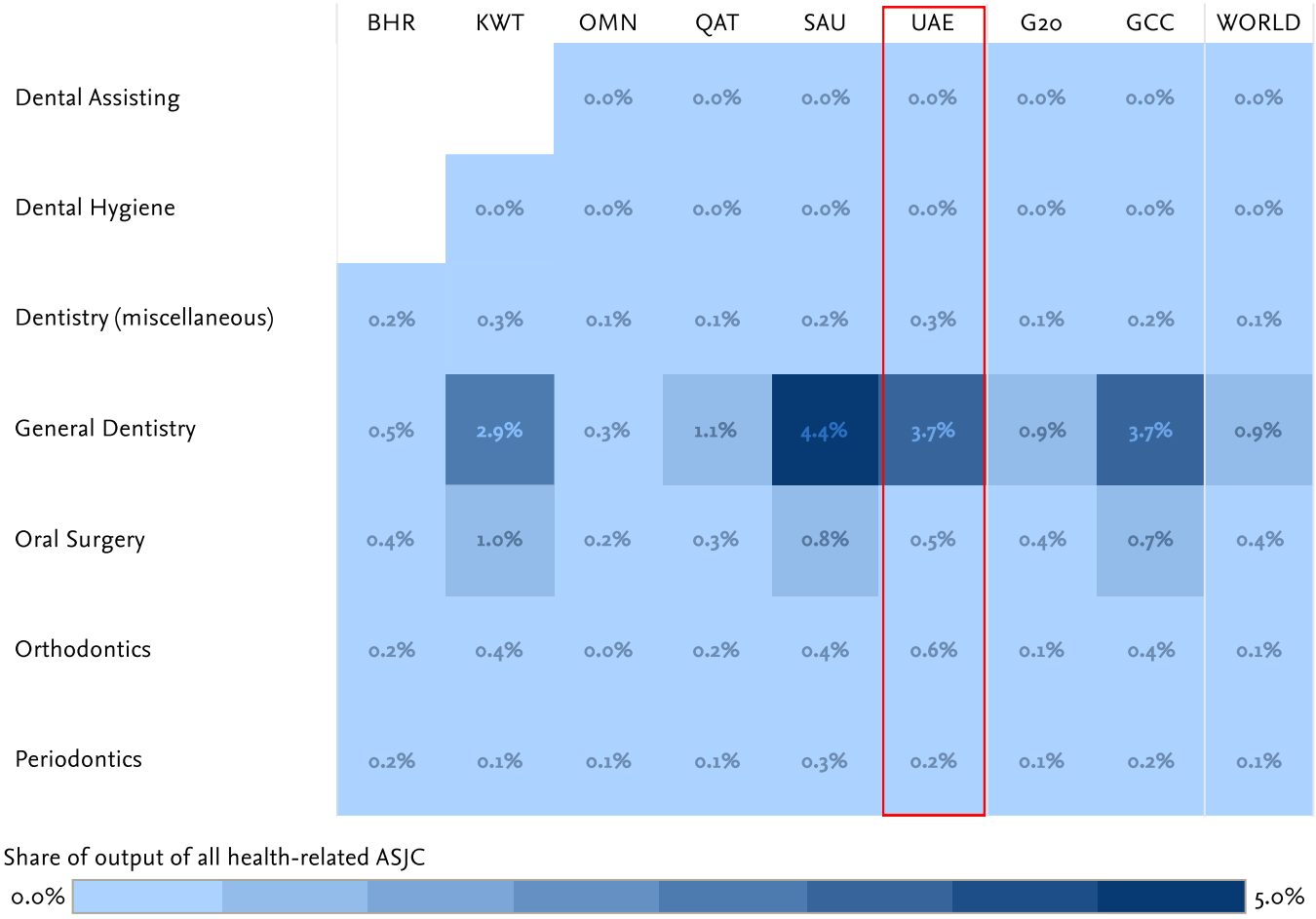

FIGURE 2-31
Share of subcategory publications within Dentistry for UAE and comparators out of all health-related output, 2017–2022. Empty (white) cells signify that a country/region has no research output in a given field.
Source: Scopus

Among the UAE institutions publishing in the field of Dentistry (FIGURE 2-32), the University of Sharjah and Ajman University were the most prolific in terms of output. For the University of Sharjah, these Dentistry publications constituted only 3.2% of its total output but had an FWCI and share of top 10% highly cited publications above the world average. At Ajman University, the field of Dentistry accounted for 8.7% of its total output, although these publications had an FWCI of 0.74, which was below the world average. The European University College had only 46 Dentistry publications, but they accounted for 85 of its total

output. This organization also had an FWCI in Dentistry of more than two times the world average, and 17% of its Dentistry publications were in the top 10% most cited publications.

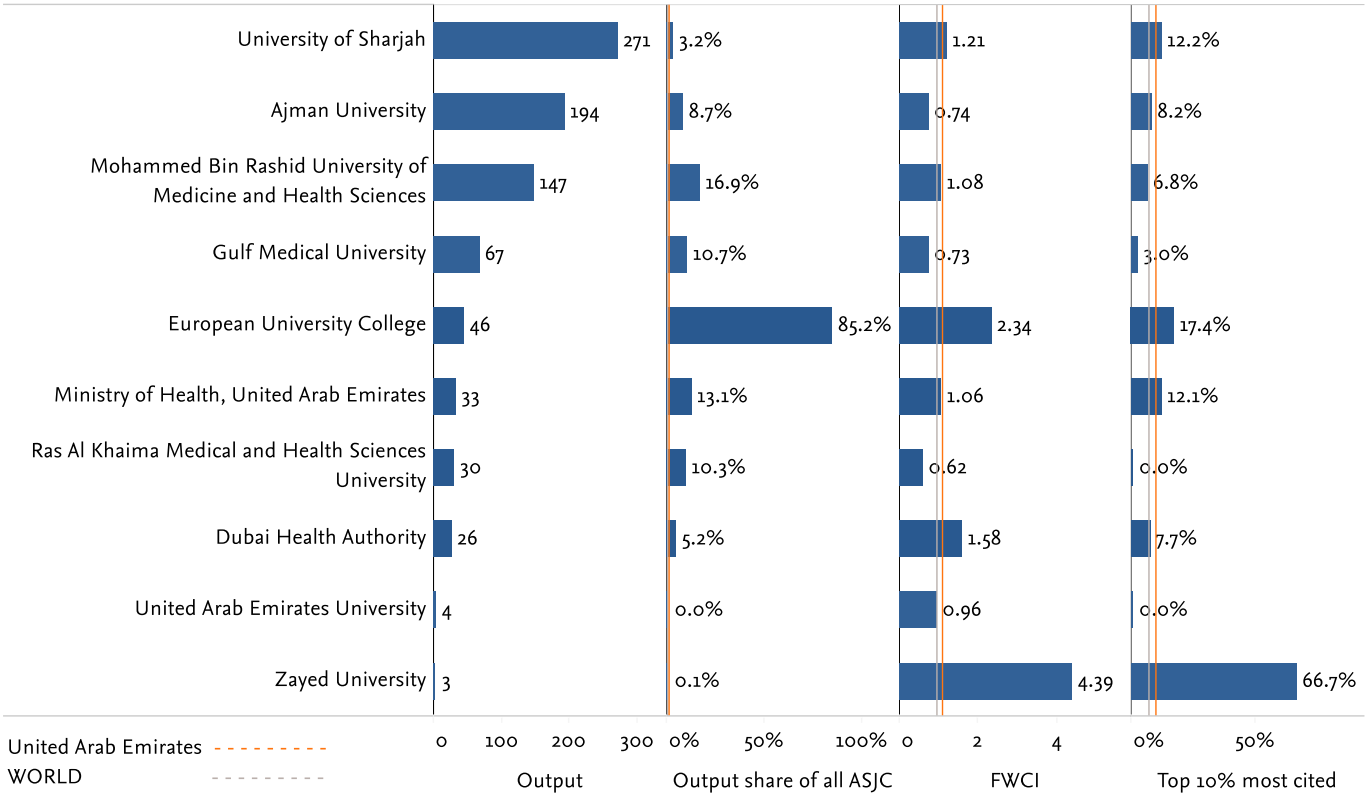

FIGURE 2-32
Top ten UAE institutions by scholarly output within Dentistry, share of total output, FWCI and share in top 10% most highly cited publications, 2017–2022. Dotted lines indicate UAE (red) and global (gray) averages.
Source: Scopus

2.9 Nursing

The subject area Nursing receives only a few contributions from UAE researchers with only 704 publications, but these point towards a diabetes focus—similarly to Medicine overall.

Within Nursing, there is a wide spread of contributions to disciplinary subfields within the GCC countries (FIGURE 2-33). While Bahrain and Oman lead with a share of 7%, UAE has only a share of 4%—below the global average. The Kingdom of Saudi Arabia's share is the lowest of all GCC countries. Overall, only 704 publications by UAE researchers are published in this subject.

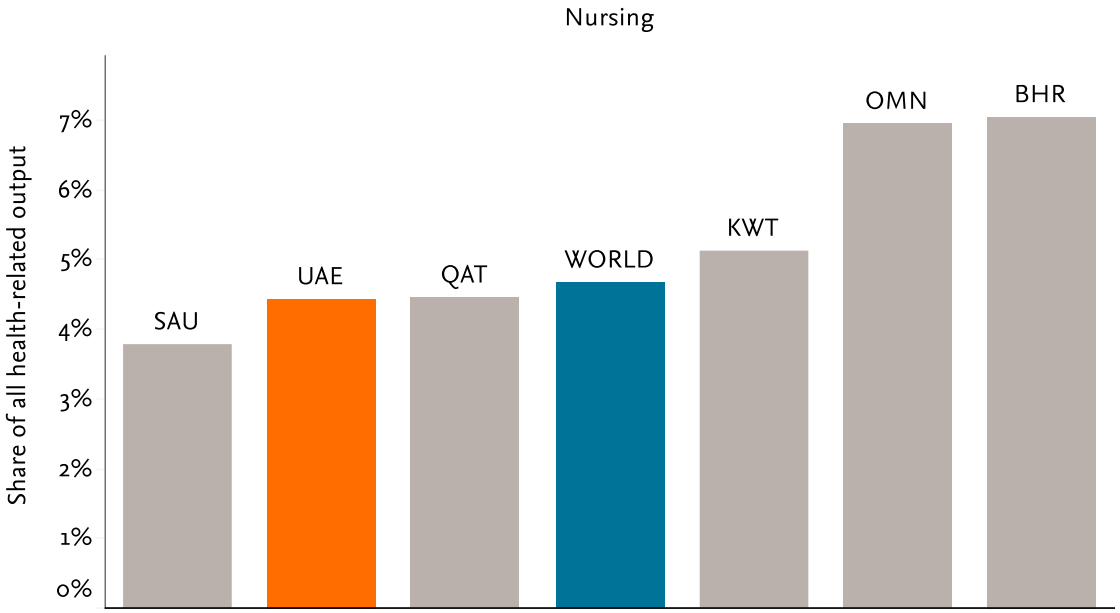

FIGURE 2-33
Share of Nursing publications of total health-related output for UAE and comparators, 2017–2022.
Source: Scopus

Not surprisingly, only a few subcategories within Nursing have a share of UAE publications above the global average (FIGURE 2-34). The most notable may be Nutrition and Dietetics, because it fits with the focus on diabetes recognized in the Medicine chapter. However, overall contribution to this subject is very low.

	BHR	KWT	OMN	QAT	SAU	UAE	G20	GCC	WORLD
Advanced and Specialised Nursing	0.4%	0.2%	0.2%	0.3%	0.1%	0.2%	0.3%	0.2%	0.4%
Assessment and Diagnosis			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Care Planning			0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Community and Home Care	0.2%	0.1%	0.2%	0.2%	0.1%	0.2%	0.1%	0.1%	0.2%
Critical Care	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%
Emergency	0.4%	0.1%	0.1%	0.2%	0.1%	0.2%	0.2%	0.1%	0.2%
Fundamentals and skills	0.2%		0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
General Nursing	0.6%	0.4%	2.5%	0.6%	1.0%	0.8%	0.8%	1.0%	0.9%
Gerontology	0.3%	0.0%		0.1%	0.1%	0.1%	0.2%	0.1%	0.3%
Issues, ethics and legal aspects	0.2%		0.0%	0.0%	0.1%	0.1%	0.2%	0.1%	0.2%
Leadership and Management	0.4%	0.5%	0.8%	0.4%	0.6%	0.4%	0.2%	0.6%	0.3%
LPN and LVN		0.2%		0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Maternity and Midwifery	0.2%	0.0%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%
Medical and Surgical Nursing		0.2%		0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Nurse Assisting							0.0%		0.0%
Nursing (miscellaneous)	0.3%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Nutrition and Dietetics	3.5%	3.1%	1.9%	2.3%	1.2%	2.0%	1.5%	1.5%	1.6%
Oncology (nursing)	0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Pediatrics	0.3%	0.1%	0.3%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%
Pharmacology (nursing)		0.0%			0.0%		0.0%	0.0%	0.0%
Psychiatric Mental Health	0.3%	0.3%	0.3%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%
Research and Theory	0.0%		0.2%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Review and Exam Preparation	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Share of output of all health-related ASJC

0.0% 3.5%

FIGURE 2-34
Share of subcategory publications within Nursing for UAE and comparators out of all health-related output, 2017–2022.
Empty (white) cells signify that a country/region has no research output in a given field.
Source: Scopus

Overall, institutional contribution is quite low, with University of Sharjah the largest single contributor (FIGURE 2-35). FIGURE 2-35Fatima College of Health Sciences has the largest share of publications in this subject. The high FWCI of some institutions may be the result of participation in large studies such as Global Burden of Disease.

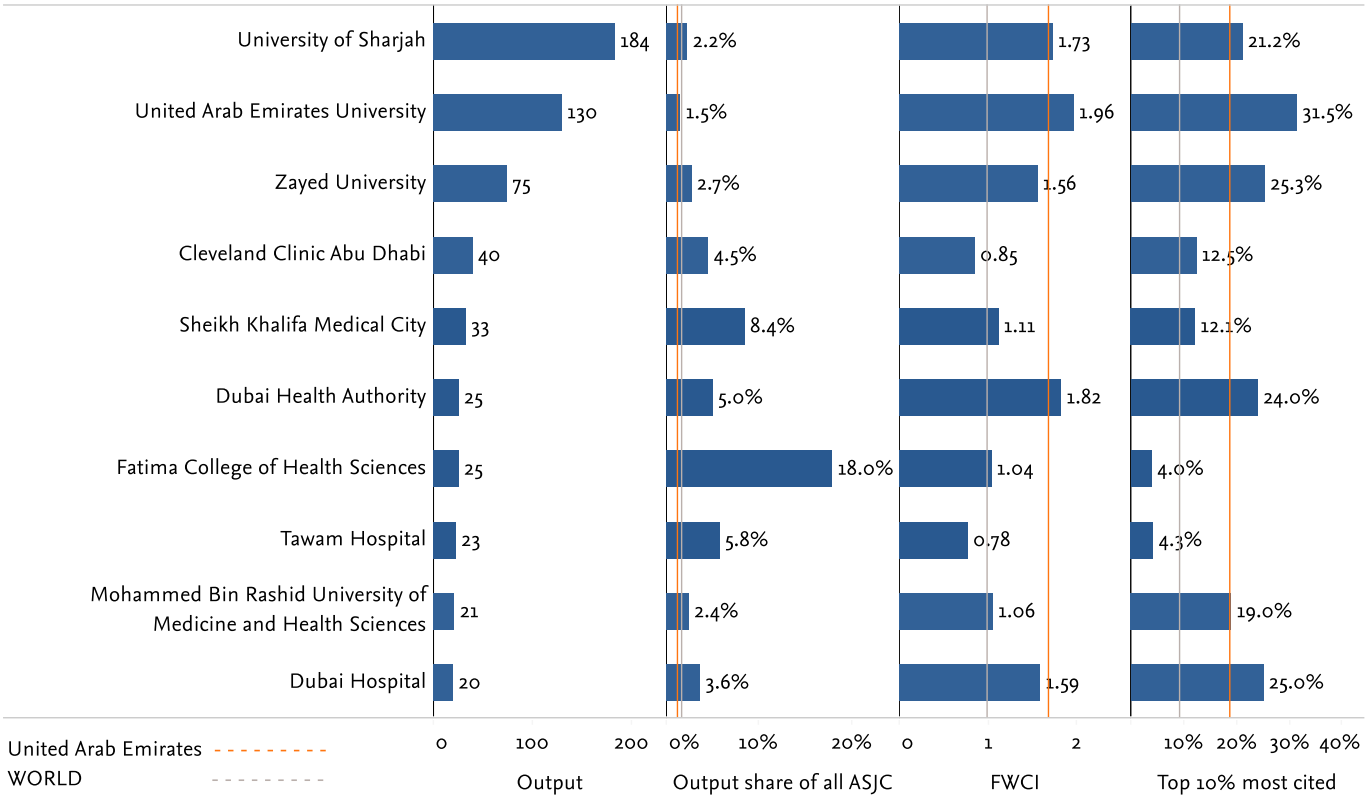

FIGURE 2-35
Top ten UAE institutions by scholarly output within Nursing, share of total output, FWCI and share in top 10% most highly cited publications, 2017–2022.
Source: Scopus

2.10 Health Professions

The share of UAE's publications in Health Professions was close to the global average and similar to most other GCC countries, except for Qatar. University of Sharjah was the most prolific UAE institution, while the Inception Institute of Artificial Intelligence had the highest share of top 10% most cited publications in the field.

For UAE, the share of publications in the field of Health Professions out of the country's total health-related output was 4.1%, which is close to the global level. The Kingdom of Saudi Arabia and Kuwait also remained very close to the global average, while Oman and Bahrain had a slightly lower share of about 2% (FIGURE 2-36). The only noticeable exception out of the GCC countries was Qatar. Nearly 10% of Qatar's health-related research was focused on Health Professions, which is two to three times higher than for any other comparator and well above the global level.

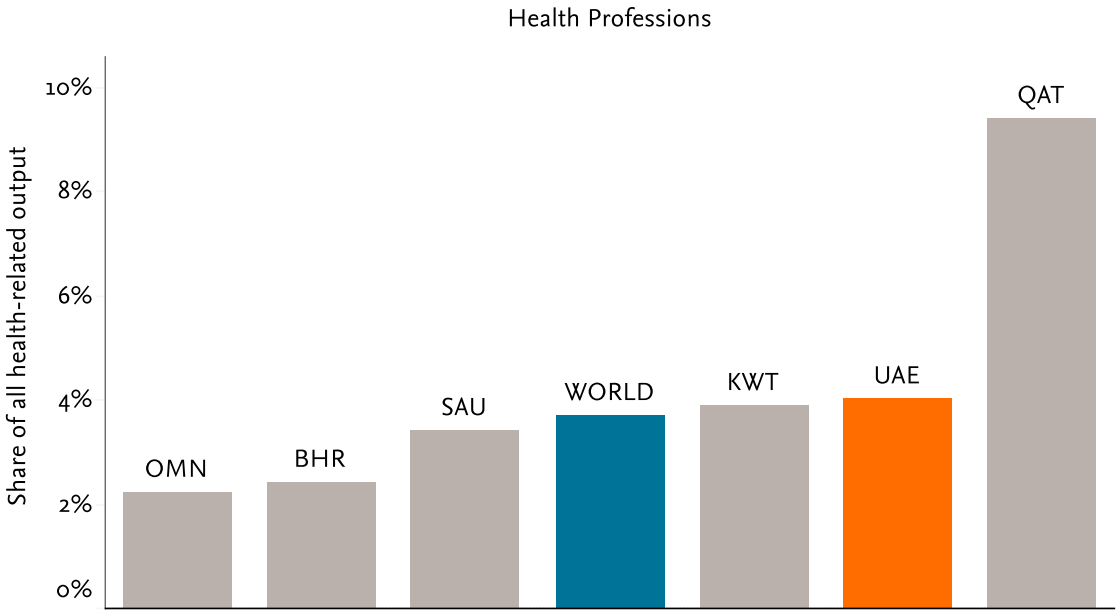

FIGURE 2-36
Share of Health Professions publications of total health-related output for UAE and comparators, 2017–2022.
Source: Scopus

The field of Health Professions has a total of 17 subcategories. Out of these subcategories, Physical Therapy, Sports Therapy & Rehabilitation had the highest share of health-related research output for all GCC

countries, but also globally. FIGURE 2-37 shows that Qatar's above-average share of Health Professions research comes from research in this research subcategory (with 6.6 of health-research output). It is worth mentioning that for multiple Health Professions subcategories some countries do not seem to have any research output at all. These include Medical Assisting and Transcription, Medical Terminology and Respiratory Care.

	BHR	KWT	OMN	QAT	SAU	UAE	G20	GCC	WORLD
Chiropractics		0.1%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Complementary and Manual Therapy	0.0%	0.0%		0.1%	0.1%	0.0%	0.1%	0.1%	0.1%
Emergency Medical Services		0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
General Health Professions		0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Health Information Management	0.6%	0.7%	0.3%	0.8%	0.8%	0.6%	0.4%	0.7%	0.4%
Health Professions (miscellaneous)	0.3%	0.2%	0.2%	0.1%	0.5%	0.3%	0.2%	0.4%	0.3%
Medical Assisting and Transcription					0.0%		0.0%	0.0%	0.0%
Medical Laboratory Technology	0.2%	0.1%	0.3%	0.2%	0.3%	0.2%	0.2%	0.3%	0.2%
Medical Terminology							0.0%		0.0%
Occupational Therapy	0.0%	0.3%		0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Optometry		0.0%	0.1%	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%
Pharmacy	0.4%	0.5%	0.3%	1.2%	0.4%	0.9%	0.2%	0.5%	0.3%
Physical Therapy, Sports Therapy and Rehabilitation	0.6%	1.1%	0.7%	6.6%	0.8%	1.1%	1.3%	1.4%	1.4%
Podiatry		0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Radiological and Ultrasound Technology	0.2%	0.6%	0.3%	0.3%	0.4%	0.6%	0.5%	0.4%	0.5%
Respiratory Care							0.0%		0.0%
Speech and Hearing	0.0%	0.3%		0.1%	0.1%	0.1%	0.3%	0.1%	0.3%

Share of output of all health-related ASJC

0.0% 7.0%

FIGURE 2-37
Share of subcategory publications within Health Professions for UAE and comparators out of all health-related output, 2017–2022. Empty (white) cells signify that a country/region has no research output in a given field.
Source: Scopus

University of Sharjah had the highest number of publications in the UAE within Health Professions with 271 publications between 2017 and 2022, which corresponded to 3.2% of this university's total output (FIGURE 2-38). While some other institutions, such as the Dubai Hospital and the Mohammed Bin Rashid University of Medicine and Health Sciences, had much lower output in this field, the share of Health Professions publications in their total research portfolio was higher with 7% and 11% respectively.

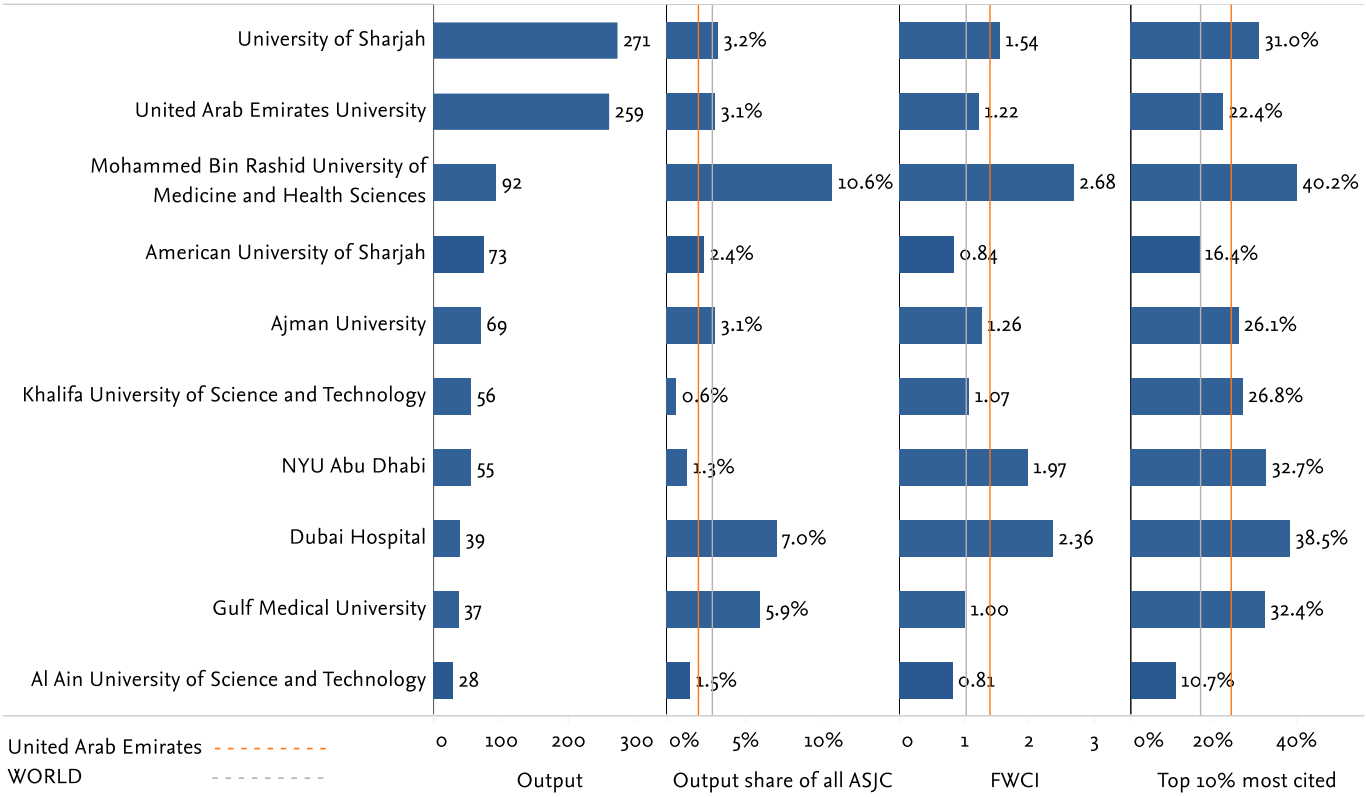

FIGURE 2-38
Top ten UAE institutions by scholarly output within Health Professions, share of total output, FWCI and share in top 10% most highly cited publications, 2017–2022. Dotted lines indicate UAE (red) and global (gray) averages.
Source: Scopus

Conclusion

The UAE's health-related output is growing at a faster rate than on average in the GCC and the World. International collaboration is the strongest driver of research excellence for the UAE.

The objective of this report was to gain a nuanced understanding of the United Arab Emirates health research performance. To this end, the UAE Ministry of Health and Prevention commissioned Elsevier to conduct an evaluation of UAE's healthcare research and benchmark the UAE's research performance with selected comparator countries (the Gulf Cooperation Council countries of Bahrain, Kuwait, Oman, Qatar, the Kingdom of Saudi Arabia) and country groups (GCC, G20 and World).

Health-related research accounted for 27% of UAE total research output, which is below global and GCC averages. However, UAE's output in health-related research had a compound annual growth rate of 25.2% from 2017 to 2022, which is more than three times higher than the global growth rate and also higher than the GCC growth rate. Over 80% of UAE's health research was published in international collaborations. In 2022, the UAE climbed to the first position among the GCC countries, according to this share. UAE's international research is highly impactful with an FWCI well above the global average in 2017–2022.

United Arab Emirates University and University of Sharjah were the largest institutional contributors to UAE health-related research by volume of output, while Khalifa University of Science and Technology had the most publications across all subjects.

Medicine was the main driver of research excellence within the subject areas of health-related research, having the highest share of publications and the highest FWCI. The biggest institutional contributions to the field of Medicine were from large universities, including United Arab Emirates University and University of Sharjah. However, highly specialized institutions such as Dubai Hospital, Dubai Health Authority and Cleveland Clinic Abu Dhabi also played a strong role in contributing to the subject of Medicine.

Apart from Medicine, UAE had a high share of publications in areas, such as Biochemistry, Genetics & Molecular Biology, Pharmacology, Toxicology and Pharmaceutics, and Immunology and Microbiology.

Appendix A: Data Sources

Scopus

Scopus is Elsevier's expertly curated abstract and citation database with content from over 7,000 publishers to help track and enhance researcher and institutional data and discover global research in all fields. Scopus covers over 84 million items from more than 26,000 serial titles, 240,000+ books and 10.4+ million conference papers connected through a robust data model including over 94,000 affiliations and 17 million author profiles. Scopus coverage is multilingual and global: approximately 46% of the titles in Scopus are published in languages other than English (or published in both English and another language). In addition, more than half of Scopus content originates from outside North America, representing countries across Europe, Latin America, Africa and the Asia–Pacific region. See www.scopus.com

SciVal

SciVal is a web-based analytics solution with unparalleled flexibility that provides access to the research performance of over 20,000 academic, industry and government research institutions and their associated researchers, output and metrics. SciVal allows you to visualize your research performance, benchmark relative to peers, develop strategic partnerships, identify and analyze emerging research trends, and create uniquely tailored reports. See www.scival.com

ClinicalTrials.gov

ClinicalTrials.gov is a registry of clinical trials developed and maintained by the United States National Library of Medicine at the National Institutes of Health. As of 2022. it is the largest database of clinical trials containing information on over 430,000 trials from 221 countries. The records in the database rely on trial sponsors and investigators to submit and make timely updates to the trial information. The purpose of the database is to provide information about clinical research studies to the public, researchers and health care professionals. See www.clinicaltrials.gov

Appendix B: Glossary of Terms

All Science Journal Classification (ASJC)

ASJC is a classification system used by Scopus. The classification is created by in-house experts and used to classify journals and conference proceedings based on their aims, scope, and content. There are twenty-seven broad ASJC subject fields, which are further divided into multiple subcategories. For more information, please visit this page.

Field-weighted citation impact (FWCI)

FWCI is a measure of citation impact that normalizes the citations received by an article against the World benchmark of citations received in the same field, publication type, and year of publication, thus also making values comparable across these three dimensions. The World FWCI is indexed to a value of 1.0, meaning that values above 1.0 indicate an above-average citation impact. For example, a value of 1.7 indicates a citation impact that is 1.7 times the average or 70% above average. For more information, please visit this page.

Gross domestic expenditure on research and development (GERD)

Gross domestic expenditure on research and development is a metric used to measure the total amount spent on research and development activities within a country's economy. It encompasses the investments made by both the public and private sectors in various scientific and technological endeavors to drive innovation and advance knowledge. GERD provides insights into a nation's commitment to R&D and its potential for economic growth and competitiveness.

Relative activity index (RAI)

Relative activity index (RAI) is defined in this report as the share of an entity's article output in a research area relative to the worldwide share of articles in the same research area. For example, Country A published 10% of its articles in 2017-2022 in Medicine, while worldwide, 5% of all articles published were in Medicine. The Relative activity index for this country in Medicine is therefore calculated as the country's article share in Medicine divided by the worldwide article share in Medicine. A value of 1.0 indicates that the country's research activity in a field corresponds exactly with the worldwide activity in that field; a value higher than 1.0 implies a greater emphasis; and a value lower than 1.0 suggests a lesser focus.

Research collaboration

Publications with two or more authors are viewed as collaborations. Collaboration is assessed by analyzing the author affiliations associated with each publication and categorizing publications based on who has contributed as an author and

what each author's affiliation is. For example, institutional collaboration is ascribed to publications where all authors are affiliated with the same institution; national collaboration is ascribed to publications where authors are affiliated with at least two different institutions but where all affiliations are within the same country; international collaboration is ascribed to publications where authors are affiliated with at least two different countries. These categories are mutually exclusive—if a publication is published by two authors from the same institution and a third author from a different institution and country, it is nevertheless considered internationally collaborative.

Top 10% most cited publications

This indicator measures the number of publications from a specific entity (such as an institution, author, or country) that appear in the top 10% of the most cited publications within the entire Scopus database. The share of the top 10% most cited represents the percentage of an entity's publications that fall within this highly cited group compared to its overall publication output.

About

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