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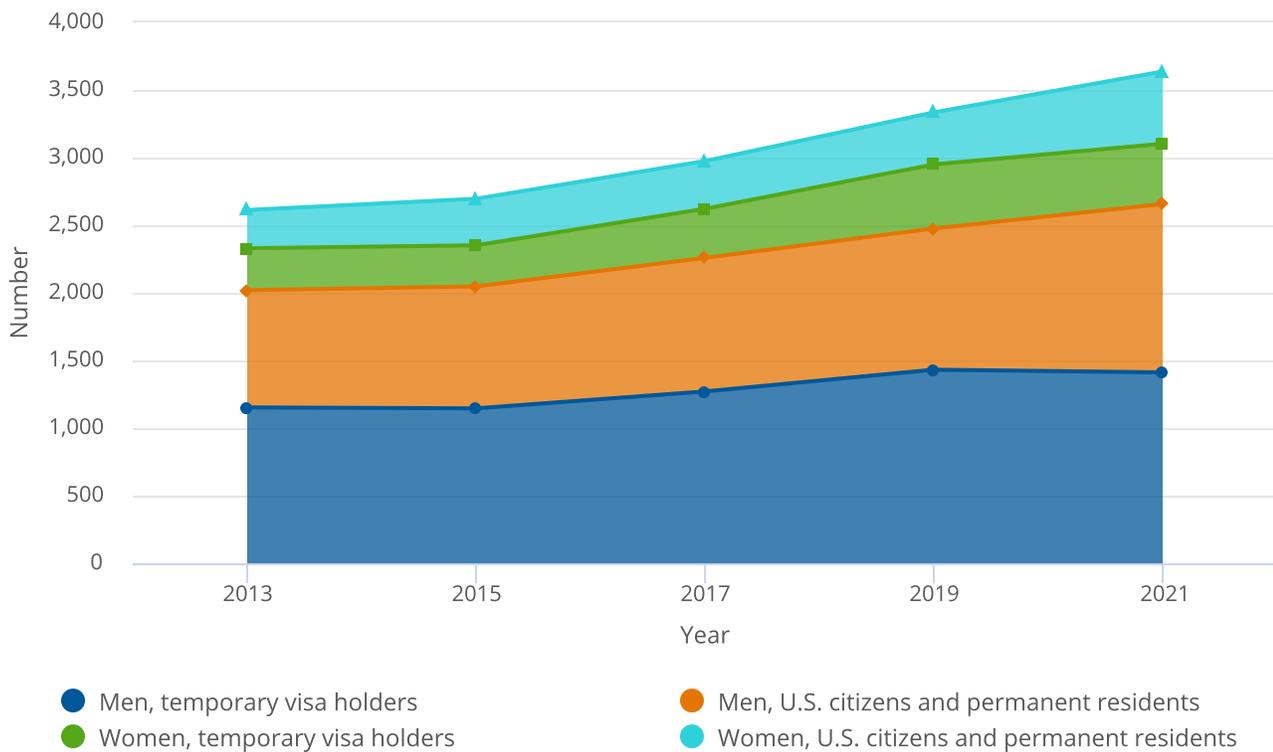
The Shifting Demographic Composition of Postdoctoral Researchers at Federally Funded Research and Development Centers in 2021

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Jack M. Stoetzel, Caren A. Arbeit, and Michael I. Yamaner

In the United States, federally funded research and development centers (FFRDCs) advance strategic research in science, engineering, and health. FFRDCs are a key part of the national efforts to attract and retain a highly skilled workforce. The 25 FFRDCs with postdoctoral programs are thus contributing to the training of the next generation of scientists and engineers. According to the Survey of Postdocs at Federally Funded Research and Development Centers (FFRDC Postdoc Survey), the number of postdoctoral researchers (postdocs) receiving training at these FFRDCs has grown by more than 1,000 postdocs (39.2%) since 2013, with 3,637 postdocs reported in 2021 ([figure 1](#)). Between 2019 and 2021, the number of postdocs who are U.S. citizens and permanent residents increased by 350 (24.5%), whereas the number of postdocs with a temporary visa declined by 48 (2.5%) ([figure 1, table 1](#)).

Data in this report are from the 2021 FFRDC Postdoc Survey, which provides information about the demographic characteristics, sources of financial support, and fields of research of postdocs working at FFRDCs. The survey is conducted in conjunction with the Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS), which is sponsored by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) and by the National Institutes of Health (NIH). This survey provides some of the only publicly available data on the research training of early career doctorates at FFRDCs. The postdocs employed by FFRDCs represent an important part of the science and engineering workforce in the United States, and the data collected in the FFRDC Postdoc Survey inform our understanding of the country's next generation of scientists and engineers.

Figure 1**Postdoctoral researchers at federally funded research and development centers, by sex and citizenship status: 2013–21****Source(s):**

National Center for Science and Engineering Statistics, Survey of Postdocs at Federally Funded Research and Development Centers.

Table 1**Sex, citizenship, ethnicity, and race of postdoctoral researchers at federally funded research and development centers: 2019 and 2021**

(Number and percent)

Citizenship, ethnicity, and race	2019		2021		Change 2019–21		
	Number	Percent	Number	Percent	Number	Percentage point	Percent
All postdocs	3,335	100.0	3,637	100.0	302	--	9.1
Women	859	25.8	980	26.9	121	1.2	14.1
Men	2,476	74.2	2,657	73.1	181	-1.2	7.3
U.S. citizens and permanent residents ^a	1,429	42.8	1,779	48.9	350	6.1	24.5
Hispanic or Latino	76	2.3	120	3.3	44	1.0	57.9
Not Hispanic or Latino	1,311	39.3	1,615	44.4	304	5.1	23.2
American Indian or Alaska Native	0	0.0	2	0.1	2	0.1	na
Asian	193	5.8	251	6.9	58	1.1	30.1
Black or African American	38	1.1	38	1.0	0	-0.1	0.0
Native Hawaiian or Other Pacific Islander	2	0.1	1	0.0	-1	0.0	-50.0
White	1,043	31.3	1,259	34.6	216	3.3	20.7
More than one race	35	1.0	64	1.8	29	0.7	82.9
Unknown ethnicity or race	42	1.3	44	1.2	2	0.0	4.8
Women	385	11.5	534	14.7	149	3.1	38.7
Men	1,044	31.3	1,245	34.2	201	2.9	19.3

Table 1**Sex, citizenship, ethnicity, and race of postdoctoral researchers at federally funded research and development centers: 2019 and 2021**

(Number and percent)

Citizenship, ethnicity, and race	2019		2021		Change 2019–21		
	Number	Percent	Number	Percent	Number	Percentage point	Percent
Temporary visa holders	1,906	57.2	1,858	51.1	-48	-6.1	-2.5
Women	474	14.2	446	12.3	-28	-2.0	-5.9
Men	1,432	42.9	1,412	38.8	-20	-4.1	-1.4

na = not applicable.

^a Race and ethnicity data are available only for U.S. citizens and permanent residents.**Note(s):**

Detail may not sum because of rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of Postdocs at Federally Funded Research and Development Centers.

Demographic Shifts among Postdocs

The FFRDC Postdoc Survey addresses many questions, including who receives postdoctoral training at FFRDCs. This section highlights the demographic characteristics of postdocs receiving training at FFRDCs, focusing on the changes between 2019 and 2021. Note that this was the first FFRDC Postdoc Survey conducted since the COVID-19 pandemic began in spring 2020. The pandemic brought about travel restrictions and limitations that, particularly in 2020, impacted the ability of foreign nationals to secure temporary visas to study or train in the United States, particularly for those who were not already studying or working in the country when restrictions went into effect.¹ The 2021 data suggest that COVID-19 did not slow the growth of postdocs at FFRDCs but did impact the opportunities available to temporary visa holders.

The overall number of postdocs at FFRDCs grew by 302 (9.1%) between 2019 and 2021 ([figure 1](#), [table 1](#)), with the number of women growing by 121 (14.1%) to 980. Among U.S. citizens and permanent residents, there were an additional 149 female postdocs at FFRDCs between 2019 and 2021, a 38.7% increase and an increase of 3.1 percentage points. This is the largest increase since the number of female postdocs who are U.S. citizens or permanent residents increased by 61 between 2013 and 2015.

Among U.S. citizens and permanent residents, the number of postdocs who are Hispanic or Latino, Asian, White, or more than one race all increased by over 20% between 2019 and 2021. These changes, along with the increase in the number of women, indicate a slowly diversifying postdoc population at FFRDCs.

About half of all postdocs at FFRDCs were temporary visa holders in both 2019 (57.2%) and 2021 (51.1%), even after a 2.5% decline in the number of postdocs who were temporary visa holders. The total decline was 48 postdocs, 28 women (5.9% decrease) and 20 men (1.4% decrease). Even with the recent decline in the number of postdocs with a temporary visa, there were 395 more temporary visa holder postdocs in 2021 than in 2013 ([figure 1](#)).

Fields of Research at FFRDCs in 2021

Overall, 70.7% of postdocs in FFRDCs engage in science research, 25.9% conduct research in engineering, and 3.4% perform research in other or unknown fields ([table 2](#)). Almost half (47.8%) of postdocs at FFRDCs work in research fields in the physical sciences, with 23.9% of all postdocs conducting research in physics and astronomy, 12.6% in chemistry, and 11.3% in materials science and chemistry. Outside of the physical sciences, the next largest fields were biological and biomedical sciences (7.1%) and geosciences, atmospheric sciences, and ocean sciences (6.7%) ([table 2](#)).

Table 2**Field of research of postdoctoral researchers at federally funded research and development centers, by citizenship and FFRDC sponsor: 2021**

(Number and percent)

Field of research	Total		Citizenship status				Federal sponsor			
			U.S. citizens and permanent residents		Temporary visa holders		Department of Energy		All other federal sponsors	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All postdoctoral researchers	3,637	100.0	1,779	100.0	1,858	100.0	3,357	100.0	280	100.0
Science and engineering	3,513	96.6	1,700	95.6	1,813	97.6	3,252	96.9	261	93.2
Science	2,571	70.7	1,238	69.6	1,333	71.7	2,359	70.3	212	75.7
Agricultural and veterinary sciences	7	0.2	4	0.2	3	0.2	7	0.2	0	0.0
Biological and biomedical sciences	258	7.1	155	8.7	103	5.5	248	7.4	10	3.6
Chemistry	458	12.6	265	14.9	193	10.4	442	13.2	16	5.7
Computer and information sciences	173	4.8	62	3.5	111	6.0	164	4.9	9	3.2
Geosciences, atmospheric sciences, and ocean sciences	242	6.7	108	6.1	134	7.2	151	4.5	91	32.5
Materials science and chemistry	412	11.3	171	9.6	241	13.0	410	12.2	2	0.7
Mathematics and statistics	75	2.1	32	1.8	43	2.3	67	2.0	8	2.9
Natural resources and conservation	16	0.4	10	0.6	6	0.3	16	0.5	0	0.0
Physics and astronomy	870	23.9	399	22.4	471	25.3	795	23.7	75	26.8
Psychology	2	0.1	2	0.1	0	0.0	1	0.0	1	0.4
Social sciences	5	0.1	3	0.2	2	0.1	5	0.1	0	0.0
Other sciences	53	1.5	27	1.5	26	1.4	53	1.6	0	0.0
Engineering	942	25.9	462	26.0	480	25.8	893	26.6	49	17.5
Aerospace, aeronautical and astronautical engineering	21	0.6	7	0.4	14	0.8	19	0.6	2	0.7
Biological, biomedical, and biosystems engineering	46	1.3	27	1.5	19	1.0	46	1.4	0	0.0
Chemical, petroleum, and related engineering fields	169	4.6	75	4.2	94	5.1	169	5.0	0	0.0
Civil, environmental, transportation, and related engineering fields	83	2.3	41	2.3	42	2.3	76	2.3	7	2.5
Electrical, electronics, communications, and computer engineering	147	4.0	64	3.6	83	4.5	124	3.7	23	8.2
Engineering science, mechanics, and physics	124	3.4	86	4.8	38	2.0	124	3.7	0	0.0
Industrial, manufacturing, systems engineering, and operations research	15	0.4	3	0.2	12	0.6	15	0.4	0	0.0
Mechanical engineering	173	4.8	59	3.3	114	6.1	159	4.7	14	5.0
Metallurgical, mining, materials, and related engineering fields	41	1.1	26	1.5	15	0.8	38	1.1	3	1.1
Nuclear engineering	87	2.4	53	3.0	34	1.8	87	2.6	0	0.0
Other engineering fields	36	1.0	21	1.2	15	0.8	36	1.1	0	0.0
Health	3	0.1	3	0.2	0	0.0	3	0.1	0	0.0
Multidisciplinary	92	2.5	58	3.3	34	1.8	76	2.3	16	5.7
Non-science or engineering	10	0.3	6	0.3	4	0.2	9	0.3	1	0.4
Field of research not known/ reported	19	0.5	12	0.7	7	0.4	17	0.5	2	0.7

FFRDC = federally funded research and development center.

Source(s):

National Center for Science and Engineering Statistics, Survey of Postdocs at Federally Funded Research and Development Centers, 2021.

Although the general distribution of postdocs is similar across fields for temporary visa holders and U.S. citizens and permanent residents, there are some differences. Fields of research that have a higher percentage of temporary visa holders than U.S. citizens and permanent residents are in the fields of materials science and chemistry (13.0% versus 9.6%), physics and astronomy (25.3% versus 22.4%), and mechanical engineering (6.1% versus 3.3%). Conversely, the following research fields have a higher percentage of postdocs at FFRDCs who are U.S. citizens and permanent residents than who are temporary visa holders: chemistry (14.9% versus 10.4%), biological and medical sciences (8.7% versus 5.5%), and engineering science, mechanics, and physics (4.8% versus 2.0%).

FFRDCs sponsored by the Department of Energy (DOE) train the majority of postdocs (3,357, or 92.3%). At both DOE and non-DOE FFRDCs, about a quarter (23.7% and 26.8%, respectively) are engaged in physics and astronomy research. A quarter (25.4%) of the postdocs at DOE FFRDCs are engaged in either chemistry (13.2%) or materials science and chemistry (12.2%) research, compared with 6.4% of postdocs engaged in such research in both fields at non-DOE FFRDCs. Similarly, over a quarter (26.6%) of postdocs at DOE FFRDCs are engaged in engineering research, compared with 17.5% of postdocs at non-DOE FFRDCs (table 2).

At FFRDCs not sponsored by DOE, the field of research with the largest percentage of postdocs is geosciences, atmospheric sciences, and ocean sciences, with about a third (32.5%) of postdocs engaging in research in these fields, compared with 4.5% of postdocs at DOE FFRDCs. Proportionally more postdocs at non-DOE FFRDCs than at DOE FFRDCs research electrical, electronics, communications, and computer engineering (8.2% versus 3.7%) or multidisciplinary fields (5.7% versus 2.3%). Physics and astronomy training occurs in similar proportions across DOE and non-DOE FFRDCs; however, there is less overlap in the proportion of postdocs in other fields (table 2).

Data Sources, Limitations, and Availability

The 2021 Survey of Postdocs at FFRDCs collected data from FFRDCs listed in the March 2021 Master Government List of FFRDCs that is maintained by NCSES within NSF.² Of the 43 FFRDCs listed, 25 FFRDCs reported employing postdocs to the 2021 FFRDC Postdoc Survey. Representatives from each FFRDC report their data on the number of postdocs employed at the institution; data reported to the survey are categorized by citizenship, sex, race, and ethnicity; source of financial support; and fields of research. The reference date for this survey cycle was 1 October 2021. The survey is conducted in conjunction with the GSS, which is sponsored by NCSES within NSF as well as by NIH.

Consistent with the NSF and NIH definitions, the FFRDC Postdoc Survey defines a postdoc as an appointee who holds a PhD or equivalent doctoral degree; whose doctorate was awarded recently, generally within the past 5 years; whose appointment is term-limited, generally no more than 5–7 years;³ who works under the supervision of a senior researcher; and whose appointment is primarily for the purpose of training in research or scholarship.

Exercise caution when using trend data because changes in how FFRDCs define their postdocs, maintain their administrative data, and report unknown responses can affect data comparability trends. In 2021, the FFRDC Postdoc Survey updated the fields and field titles used for reporting. This change keeps the field reporting similar to the GSS, which added fields and modified field labels in the 2020 cycle. Most notably for users, the FFRDC Postdoc Survey collects data on the sciences aligned with the GSS broad fields and detailed fields for physical sciences. Materials science and chemistry was added in 2021 due to the large number of postdocs in that field. Engineering field labels were adjusted to align with the GSS. The FFRDC Postdoc Survey continues to include a small number of postdocs at FFRDCs who do not engage primarily in science, engineering, and health research.

Detailed data from this survey are available at <https://www.nsf.gov/statistics/srvyffrdcpd/>. For more information on the FFRDC Postdoc Survey, please contact the Survey Manager.

Notes

¹ In 2020, the GSS saw a decline in postdocs with temporary visas. See Davies C, Arbeit CA, Yamaner MI; National Center for Science and Engineering Statistics (NCSES). 2022. *Assessing the Impact of COVID-19 on Science, Engineering, and Health Graduate Enrollment: U.S. Part-Time Enrollment Increases as Full-Time Temporary Visa Holder Enrollment Declines*. NSF 22-317. Alexandria, VA: National Science Foundation. Available at <https://nces.nsf.gov/pubs/nsf22317/>.

2 For the Master Government List of FFRDCs used for this survey, please see <https://www.nsf.gov/statistics/ffrdclist/archive/ffrdc-2021.xlsx>.

3 In the GSS COVID Impact Module, 16% of coordinators (and over 24% at very high research activity public institutions) reported changes to postdoctoral duration due to the pandemic. Thus, while the general rule is 5–7 years for a postdoc, due to the COVID-19 pandemic, some FFRDCs could have extended postdoc training periods. See Arbeit CA, Yamaner MI; National Center for Science and Engineering Statistics (NCSES). 2021. *Universities Report Growth in U.S. Citizen and Permanent Resident Enrollment along with Declines in Enrollment of Temporary Visa Holders at Master's and Doctoral Levels Due to the COVID-19 Pandemic*. NSF 22-313. Alexandria, VA: National Science Foundation. Available at <https://ncses.nsf.gov/pubs/nsf22313/>.

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Contact Us

Report Authors

Jack M. Stoetzel
RTI International, under contract to NCSES

Caren A. Arbeit
RTI International, under contract to NCSES

Michael I. Yamaner
Survey Manager
Tel: (703) 292-7815
E-mail: myamaner@nsf.gov

NCSES

National Center for Science and Engineering Statistics
Directorate for Social, Behavioral and Economic Sciences
National Science Foundation
2415 Eisenhower Avenue, Suite W14200
Alexandria, VA 22314
Tel: (703) 292-8780
FIRS: (800) 877-8339
TDD: (800) 281-8749
E-mail: ncsesweb@nsf.gov