



2019 NEPHROLOGY FELLOW **SURVEY** RESULTS AND INSIGHTS

Stephen M. Sozio, MD, MHS, MEHP, Principal Investigator,
Johns Hopkins University School of Medicine

Kurtis Pivert, ASN Data Science Officer

With the ASN Data Subcommittee:

Suzanne Boyle, MD, MSCE

Lili Chan, MD, MS

Kelsea McDyre, MS

Ali Mehdi, MD

Sayna Norouzi, MD

Shamir Tuchman, MD, MPH

Joshua Waitzman, MD, PhD



This report's findings are solely those of the authors and do not reflect the views of the Johns Hopkins University School of Medicine (JHUSOM) or the ASN Alliance for Kidney Health. Please provide your comments and feedback on this report to **workforce@asn-online.org**.

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EXECUTIVE SUMMARY

As the annual American Society of Nephrology (ASN) Nephrology Fellow Survey entered its sixth year under its new principal investigator Dr. Stephen M. Sozio, the project explored new facets and perceptions of nephrology fellows' education and transitions into practice. This year, 498 of the 988 current nephrology fellows (from both adult and pediatric training programs) who received the survey participated, for a **gross response rate of 50.2%** (the highest response in the survey's 6-year history).

Among the 142 respondents who had accepted a job, **the median base starting salary was \$190,000 before incentives**. For adult nephrologist respondents, median base salary was \$199,000; for pediatric nephrologists \$150,000. Women respondents reported higher indebtedness levels and lower median starting salaries than their male colleagues (\$175,000 vs \$200,000, respectively). There was substantial geographic variation in salary distribution, with respondents entering practice in the Mountain and Pacific Census Divisions reporting the highest base starting salaries ($p = 0.00795$, one-way ANOVA).

Although **perceptions of local and national nephrology job market continue to improve**, 35% of respondents still report dissatisfaction with opportunities near their training location. And while the majority of fellows move out of their state of training for their first post-fellowship job, there remains a lack of movement into traditionally underserved regions of the US. Work-style factors (frequency of weekend-call, frequency of night-time call, workday length, and "predictable workday") seem to outweigh financial compensation when evaluating nephrology job prospects.

More fellows now recommend the field of nephrology to future trainees—80.6% of US medical graduates and 78.4% of international medical graduates would do so. Nearly a **third of respondents participated in ASN-sponsored programs**, designed to increase interest in nephrology careers among medical students and internal medicine residents. Most graduating nephrology fellows intend on continuing to practice with the subspecialty of nephrology, but there is a substantial proportion of fellows pursuing further training in critical care.

SURVEY BACKGROUND AND MOTIVATION

Since 2014, ASN has invited all current adult and pediatric nephrology fellows to participate in the annual fellow survey. The survey and ASN's concurrent workforce research will help inform the Society's efforts to foster the next generation of kidney health professionals and build the nephrology pipeline. This survey quantifies the incoming physician workforce, captures leading indicators on the state of the employment market, and collates fellows' perceptions of their training and the specialty. Among the important variables captured are fellows' race and ethnicity, information unavailable from other sources of practicing physician data.

New Survey Features in 2019

Starting this year, the annual Nephrology Fellow Survey is overseen by new principal investigator Stephen M. Sozio, MD, MHS, MEHP, with input from the members of the ASN Data Subcommittee (roster below). The 2019 survey was tailored to address knowledge gaps specific to pediatric nephrology and implemented methods to improve the validity of quantitative data captured—in particular monetary values—to facilitate calculation of summary statistics and parametric modeling.

ASN Data Subcommittee

- Stephen M. Sozio, MD, MHS, MEHP ***Chair***
(Johns Hopkins University School of Medicine)
- Suzanne Boyle, MD, MSCE (Drexel University College of Medicine)
- Lili Chan, MD, MS (Icahn School of Medicine at Mount Sinai)
- Ali Mehdi, MD (*Fellow* Cleveland Clinic Foundation)
- Sayna Norouzi, MD (*Fellow* Baylor College of Medicine)
- Shamir Tuchman, MD (Children's National Health System)
- Joshua Waitzman, MD, PhD (*Fellow* Beth Israel Deaconess Medical Center)
- Kelsea McDyre, MS, ASN Staff
- Kurtis Pivert, ASN Staff

RESULTS

Respondents

I. Response Rate

A total of 498 adult and pediatric nephrology fellows responded to the survey (gross response rate 50.2%). Of these, seven participants did not advance beyond the consent and first several questions and were censored. This yielded a total of 491 participants (net response rate 49.7%), of whom 413 were in an adult nephrology and 78 in pediatric nephrology training programs (Figure 1).

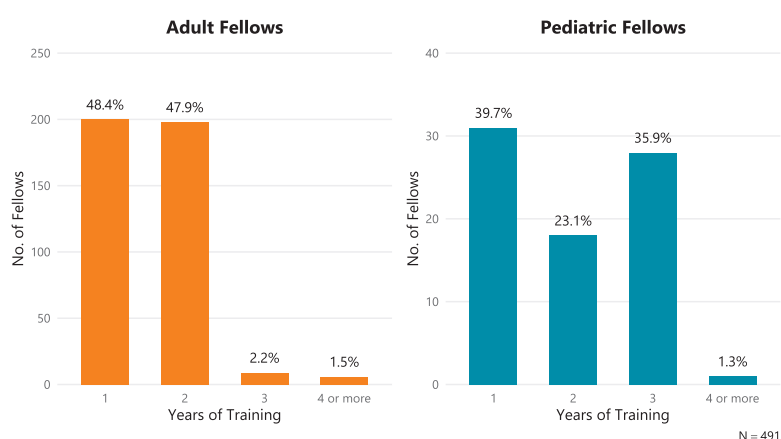


FIGURE 1: YEARS OF TRAINING COMPLETED

These represented 50.2% of all adult nephrology fellows (based on 2018 ASN Nephrology GME Census data) and 64.5% of all pediatric fellows (based on data provided by ASPN). Distributions of participants by fellowship year were similar to most recently available data from the ACGME ($p = 0.8889$, $p = 0.199$, X^2 test for independence, Figure 2) (Methods and data reporting process are detailed in Appendix 1).

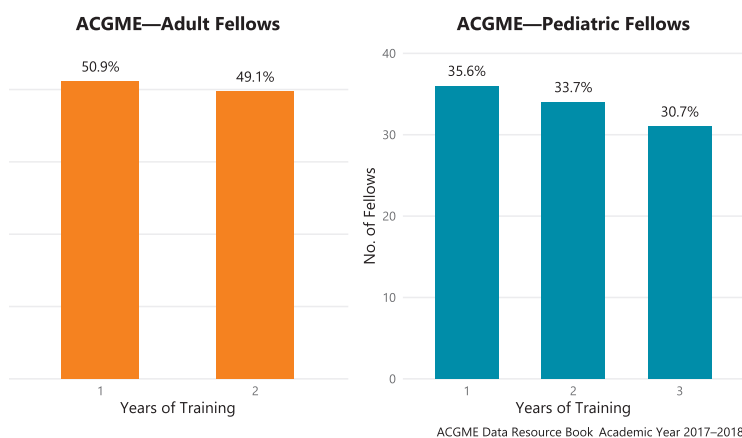


FIGURE 2: DISTRIBUTION OF FELLOWS BY TRAINING YEAR—ACGME

II. Respondent Demographics

Median age for both adult and pediatric fellows was 33 years (ranges ≤ 30 to ≥ 55 years and ≤ 30 to 44 years, respectively) and a majority were married (adult, 65.3%; pediatric, 75.6%) (Table 1). Adult fellows were more likely to be male (66.2%), international medical graduates (IMGs) (64.5%), and of Asian or Pacific Islander race (41.9%). For pediatric fellows most were female (79.5%), US medical graduates (USMGs, 67.9%), and white (64.9%). While proportions of African Americans in both cohorts were below the threshold for national representation (currently 13.4%) (Figure 3), there was a markedly higher proportion of Hispanic/Latina(o) physicians in adult fellowships (10.2% vs. 2.6%; $p = 0.05059$, X^2 test for independence) (Figure 4).

TABLE 1: RESPONDENT DEMOGRAPHIC CHARACTERISTICS

Variable		Adult Fellows	Pediatric Fellows
Median Age (Years)		33 (IQR 32, 37)	33 (IQR 32, 35)
Gender Identity	Male	66.2%	20.5%
	Female	33.7%	79.5%
Relationship Status	Single	106 (25.9%)	15 (19.2%)
	Partnered	24 (6%)	3 (3.8%)
	Married	267 (65.3%)	59 (75.6%)
	Divorced	6 (1.5%)	NA
	Other	1 (0.2%)	NA
Race	American Indian or Alaska Native	0.2%	1.3%
	Asian or Pacific Islander	41.9%	20.8%
	Black or African American	6.7%	7.8%
	White	34.7%	64.9%
	Other	16.5%	5.2%
Ethnicity	Hispanic	10.2%	2.6%
Educational Status	IMG	64.5%	32.1%
	USMG	35.5%	67.9%
Citizenship Status	Native-born U.S. citizen	140 (34.2%)	48 (61.5%)
	Naturalized U.S. citizen	96 (23.5%)	10 (12.8%)
	Permanent resident	52 (12.7%)	NA
	H-1, H-2, or H-3 visa (temporary worker)	43 (10.5%)	4 (5.1%)
	J-1 or J-2 visa (exchange visitor)	71 (17.4%)	14 (17.9%)
	Other visa	7 (1.7%)	NA
Years of Training	1	200 (48.4%)	31 (39.7%)
	2	198 (47.9%)	18 (23.1%)
	3	9 (2.2%)	28 (35.9%)
	≥ 4	6 (1.5%)	1 (1.3%)

II. Respondent Demographics (cont.)

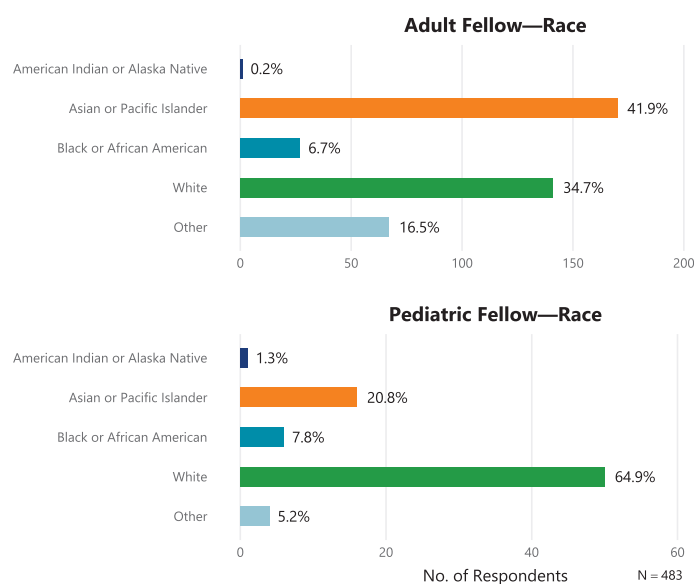


FIGURE 3: RACE

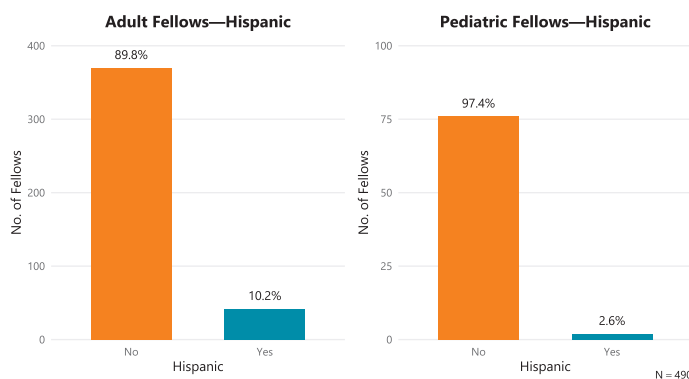


FIGURE 4: ETHNICITY

Cohorts of adult and pediatric nephrology fellows were mirror images of each other. A majority of trainees in adult programs had completed medical school abroad (63.7%) while most pediatric fellows were graduates of allopathic (59%) or osteopathic (9%) US schools (Figure 5). These proportions were similar to ACGME data (Figure 6, $p = 0.199$ for both adult and pediatric fellows, χ^2 test for independence). There was less variation in citizenship status among pediatric fellows, with most indicating they were native-born citizens (61.5% vs. 34.2% for adults), while >40% of adult fellows were either permanent residents (12.7%) or training on a H or J visa (10.5% and 17.4%) respectively. Of note, several fellows indicated they had either O-1 visas (for extraordinary ability) or were training under temporary protected status.

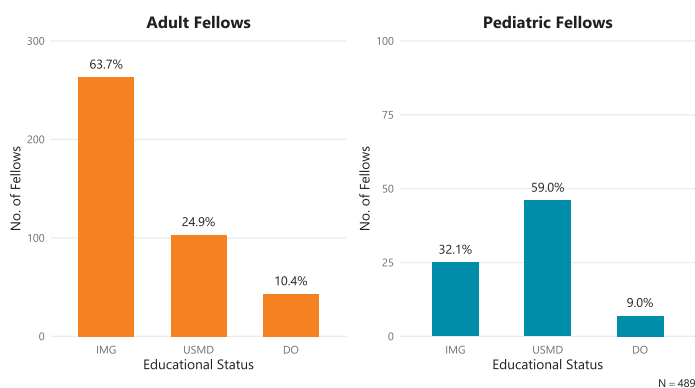


FIGURE 5: EDUCATIONAL STATUS

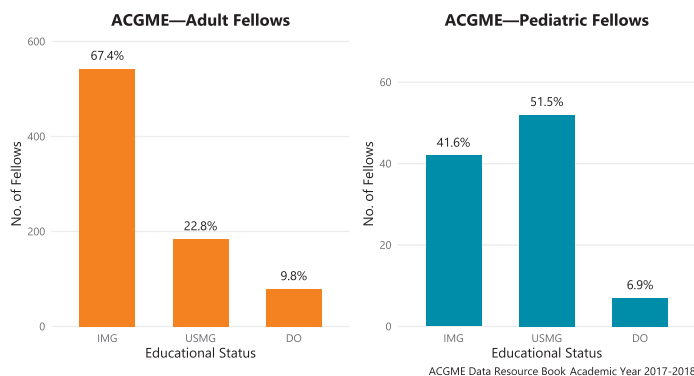


FIGURE 6: DISTRIBUTION OF FELLOWS BY EDUCATIONAL STATUS—ACGME

II. Respondent Demographics (cont.)

The vast majority of respondents were in clinical nephrology training (88% adults, 90% pediatrics) (Table 2). Among other fellowships, research and medicine-pediatrics were the next most commonly reported among adults and pediatric respondents, respectively (7.8% for both).

TABLE 2: ADULT FELLOWS CURRENT FELLOWSHIP TYPE

Adult Fellowship Type	No. of Respondents
Clinical Nephrology	361
Research	32
Nephrology-Critical Care Medicine	9
Clinical-Research	4
Interventional Nephrology	3
Onconeurology	1
Transplant Nephrology	1

III. Educational Debt

Educational debt—and its growing burden, especially for USMGs—is a key factor in physicians' career choices. To better gauge this burden, debt and other monetary variables were, for the first time in the survey's history, measured in real numeric values (in multiples of \$1000) instead of binned ranges. This allows generation of summary statistics and the opportunity to view distributions across multiple respondent characteristics.

As previously reported, IMGs have little or no educational debt (median \$0 vs. \$225,000 for USMGs) (Figure 7). Yet regardless of fellowship, median educational debt for women (adult fellow median debt \$125,000; pediatric \$130,000) was greater than that reported by men (adult \$65,500; pediatric \$103,000) (Figure 8).

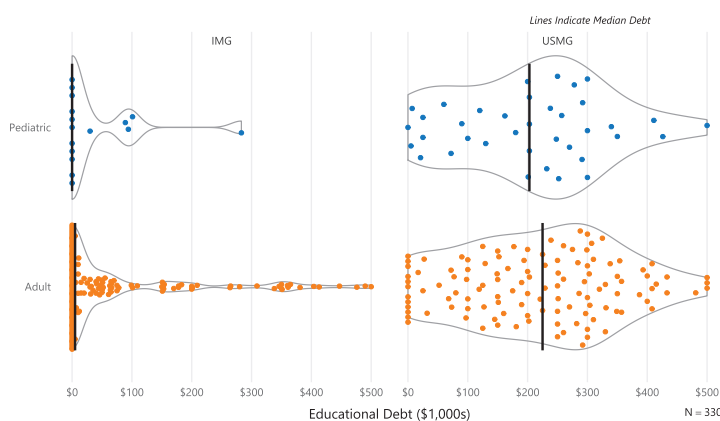


FIGURE 7: DEBT—EDUCATIONAL STATUS AND FELLOWSHIP TYPE

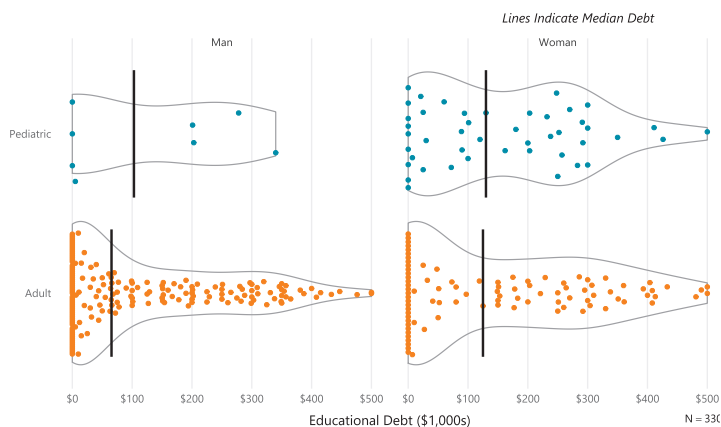


FIGURE 8: DEBT—GENDER IDENTITY AND FELLOWSHIP TYPE

IV. Geographic Distribution of Respondents

A majority of respondents were in fellowship in the Northeast and South Census regions (Figure 9). Because many physicians intend to practice in or near the areas they train, the locations of fellow respondents—while limited by the locations of training institutions—may not be optimally located for efforts to address the current maldistribution of physicians in the US identified in previous reports on the ASN nephrology fellow survey authored by the George Washington University Health Workforce Institute. Geographic distribution of participants is similar compared with the states of their internal medicine residency (Figure 10), which overlaid with their current location shows the weighting of fellows training locations (Figure 11).

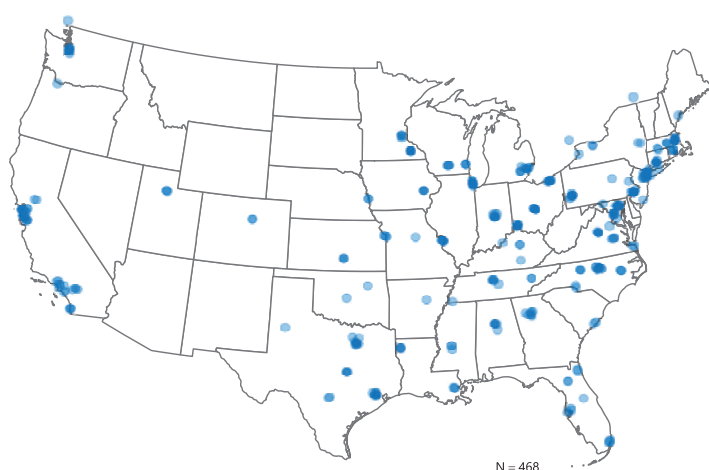


FIGURE 9: FELLOWSHIP LOCATION

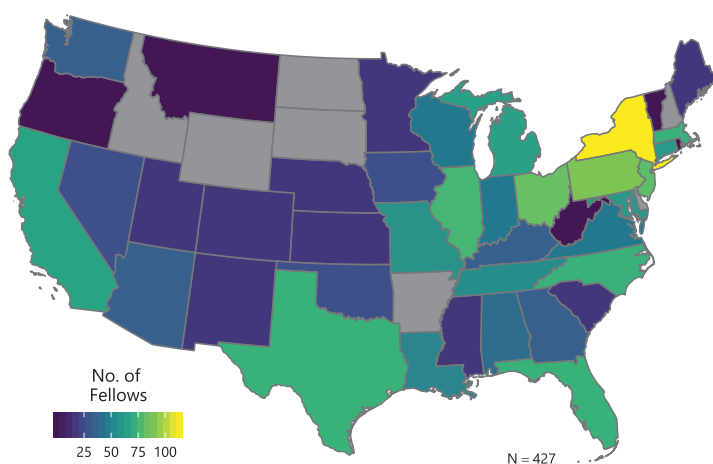


FIGURE 10: RESIDENCY LOCATION

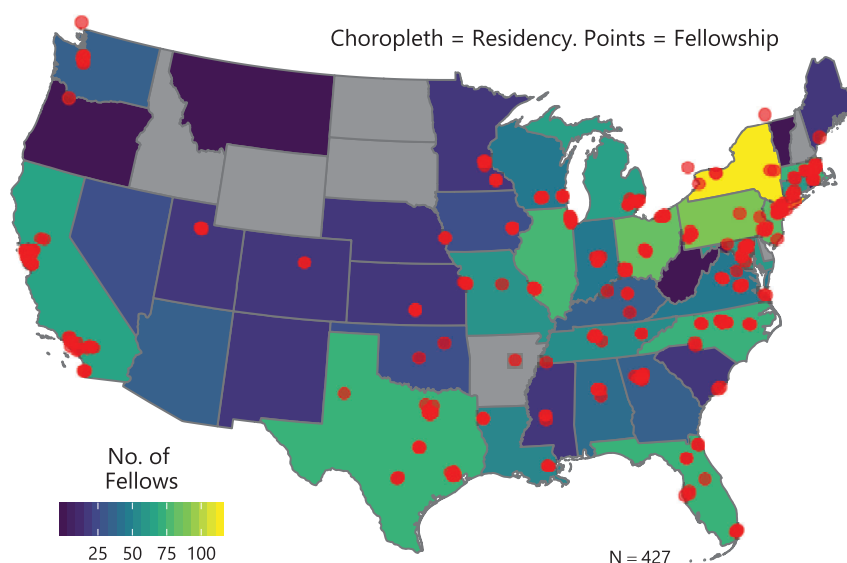


FIGURE 11: OVERLAY OF RESIDENCY AND FELLOWSHIP LOCATION

V. Future Plans

All participants were asked about their future plans, both for after the current academic year and beyond their current fellowship. A majority of respondents were completing their first year of training (adult, 48.4%; pediatrics, 39.7%) and intended to continue their current fellowship (Table 3). Nearly half of the 52 participants entering subspecialty training were entering transplant (55%) followed by joint nephrology-critical care fellowships (21%) (Table 4).

TABLE 3: FUTURE PLANS AFTER CURRENT ACADEMIC YEAR

Plans After Current Year	No. of Respondents (%)
Continue Current Fellowship	268 (54.6%)
Post-Fellowship Practice	153 (31.2%)
Additional Subspecialty Training or Fellowship	52 (10.6%)
Undecided/don't know yet	9 (1.8%)
Internal Medicine Residency	4 (0.8%)
Missing	3 (0.6%)
Other	2 (0.4%)

TABLE 4: SUBSPECIALIZATION OF FELLOWS PURSUING ADDITIONAL TRAINING AFTER CURRENT ACADEMIC YEAR (N = 47)

Additional Training	No. of Fellows (%)
Transplant Nephrology	26 (55.3%)
Nephrology-Critical Care Medicine	10 (21.3%)
Research	4 (8.5%)
Interventional Nephrology	2 (4.3%)
Onconeurology	2 (4.3%)
Glomerular Disease	1 (2.1%)
Palliative Care	1 (2.1%)
Renal Genetics	1 (2.1%)

When asked about their intended subspecialization after fellowship, the majority of participants indicated they would practice general clinical pediatric or adult nephrology (45%) followed by transplant nephrology (16.2%). Of note, 7.5% indicated they intended to practice critical care exclusively (Figure 12). Clinical nephrology again was the most anticipated focus of the first post-fellowship position, with only 5 participants (1.6%) indicating working exclusively in non-nephrology hospital medicine.

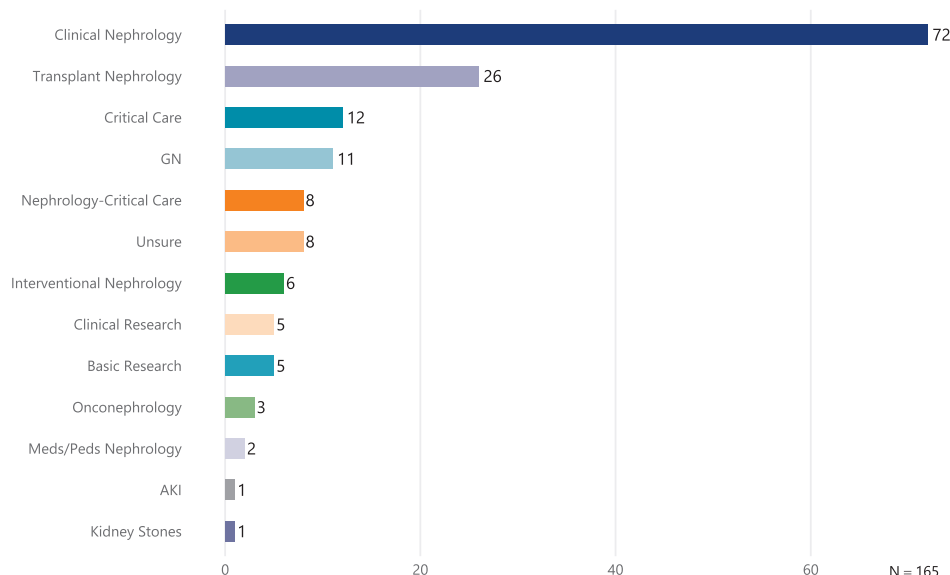
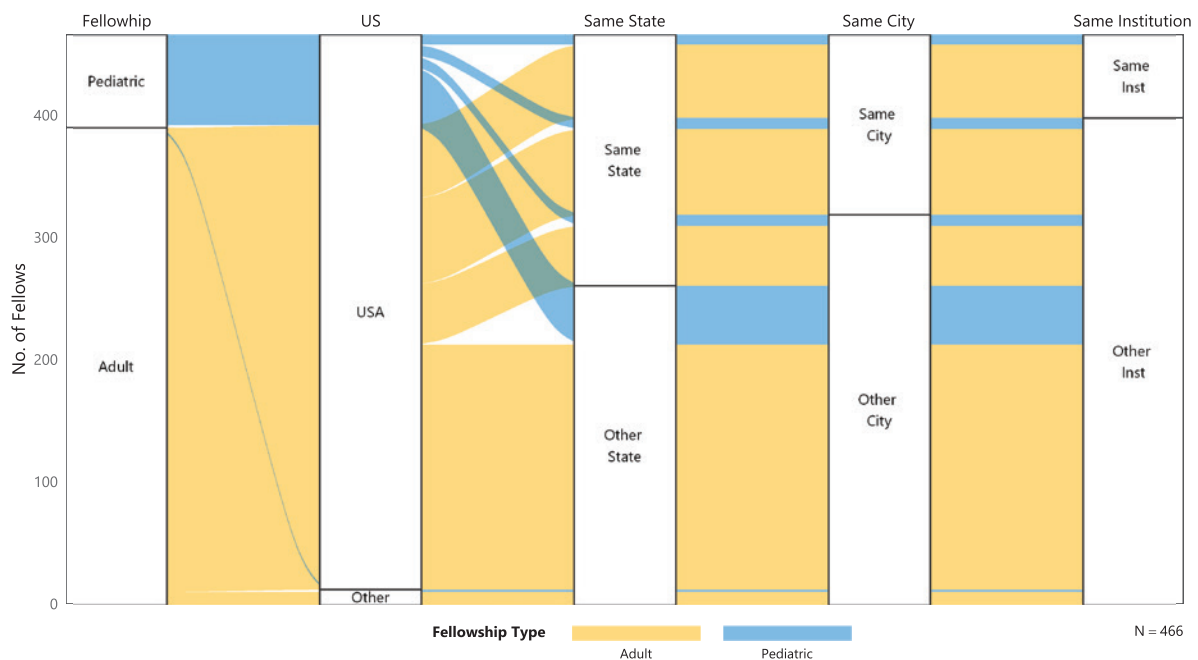


FIGURE 12: INTENDED POST-FELLOWSHIP SPECIALIZATION

TABLE 5: ANTICIPATED FOCUS OF FIRST JOB

Anticipated Focus	No. of Fellows (%)
Clinical nephrology	203 (41.3%)
Missing	176 (35.8%)
Nephrology Research	44 (9.0%)
Clinical nephrology and another clinical specialty (e.g., critical care)	40 (8.1%)
Non-nephrology—Other clinical specialty area (e.g., critical care)	10 (2.0%)
Other	6 (1.2%)
Non-nephrology—Hospitalist	5 (1.0%)
Transplant Nephrology	3 (0.6%)
Interventional Nephrology	2 (0.4%)
Nephrology-Industry	1 (0.2%)
Non-nephrology—Government	1 (0.2%)

As noted, perceived employment opportunities near training institutions are a factor physicians consider when assessing their choices in graduate medical education. However, only 43% of adult fellows and 33% of pediatric fellows anticipated staying in the same state, and just 32% and 22%, respectively, in the same city for their first post-fellowship job (Figure 13). While 60 adult fellows (15%) and eight pediatric respondents (10%) indicated they anticipated practicing at the same institution where they completed their training, 13 fellows (11 adult [3%] and two pediatric [3%]) planned to practice outside the US.

**FIGURE 13: ANTICIPATED PRACTICE LOCATION**

Local Job Perspectives

Aggregated perspectives of local employment opportunities were generally negative, with 64.3% indicating there were “Too Few” or “Far Too Few” jobs within 50 miles of their fellowship program (Figure 14). Pediatric fellows were more pessimistic about their local prospects than their adult counterparts, with just 13.8% reporting an “Appropriate” number of jobs (vs. 36.8% for adults) (Figure 15). No statistical comparisons between these subgroups were statistically significant ($p = 1$, Fisher’s exact test).

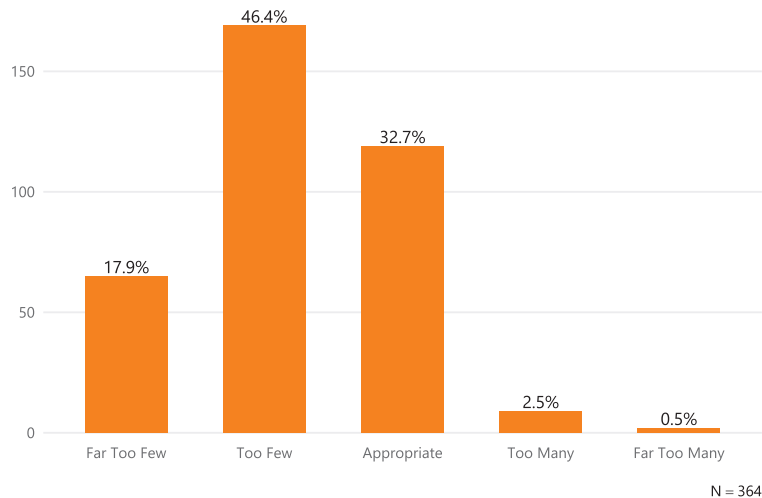


FIGURE 14: LOCAL JOB MARKET PERCEPTION—COHORT

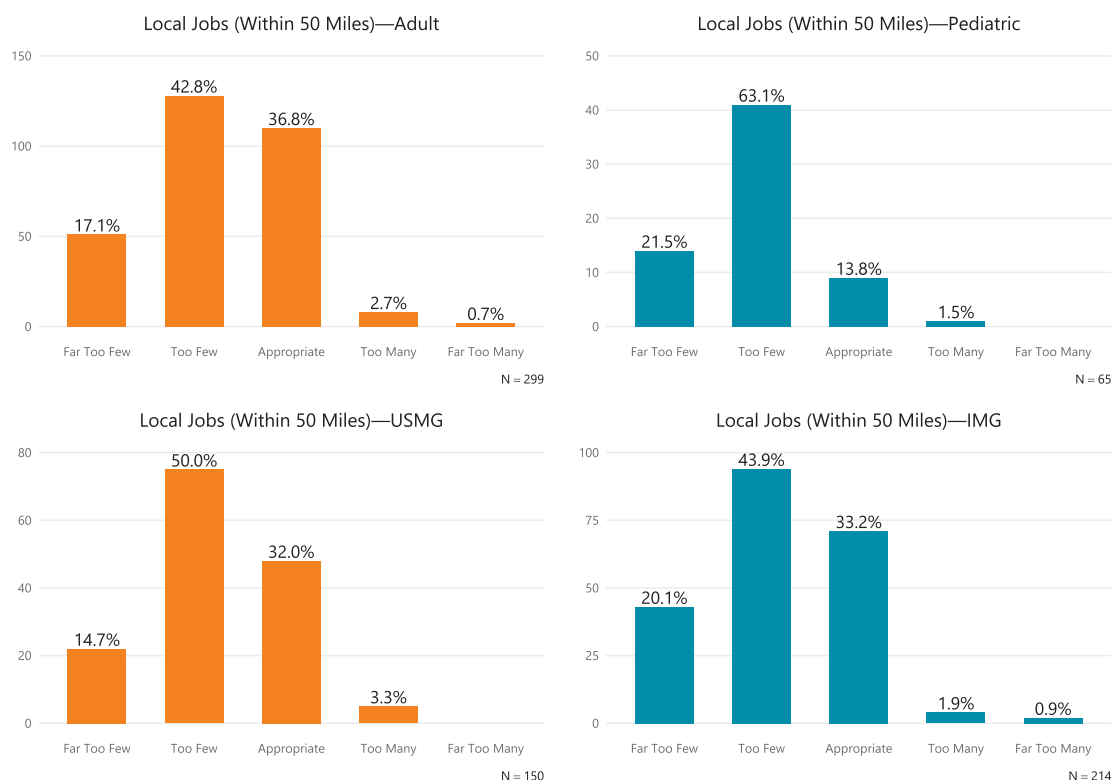


FIGURE 15: LOCAL JOB MARKET PERCEPTION—EDUCATIONAL STATUS AND FELLOWSHIP TYPE

National Job Perspectives

Impressions of the national employment marketplace were more favorable, with 56.4% indicating an “Appropriate” number of jobs overall (Figure 16), with similar subgroup proportions (range 55.5%–57.7%) (Figure 17). Again, no statistical comparisons between these subgroups were statistically significant ($p = 1$, Fisher’s exact test).

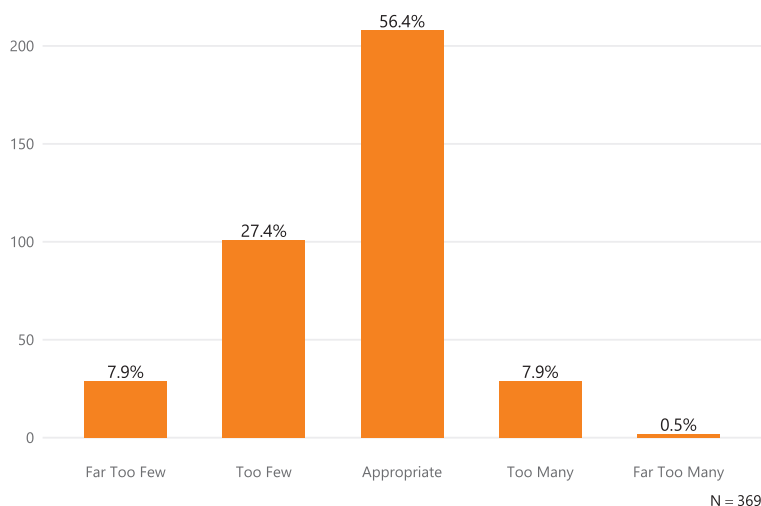


FIGURE 16: NATIONAL JOB MARKET PERCEPTION—COHORT

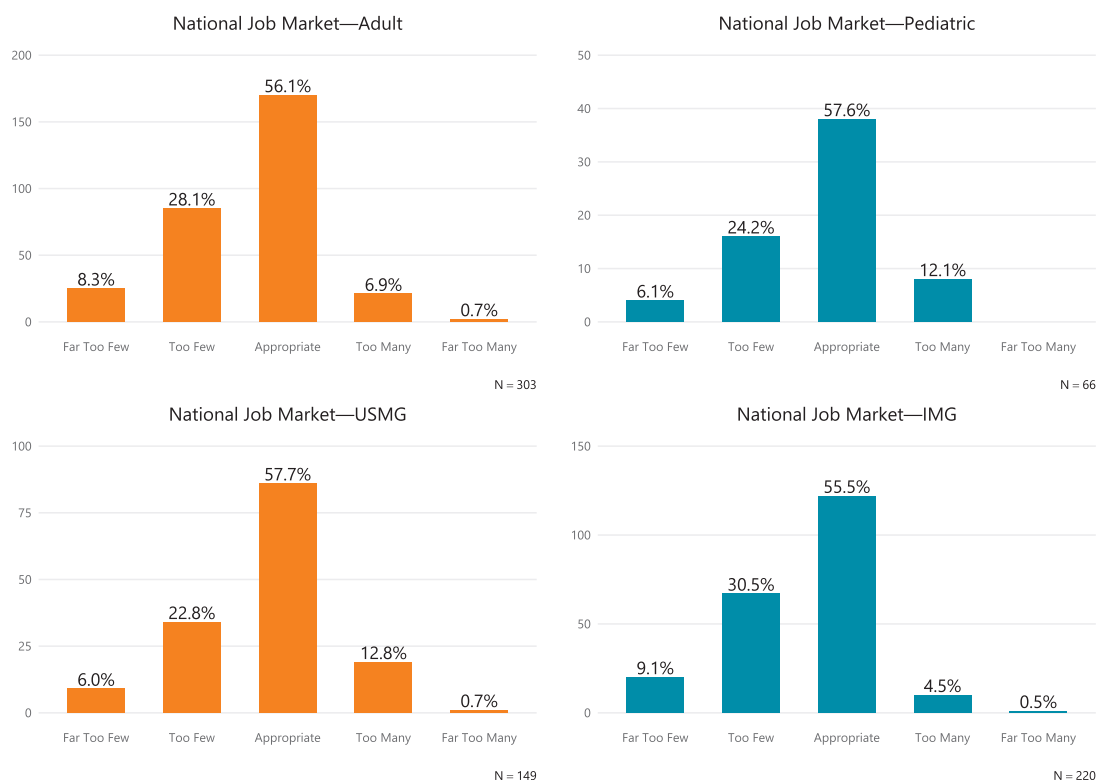
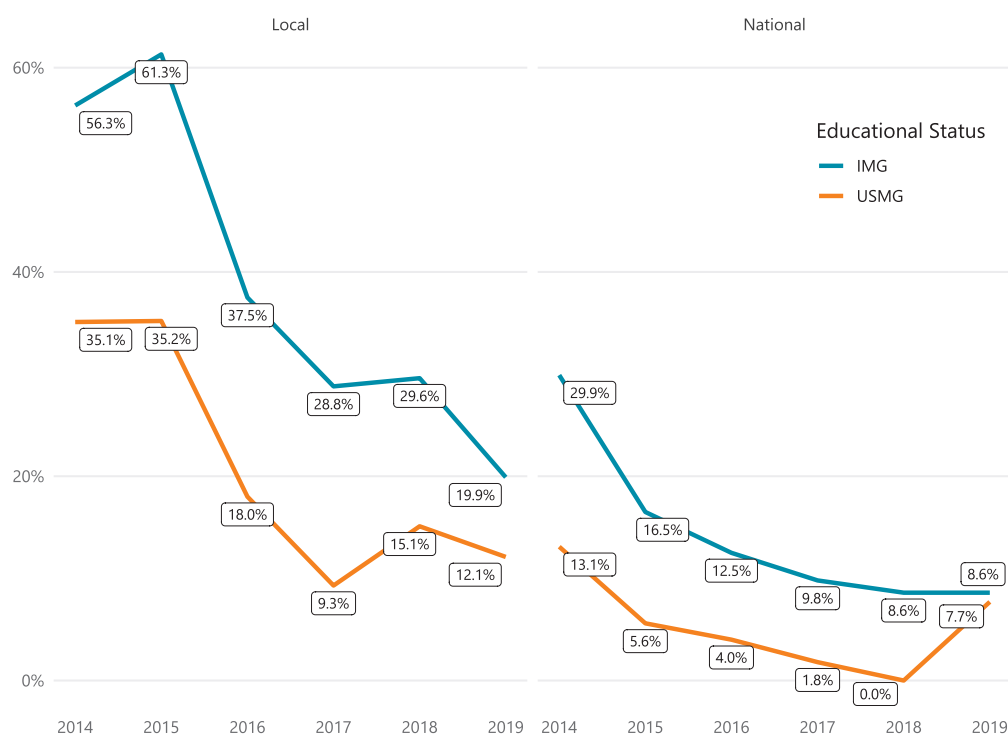


FIGURE 17: NATIONAL JOB MARKET PERCEPTION—EDUCATIONAL STATUS AND FELLOWSHIP TYPE

Trends in Job Market Perceptions

Since the survey's inception in 2014, both IMG and USMG fellows have perceived an improving job market locally and nationally (Figure 18). However, USMG fellows' impressions of the national employment market soured slightly in 2019, with 7.7% indicating there are "Far too few" jobs. These questions were revised to improve the reliability and validity with a balanced Likert scale, thus when comparing previous versions to 2019 data (for adult fellow respondents only) the analog of previously analyzed responses "No Jobs" and "Very few jobs"—"Far too few"—were reported.



*Adult fellow respondents only. 2019 N = 299.

FIGURE 18: LOCAL AND NATIONAL JOB MARKET PERCEPTION TRENDS

Nephrology Job Market—Experiences and Perspectives

Of the 491 participants, 213 adult fellows (52%) and 29 pediatric fellows (37%) had completed the requisite years of training for board eligibility. Only these respondents were exposed to the following question sections on job search experiences and first post-fellowship job characteristics.

I. Job Search Process

Only two adult fellows were entering solo practice, while 167 had begun their search for a nephrology position (Table 6) and 44 initiated a search for non-nephrology post-fellowship employment (Table 7). The top other position sought by participants was hospital medicine (15 participants, Table 8). Overall, 125 (52%) of respondents had received advice about their job search and negotiating their first contract (46% of adult and 97% of pediatric fellows).

**TABLE 6: NEPHROLOGY JOB SEARCH STATUS
(N = 242)**

Fellowship	Job Search Status	No. of Fellows
Adult	Yes	144
Adult	No, not yet	67
Adult	No, I will be self-employed	2
Pediatric	Yes	23
Pediatric	No, not yet	6

TABLE 7: OTHER JOB SEARCH STATUS

Fellowship	Other Job Search Status	No. of Fellows
Adult	Yes	39
Adult	No	174
Pediatric	Yes	5
Pediatric	No	24

TABLE 8: OTHER JOB SEARCH—SPECIFICS (N = 44)

Other Job	No. of Fellows
Hospitalist	15
Internal Medicine	13
Critical Care Medicine	4
Pediatrics	4
Missing	4
Primary Care	3
Moonlighting	1
Industry	1

I. Job Search Process (cont.)

The number of jobs applied for by educational status and fellowship type is shown in Figure 19. While a quarter of both IMG and USMG fellows entered into positions without going through the application process, 36.4% of IMG and 44.4% of USMG pediatric fellows applied ≥ 10 and 5 jobs, respectively. Yet between 11.8% and 26.9% of job seekers failed to receive a job offer (Figure 20).

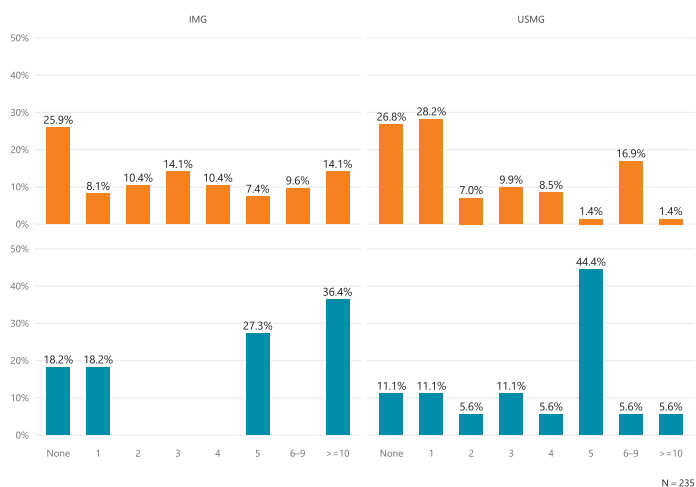


FIGURE 19: JOB APPLICATIONS—EDUCATIONAL STATUS AND FELLOWSHIP TYPE

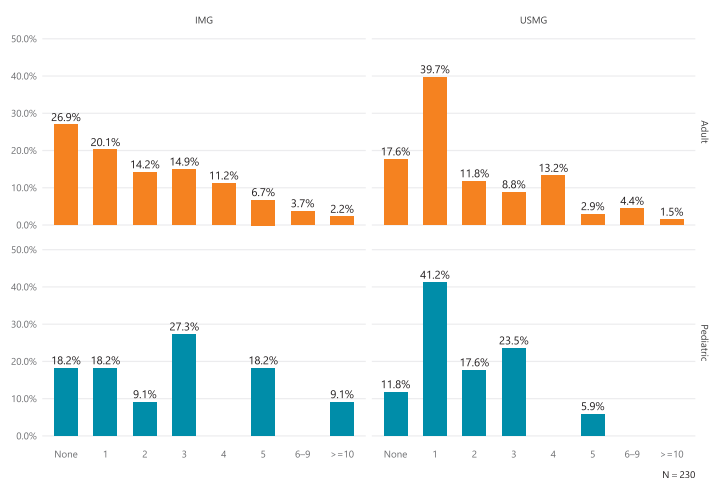


FIGURE 20: JOB OFFERS—EDUCATIONAL STATUS AND FELLOWSHIP TYPE

Of the 144 adult fellows looking for a position, 81% had accepted a nephrology job and 19% had an offer but were continuing their search (Figure 21). For pediatric participants, 87% of the 23 searching had signed a nephrology contract while 13% were still looking. Of those looking outside the specialty, 49% of the 39 adult participants had found positions, while the remaining 51% continued their search (Figure 22).

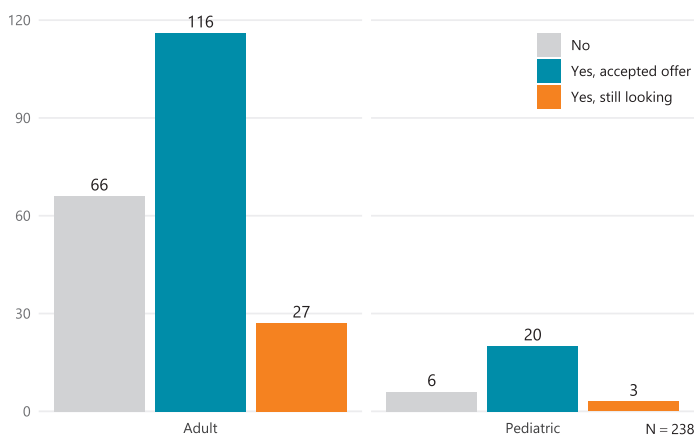


FIGURE 21: OFFERED NEPHROLOGY JOB

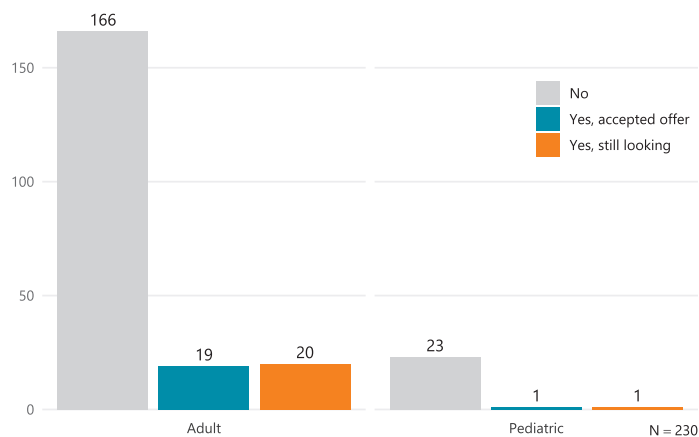
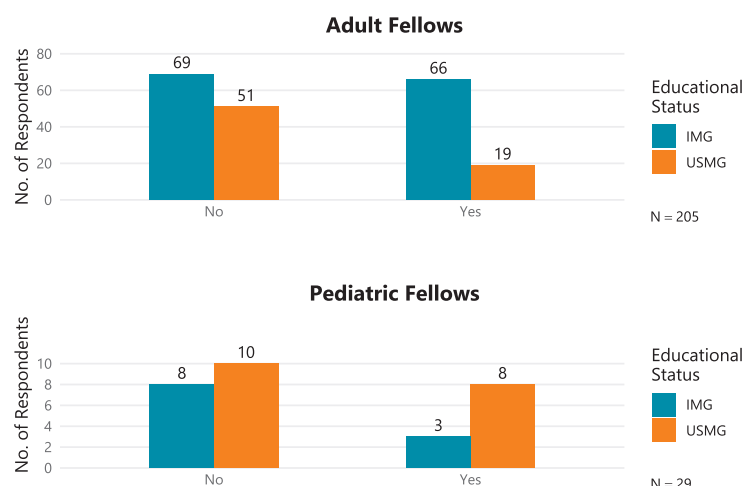


FIGURE 22: OFFERED OTHER JOB

II. Difficulty Finding Satisfactory Position

A substantial portion of adult (41.4%) and pediatric (38%) fellows encountered problems finding a post-fellowship position they considered satisfactory (Figure 23).



**FIGURE 23: DIFFICULTY FINDING SATISFACTORY POSITION—
EDUCATIONAL STATUS AND FELLOWSHIP TYPE**

As in past surveys, job location, practice setting, and compensation were frequently cited as the sources of the difficulty (Table 9). Challenges finding a satisfactory job and local employment perceptions appear to be associated with a higher proportion of those indicating “Far Too Few” or “Too Few” local jobs reporting difficulty than those who reported “Appropriate,” “Too Many,” or “Far Too Many” positions ($p = 0.00675$, X^2 test for independence).

TABLE 9: REASON FOR DIFFICULTY FINDING SATISFACTORY POSITION (N = 96)			
Reason		Adult (N = 85)	Pediatric (N = 11)
In a desired location	IMG	46	3
	USMG	13	8
In a desired practice setting	IMG	35	0
	USMG	16	6
Offering adequate salary/compensation	IMG	40	2
	USMG	15	4
Offering employment opportunities for spouse/partner	IMG	9	1
	USMG	1	1
Other (Please specify)	IMG	7	1
	USMG	3	0
That met visa status requirements	IMG	31	1
	USMG	1	0

II. Difficulty Finding Satisfactory Position *(cont.)*

Among the employment types frequently encountered in their job search, there were conflicting signals due to the “select all” question structure, which was used to capture the maximum amount of information, but whose interpretability is limited to general trends and not point estimates (Tables 10 and 11). Given this context, private practice–nephrology positions were most common for adult participants and academic practice for pediatric fellows. Clinical researcher opportunities were among the more-scarce jobs for pediatric fellows, and for adults, clinical educator and academic faculty practice positions.

TABLE 10: MORE FREQUENTLY ENCOUNTERED JOBS (N = 206)

More Frequent Jobs		Adult (N = 180)	Pediatric (N = 26)
<i>Academic clinical nephrology</i>	IMG	39	9
	USMG	11	14
<i>Clinical Educator</i>	IMG	4	0
	USMG	2	4
<i>Clinical Investigator—Basic/translational research</i>	IMG	3	2
	USMG	1	0
<i>Clinical Investigator—Clinical Research</i>	IMG	3	0
	USMG	2	1
<i>Government</i>	IMG	2	0
	USMG	2	0
<i>Industry</i>	IMG	2	0
<i>Other (please specify)</i>	IMG	4	0
	USMG	4	1
<i>Private practice—Multispecialty group practice</i>	IMG	23	1
	USMG	12	1
<i>Private practice nephrology—Nephrology only practice</i>	IMG	88	2
	USMG	44	3
<i>Transplant Nephrologist</i>	IMG	5	0
	USMG	4	0

II. Difficulty Finding Satisfactory Position *(cont.)*

TABLE 11: LESS FREQUENTLY ENCOUNTERED JOBS (N = 172)			
Less Frequent Jobs		Adult (N = 150)	Pediatric (N = 22)
<i>Academic clinical nephrology</i>	IMG	60	2
	USMG	23	3
<i>Clinical Educator</i>	IMG	13	0
	USMG	10	2
<i>Clinical Investigator—Basic/translational research</i>	IMG	11	1
	USMG	4	3
<i>Clinical Investigator—Clinical Research</i>	IMG	7	2
	USMG	6	6
<i>Government</i>	IMG	9	0
	USMG	4	0
<i>Industry</i>	IMG	9	0
	USMG	4	0
<i>Other (please specify)</i>	IMG	6	0
	USMG	3	0
<i>Private practice—Multispecialty group practice</i>	IMG	12	3
	USMG	10	4
<i>Private practice nephrology—Nephrology only practice</i>	IMG	16	4
	USMG	5	6
<i>Transplant Nephrologist</i>	IMG	9	3
	USMG	5	3

III. First Post-Fellowship Job Characteristics

For the 2019 nephrology fellow survey respondents the median base salary was \$190,000. When compared by gender identity, men had a higher median base salary (\$200,000) than reported by women respondents (\$175,000) (Figure 24).

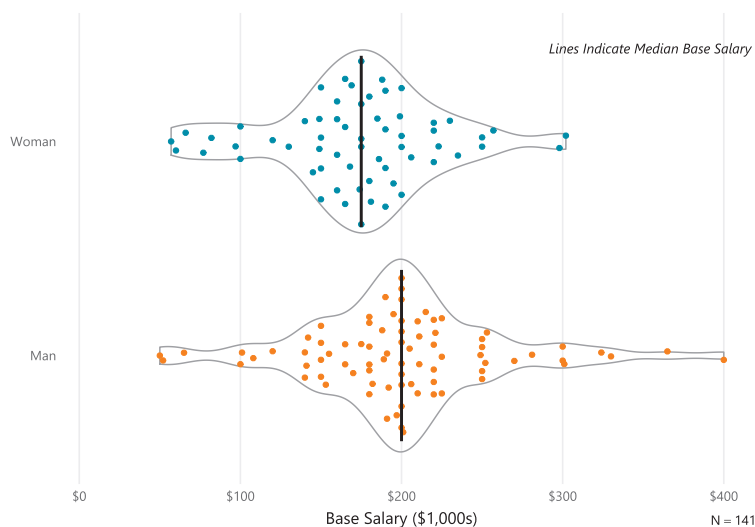


FIGURE 24: BASE SALARY—GENDER IDENTITY

Despite having a tighter salary range (\$57,000–\$302,000) than men (\$50,000–\$400,000) there was slightly more variation in the base salaries for women (IQR \$50,000, median absolute deviation (MAD) \$37,100 for women; IQR \$46,500, MAD \$34,100 for men). Base starting salaries of as little as \$50,000 were reported, which may have been in error (e.g., “fat finger”) but the data were retained as the median, which is the preferred summary statistic for monetary values, is robust to outliers. IMG participants demonstrated a higher median base salary (\$195,000, range \$50,000–\$400,000) than graduating USMG fellows (\$180,000, range \$52,000–\$300,000), with similar IQRs (\$55,000 vs \$60,000, respectively) (Figure 25).

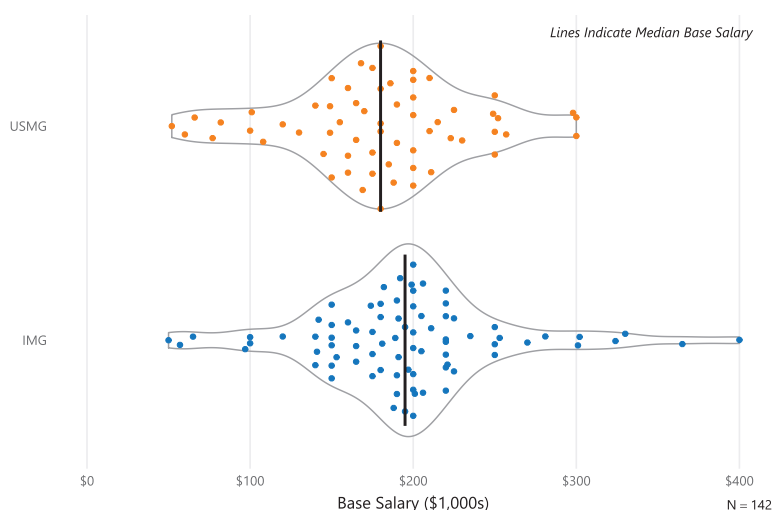


FIGURE 25: BASE SALARY—EDUCATIONAL STATUS

III. First Post-Fellowship Job Characteristics *(cont.)*

Stratified solely by fellowship type, pediatric fellows reported a median base salary of \$150,000 (range \$50,000–\$225,000, IQR \$23,000, MAD \$22,200), compared with a median of \$199,000 for adult nephrologists (range \$52,000–\$400,000, IQR \$50,000, MAD \$35,600) (Figure 26).

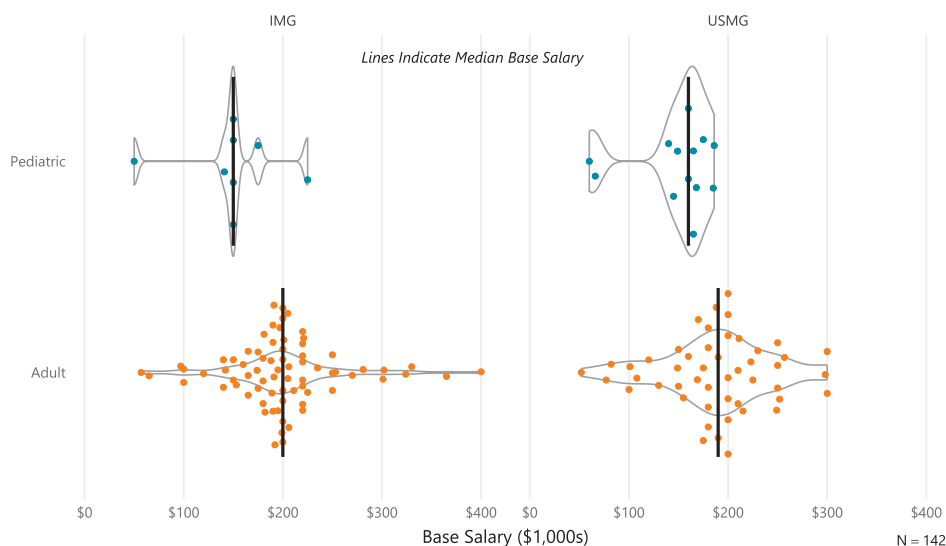


FIGURE 26: BASE SALARY—EDUCATIONAL STATUS AND FELLOWSHIP TYPE

When comparing fellowship and educational status, adult IMGs had the highest median base salary (\$200,000) whereas pediatric IMGs has the lowest (\$150,000). Female participants also reported lower median base salaries regardless of educational status (IMGs, \$181,000; USMGs, \$168,000) (Figure 27).

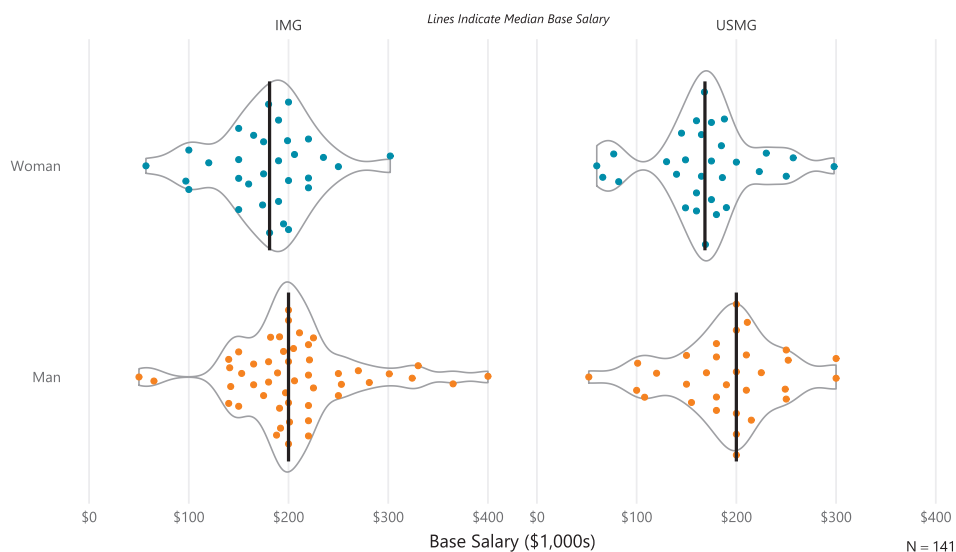


FIGURE 27: BASE SALARY—EDUCATIONAL STATUS AND GENDER IDENTITY

III. First Post-Fellowship Job Characteristics *(cont.)*

Stratifying base salary by demographics of practice location and other fellow characteristics found participants entering practice in rural areas and small cities reporting the highest starting salaries (Table 12).

TABLE 12: MEDIAN BASE SALARY BY FIRST JOB DEMOGRAPHIC LOCATION AND OTHER VARIABLES

Demographic Practice Location	Adult (N = 121)	Pediatric (N = 21)	Men (N = 80)	Women (N = 61)	IMG (N = 81)	USMG (N = 61)
Inner city	\$190,000	\$150,000	\$192,000	\$175,000	\$197,500	\$177,500
Other area within major city	\$188,000	\$154,500	\$189,000	\$160,000	\$188,500	\$160,000
Rural	\$302,000	—	\$330,000	\$201,000	\$302,000	—
Small city (population <50,000)	\$211,000	\$168,000	\$211,000	\$192,000	\$200,000	\$205,500
Suburban	\$200,000	\$150,000	\$200,000	\$180,000	\$200,000	\$193,000

This was also reflected in salary by Census Division, with the highest salary coming from the more sparsely populated Mountain Division and salary ranges narrower (and slightly lower) for those entering practice in the New England, Middle Atlantic, and South Atlantic divisions (Figure 28). While a comparison of base salaries by Census Division found the difference in salary distributions was statistically significant ($p = 0.00795$, one-way ANOVA) these data are limited and should be interpreted with caution. It is also important to note that base starting salaries may not reflect the near- or long-term earning potential of nephrologists after entering practice.

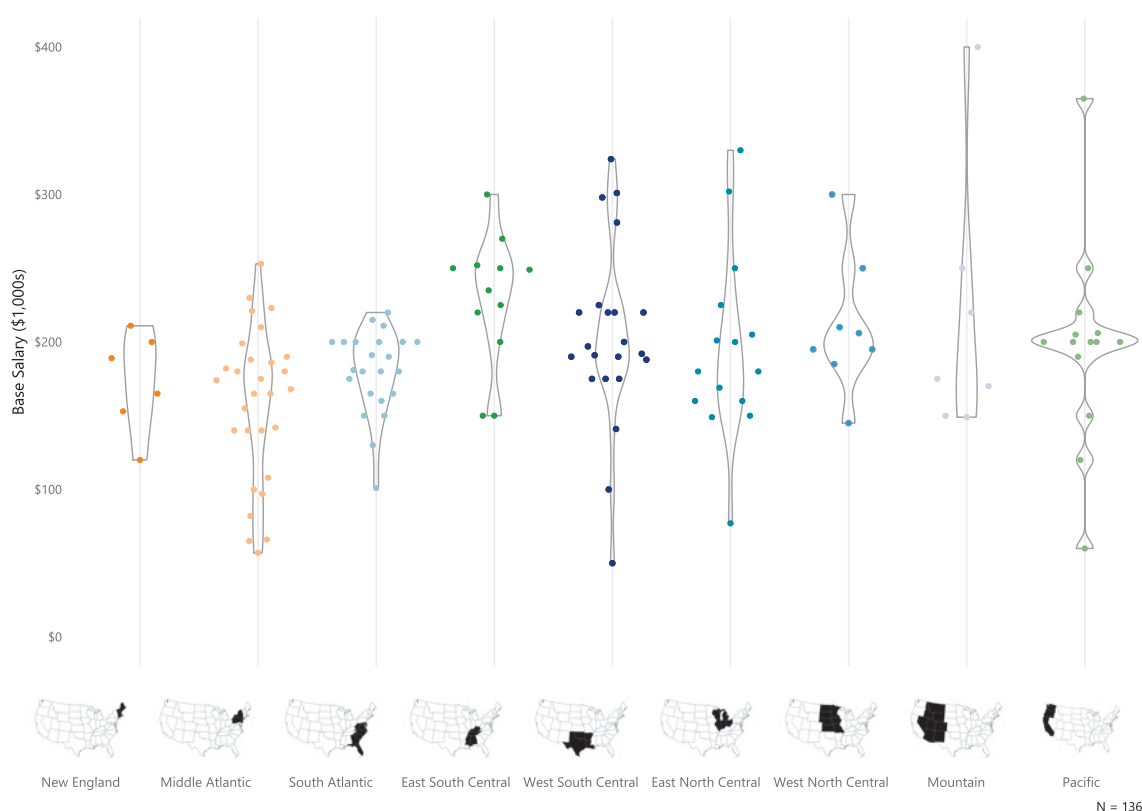


FIGURE 28: BASE SALARY—CENSUS DIVISION

First Job Focus

A majority of respondents, both adult and pediatric fellows, were entering clinical practice (99 and 15, respectively) followed by research (nine and six fellows). Among adult respondents only four indicated they were practicing hospital medicine in a non-nephrology position (Table 13).

TABLE 13: FIRST POST-FELLOWSHIP JOB FOCUS (N = 144)		
Fellowship	Job Focus	No. of Fellows
Adult	Clinical nephrology	99
Adult	Nephrology Research	9
Adult	Clinical nephrology and another clinical specialty (e.g., critical care)	5
Adult	Non-nephrology—Hospitalist	4
Adult	Nephrology-Government	2
Adult	Nephrology-Industry	1
Adult	Concierge medicine	1
Adult	Interventional Nephrology	1
Adult	Nephrology - Military	1
Pediatric	Clinical nephrology	15
Pediatric	Nephrology Research	6

Adult fellows most commonly reported starting a primarily clinical nephrology position in a non-academic hospital (52 participants), pediatric fellows in a university-affiliated medical center (15) (Tables 14–15).

TABLE 14: ADULT FELLOWS—FIRST POST-FELLOWSHIP JOB PRACTICE SETTING (N = 121)	
First Job Practice Setting—Adult	No. of Fellows
Primarily clinical nephrology in a non-academic hospital	52
Primarily clinical nephrology (mostly clinical FTE) position in a university based/affiliated medical center	41
Primary research position in a university based/affiliated medical center	13
Mixed nephrology and non-nephrology clinical position in a university based/affiliated medical center	4
Other	4
Government	2
Mixed clinical nephrology and non-nephrology in a non-academic hospital	2
Primarily clinical non-nephrology position in a hospital not associated with an academic institution	2
Primarily clinical non-nephrology position in a university based/affiliated medical center	1

TABLE 15: PEDIATRIC FELLOWS—FIRST POST-FELLOWSHIP JOB PRACTICE SETTING (N = 21)	
First Job Practice Setting—Pediatric	No. of Fellows
Primarily clinical nephrology (mostly clinical FTE) position in a university based/affiliated medical center	15
Primary research position in a university based/affiliated medical center	5
Primarily clinical nephrology in a non-academic hospital	1

First Job Focus *(cont.)*

Most fellows anticipated overseeing outpatient clinic and inpatient consults, as well as outpatient dialysis for adult participants (Table 16).

TABLE 16: FIRST POST-FELLOWSHIP JOB RESPONSIBILITIES (N = 143)			
First Job Responsibilities		Adult (N = 82)	Pediatric (N = 61)
<i>Apheresis</i>	IMG	11	2
	USMG	5	3
<i>Basic science research</i>	IMG	1	1
	USMG	2	1
<i>Clinical research</i>	IMG	5	0
	USMG	7	10
<i>Dialysis catheter placement</i>	IMG	6	1
	USMG	9	0
<i>Education</i>	IMG	22	6
	USMG	13	9
<i>Inpatient care</i>	IMG	68	8
	USMG	45	12
<i>Interventional nephrology</i>	IMG	2	0
	USMG	2	0
<i>Joint venture with a dialysis provider</i>	IMG	7	0
	USMG	13	0
<i>Kidney biopsy</i>	IMG	7	7
	USMG	6	11
<i>Medical directorship with a dialysis provider</i>	IMG	10	0
	USMG	12	0
<i>Outpatient clinic care</i>	IMG	61	8
	USMG	43	12
<i>Outpatient dialysis care</i>	IMG	50	7
	USMG	37	10

First Job Focus (cont.)

Only 7% (10 fellows) of adult respondents indicated their first job was part-time (Figure 29). Stratifying by gender identity and full- vs. part-time employment, the median base salary for women working full-time (\$178,000) still lagged that for men (\$200,000) as it did for physicians working part-time (women \$120,000; men, \$185,000). Of these, one indicated they were between 75% and 100% FTE, one was 51%–74%, five between 26% and 50%, and one \leq 25% FTE. Despite the range of FTE for those with part-time employment, the median salary for the cohort was \$125,000 (range \$57,000–\$250,000).

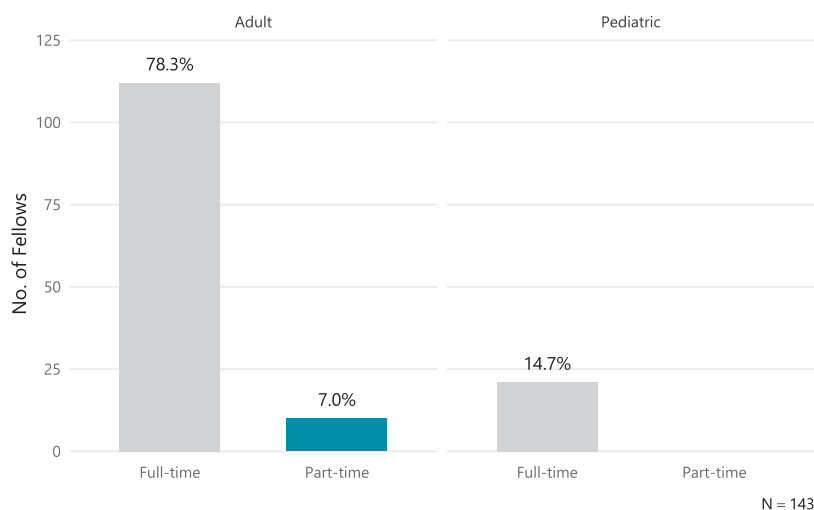


FIGURE 29: FULL-TIME VS. PART-TIME

Most adult fellows anticipated 51–60 paid hours per week, and pediatric respondent 41–50 hours (Table 17).

TABLE 17: NUMBER OF PAID HOURS PER WEEK BY FELLOWSHIP (N = 143)		
Fellowship	No. of Paid Hours/Week	No. of Fellows
Adult	51–60 hours	40
Adult	41–50 hours	37
Adult	31–40 hours	21
Adult	21–30 hours	3
Adult	\leq 20 hours	2
Adult	\geq 61 hours	19
Pediatric	51–60 hours	6
Pediatric	41–50 hours	10
Pediatric	31–40 hours	3
Pediatric	\geq 61 hours	2

When assessing salary by gender identity and weekly paid hours, female respondents anticipating working \geq 61 hours had a median salary of \$170,000 compared with \$190,000 for men.

First Job Focus (cont.)

It's important to note that because of the class imbalance in the distribution of responses for full-/part-time employment and anticipated hours worked these comparisons should be interpreted with caution. Of those who have accepted a position, 40 adult fellows intended to moonlight (19 in a different specialty, 17 in nephrology, and four as a dialysis provider). Only two pediatric fellows planned on moonlighting. Among those fellows who were not practicing nephrology in their first post-fellowship position, most were entering a different clinical practice. Adult and pediatric fellows both expected approximately 3 months of on-call time per year (adult, median 12 weeks; pediatric, 12.5 weeks) (Figure 30). Nearly half of pediatric respondents anticipated having night call ≥ 5 times in a month, compared with only 34.4% of adult fellows (Figure 31).

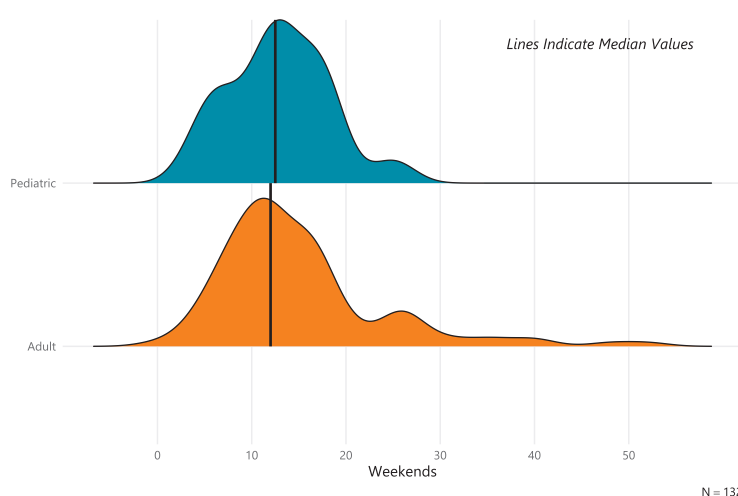


FIGURE 30: EXPECTED WEEKEND CALL—FELLOWSHIP TYPE

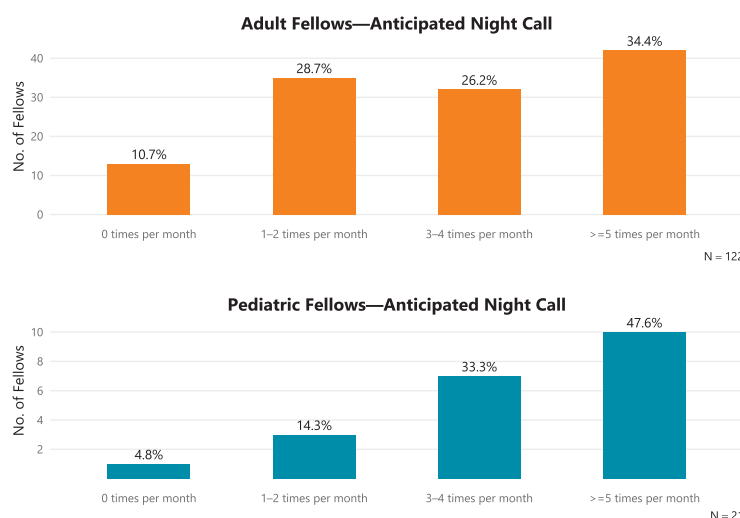


FIGURE 31: ANTICIPATED NIGHT CALL—FELLOWSHIP TYPE

More adult nephrologists entering practice anticipated having physician extender coverage (21% vs. 9.5% for pediatric nephrologists) (Figure 32).

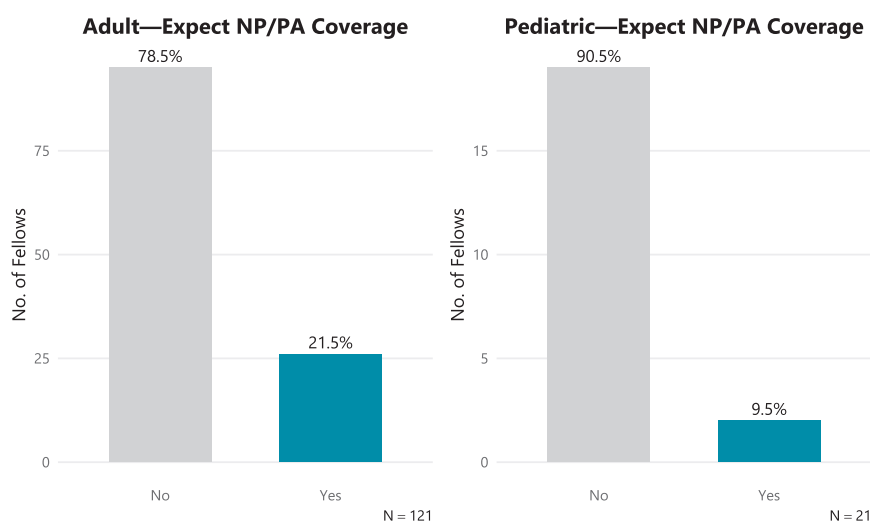


FIGURE 32: EXPECTED EXTENDER COVERAGE—FELLOWSHIP TYPE

Positions Outside of Nephrology

Among participants whose first post-fellowship position was outside nephrology, 13 fellows indicated they were in another clinical practice and another was entering a full-time research position without clinical duties. When asked whether their employment was outside the US, only two of the 144 respondents (1.4%, both adult fellows) were entering clinical practice in another country.

Service Obligation and Anticipated Duration at First Position

The number of IMG physicians reporting a service obligation (e.g., a J-1 visa waiver of the 2-year home residency requirement by practicing in health professional shortage areas) at their first position (10.7%, Table 18) were flat compared to 2018 (18.8%), as were USMG (loan forgiveness) totals (3.3%, down from 6.1%; raw count difference of one fewer fellow for both IMGs and USMGs).

TABLE 18: FIRST POST-FELLOWSHIP—SERVICE OBLIGATION (N = 142)				
Fellowship	Educational Status	Service Obligation	No.	Percentage
Adult	IMG	No	61	50.0%
Adult	IMG	Yes	13	10.7%
Adult	USMG	No	44	36.1%
Adult	USMG	Yes	4	3.3%
Pediatric	IMG	No	3	15.0%
Pediatric	IMG	Yes	5	25.0%
Pediatric	USMG	No	12	60.0%

Visa waivers were reported by 15 participants, and loan forgiveness program by one fellow. Nearly half of respondents entering their first job expected a long-term commitment of ≥ 6 years (45.8%), with the next largest cohort planning to stay 3 years (21.1%) (Figure 33).

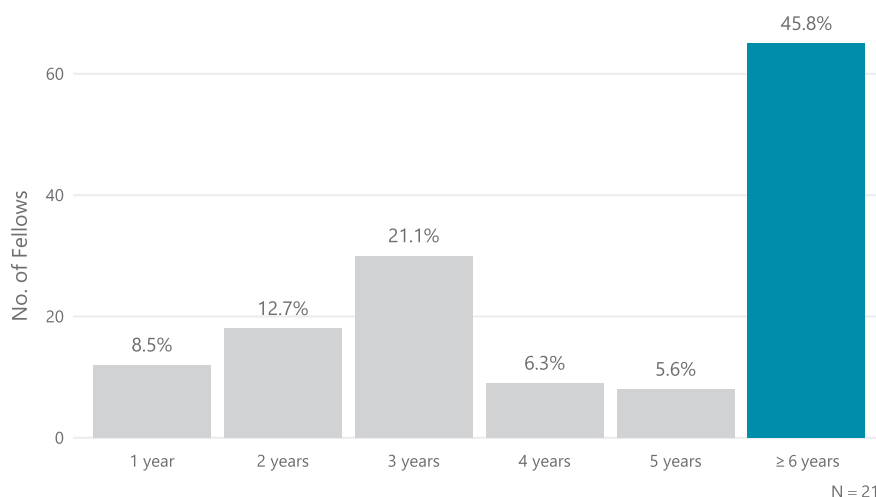


FIGURE 33: ANTICIPATED FIRST JOB DURATION

Geographic Location and Demographic Characteristics of First Job in the US

Location data (state only) for responding fellows' first job is limited (N = 136) and may not be representative of all graduating fellows entering practice (Figure 34). However, there are large areas of the country (in grey) that may not have an incoming graduating nephrologist. These include states with documented physician access issues (for example, Montana or Wyoming) and where respondents received their nephrology training (Wisconsin or Iowa). Again, this data is limited, but it is unclear whether the incoming workforce will contribute to reducing the previously identified maldistribution of kidney health specialists in the US.

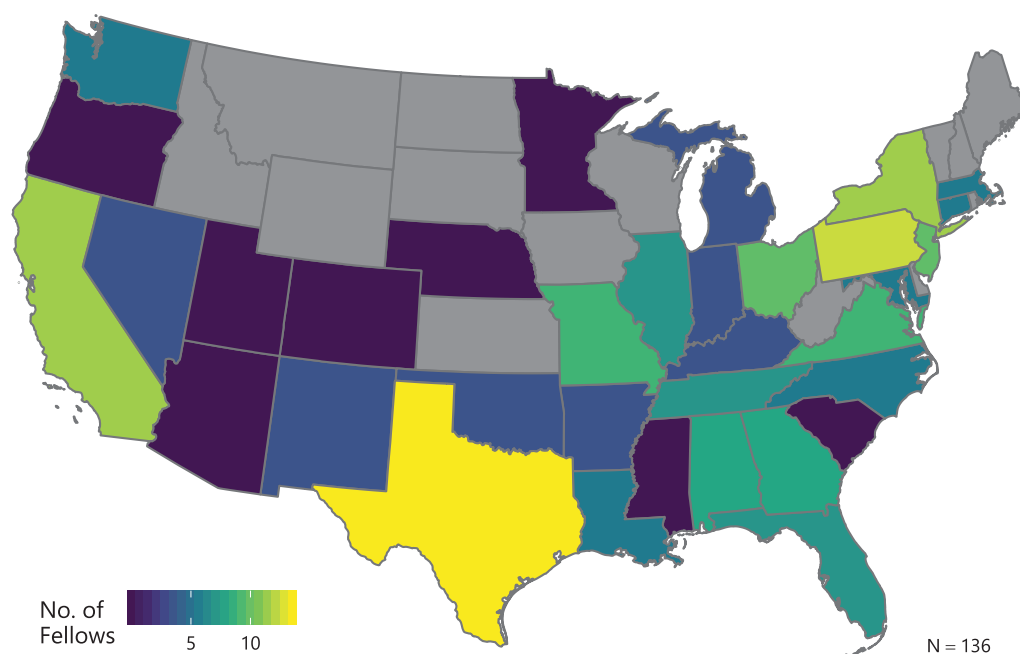


FIGURE 34: EMPLOYMENT LOCATION

The inner city was most commonly reported demographic area indicated by respondents (36.4%), while suburban area was third the most desired demographic area (31.7%) (Table 19).

TABLE 19: DEMOGRAPHIC AREA OF FIRST POST-FELLOWSHIP JOB (N = 143)

Demographic Area	No.	Percentage
Inner city	52	36.4%
Other area within major city	33	23.1%
Suburban	31	21.7%
Small city (population <50,000)	24	16.8%
Rural	3	2.1%

Percent Time in Activities

Given the majority of respondents were entering clinical practices, it's unsurprising that, on average, the bulk of time by activity was going to be spent in direct patient care (mean 77.4%) (Table 20). Of note, teaching and administrative duties were expected to take the same proportion of effort (mean ~6% for both) in their new positions.

TABLE 20: ANTICIPATED MEAN PERCENTAGE TIME SPENT BY ACTIVITY IN FIRST JOB

Activity	Mean Percentage
Direct Patient Care	77.4%
Research	10.6%
Teaching	5.7%
Administration	5.6%
Volunteering	0.8%

Incentives

Fellows were allowed to indicate all the incentives they may have received for their first post-fellowship job (N = 141) (Table 21). Income guarantees (35% of participants), relocation support (31%), and MOC/CME support (31%) were the top three reported.

TABLE 21: INCENTIVES RECEIVED FOR FIRST POST-FELLOWSHIP JOB (N = 141; 81 IMGs, 60 USMGs)

Incentive	No. of Fellows
Income guarantees	49
Relocation allowances	44
Support for maintenance of certification and continuing medical education	44
Career development opportunities	41
Sign-on bonus	31
None	26
Protected time for research/research "start-up" package	18
H-1 visa sponsorship	16
J-1 visa waiver	14
Spouse/partner job transition assistance	12
Educational loan repayment	5
On-call payments	4
O-1 visa sponsorship	1
Stipend during fellowship	1
Teaching opportunities	1

Incentives (cont.)

Excepting the IMG pediatric fellow respondents (where a majority indicated incentives were “Extremely Important” in choosing a position), there was little variation in the distribution of Likert scores for incentive importance. A comparison between IMG and USMG physicians (using a χ^2 test for independence and releveling Likert scores as binary [“Very” or “Extremely Important” as “Yes”, all others as “No”]) was not statistically significant ($p = 0.2963$).

Of the 71 respondents who received incentive income, the median incentive was \$10,000 for both USMGs and IMGs (Figure 35). When broken down by fellowship, \$10,000 was the median incentive for all fellowship and educational statuses, excepting IMG pediatric fellows, whose median was \$15,000. When aggregated by gender identity and educational status, IMG men reported the highest median monetary incentives (\$17,500), while USMG women reported median incentive values twice their male counterparts (\$10,000 vs. \$5,000) (Figure 36).

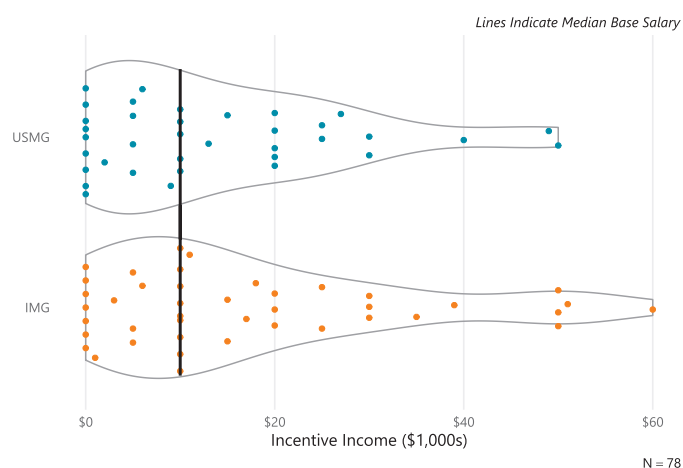


FIGURE 35: INCENTIVE INCOME—EDUCATIONAL STATUS

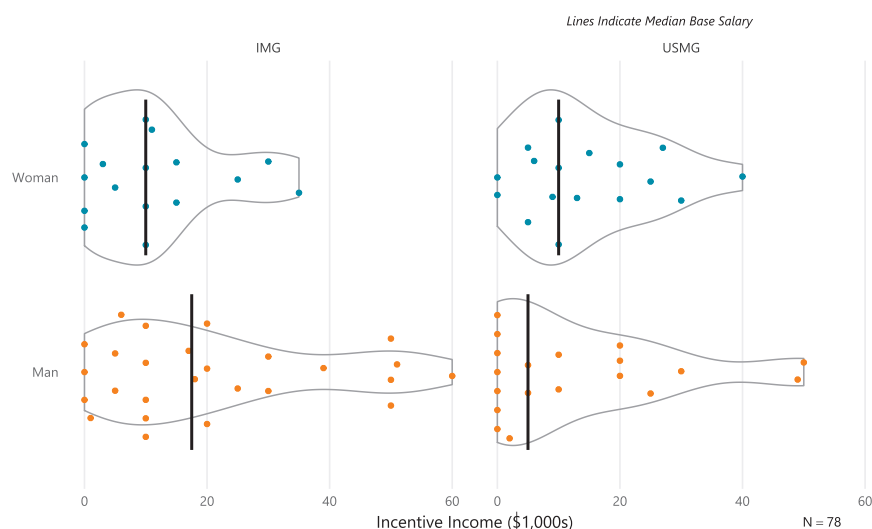


FIGURE 36: INCENTIVE INCOME—EDUCATIONAL STATUS AND GENDER IDENTITY

Income Satisfaction

Across fellowship types and educational statuses, fellows’ most commonly reported level of satisfaction was “Somewhat Satisfied,” the second highest level on the 5-point Likert scale (range 31.2% [adult USMG fellows] to 46.2% [pediatric USMG fellows]) (Figure 37). Adult IMGs were the least satisfied with their income, with 36.5% “Somewhat” and 2.7% “Very” dissatisfied with their compensation.

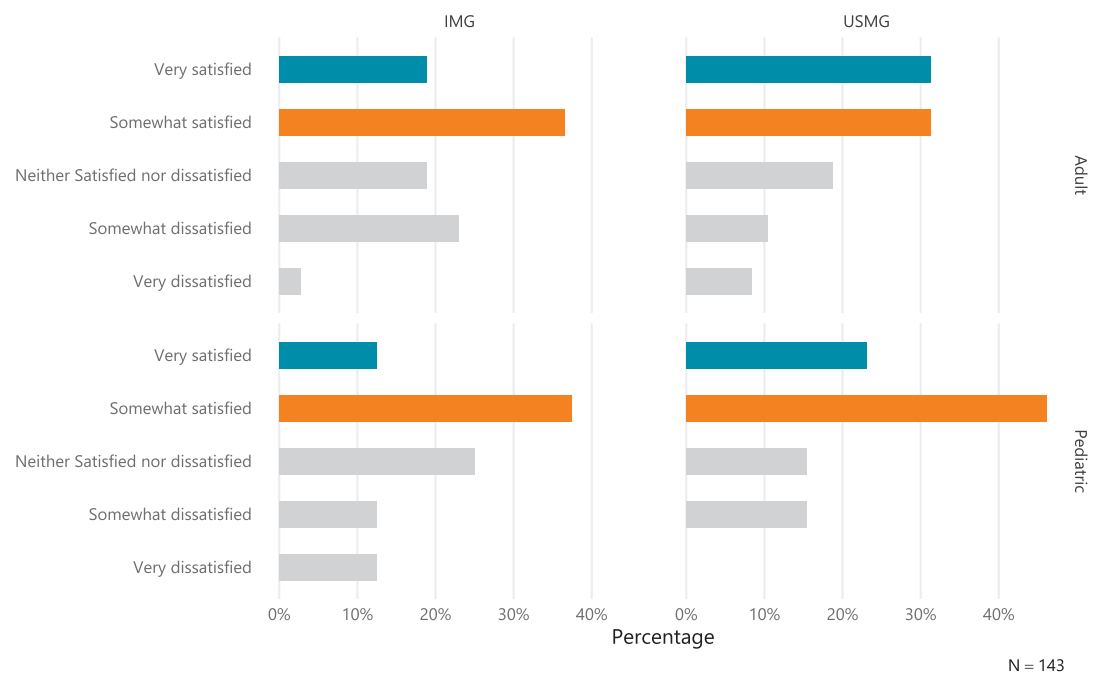


FIGURE 37: INCOME SATISFACTION—EDUCATIONAL STATUS AND FELLOWSHIP TYPE

Perceptions of Specialty and Educational Experiences

Important Factors When Considering Employment Offers

Weekend call frequency, employment in a desired geographic location, and overnight call frequency were the highest rated influential factors when fellows were assessing job opportunities (Figure 38).

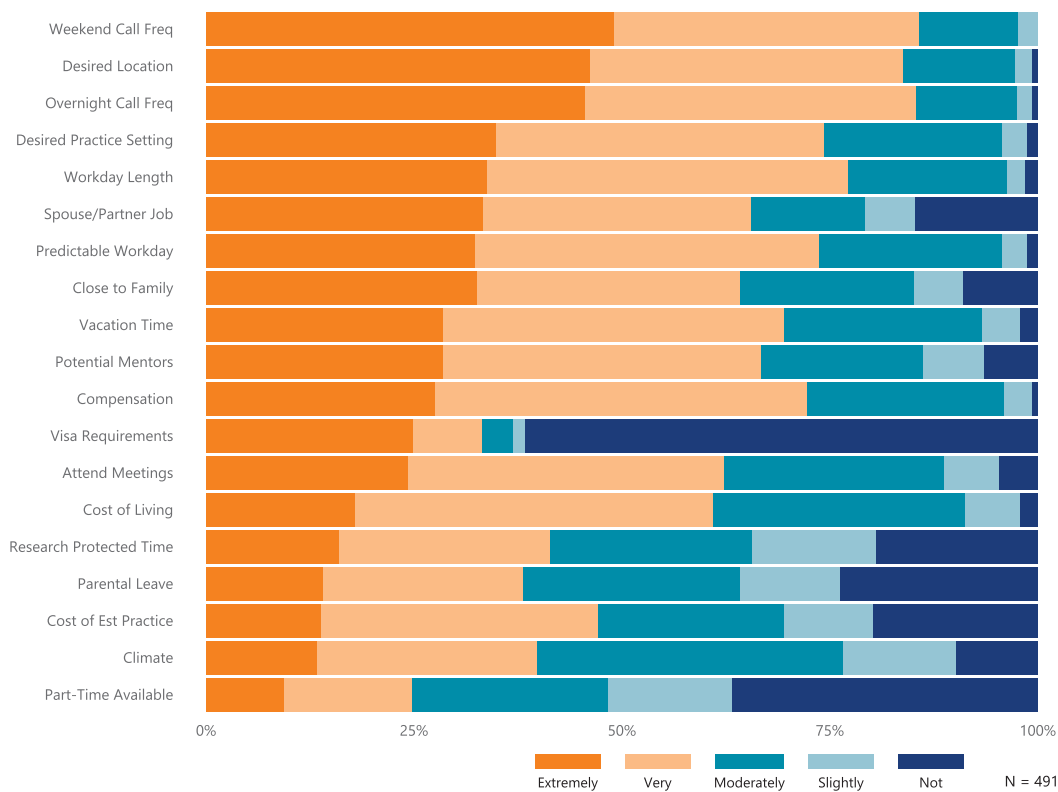


FIGURE 38: EMPLOYMENT INFLUENTIAL FACTORS

There was substantial difference between subgroups of respondents about which factors were most important to them. Both women and men had the same top three factors as the overall cohort, but women were more interested in employment opportunities for their spouse or partner, while men highly ranked workday length and proximity to their family ($p = 0.03377$, X^2 test for independence). IMGs and USMGs differed substantially as expected on visa requirements ($p = 2.71e^{-11}$). As adult and pediatric nephrology focus on different populations what fellows indicate as important also differed substantively. Desired location, partner/spouse employment, and potential mentors comprised the factors pediatric responses most often ranked as “Extremely important” while the top three factors for adults were the same as for the overall cohort ($p = 0.00829$). Of note, overall compensation was ranked 11th in “Extreme Importance.”

Recommend the Specialty

As a whole, a majority of respondents would recommend the specialty to medical students (80%), which was reflected overall in the subgroups (Figure 39).

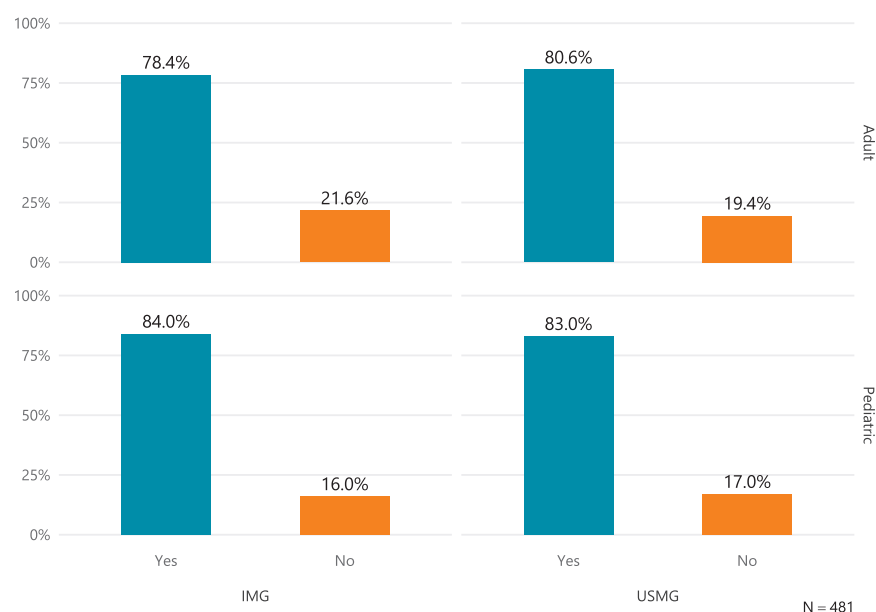


FIGURE 39: RECOMMEND NEPHROLOGY

However, perceptions of local job opportunities may be contributing to these recommendations. There was a statistically significant difference in recommending nephrology between those respondents who perceived “Far Too Few” or “Too Few” local job opportunities and those who indicated an “Appropriate”, “Too Many”, or “Far Too Many” number ($p = 0.000327$, χ^2 test for independence). Since the survey’s inception, an increasing proportion of IMGs—and respondents overall—are recommending the specialty, while the proportion of USMGs recommending nephrology has remained flat (Figure 40).

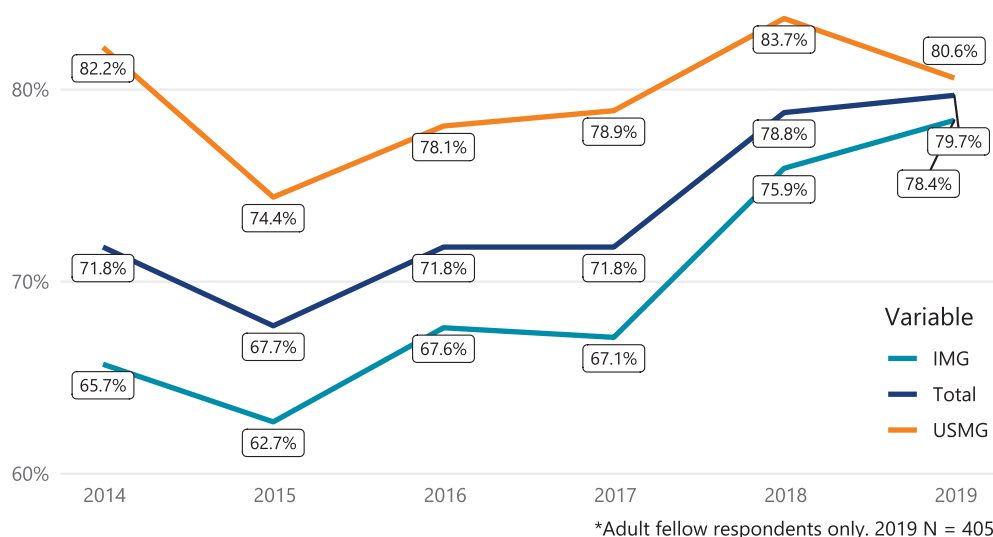


FIGURE 40: TRENDS—RECOMMEND NEPHROLOGY

Recommend the Specialty (cont.)

Among the reasons for recommending the specialty, long-term patient relationships, intellectual stimulation, and the rewards of a challenging field were commonly cited (Figures 41 and 42 and Table 22). Some respondents qualified their recommendations noting that medical students and/or residents should have a deep interest in the field if they want to pursue nephrology and its demands during fellowship and into practice.

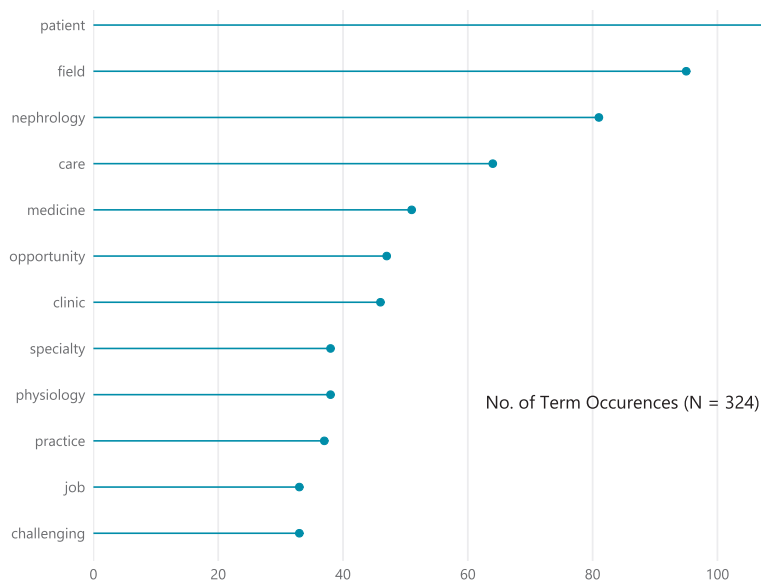


FIGURE 41: RECOMMEND NEPHROLOGY—FREQUENT TERMS

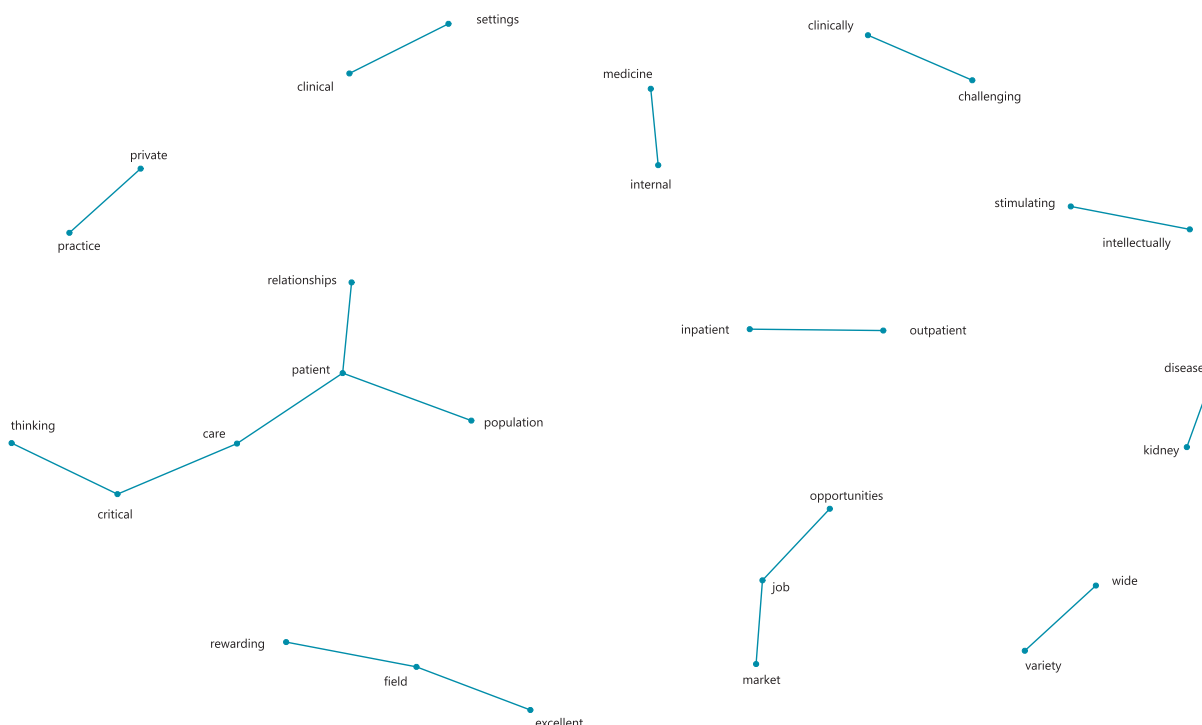


FIGURE 42: RECOMMEND NEPHROLOGY—FREQUENT BIGRAMS

Recommend the Specialty *(cont.)*

TABLE 22: REPRESENTATIVE QUOTATIONS—RECOMMENDING NEPHROLOGY

1. Interesting pathology; 2. long-term patient relationships (particularly with dialysis patients); 3. Ability to practice both inpatient and outpatient medicine

A cerebral specialty, excellent variety of disease processes and clinical cases, mix of inpatient and outpatient

Aside from the intellectual and rewarding patient care aspects, you can make a good living and have a good quality of life. This needs to be the focus moving forward with recruitment. I had plenty of nice job offers for a native-born US citizen in very desirable areas with nice compensation. I have long-time friends in other fields struggling to find jobs in saturated fields. Fields. Not markets. Nephrology is not a saturated field and the opportunities abound.

Although it is busier and have to manage complex patients, it is very stimulating and rewarding... that's the main reason we all went into Medicine! Patient-physician relationship in this field is unique.

Because GN, AKI, electrolyte & acid-base problems are exciting to work through. Nobody else can figure this out. And you're a consultant taking phone calls & having to go in once in a while. You are not the primary team dealing with a lot of the nuisance of medicine.

Because it's grateful to follow patients for a prolong period and get to know their background. Help them with every aspect of life and is rewarding to see how life changes in transplant patients. Unique specialty, involves the whole body to understand the process.

For me, I like it because of the clinicopathologic correlations, the foundation in internal medicine, the diversity of problems dealt with (endocrine, immunology, hematologic, infectious, hemodynamic, cardiovascular, etc.), and the long meaningful relationships we build with our patients.

I find nephrology very rewarding as a mentally stimulating career and with patients of great need. I think these outweigh the cons of lower salaries as compared to other subspecialties and the hard work of nephrology training and careers.

I would recommend it to those who love it. It is an interesting field that requires an understanding of physiology. It has inherent reward regardless of patient adherence or appreciation. Every consult and patient require a thorough history and evaluation of lab data. With that said, it is quite demanding, and I would NOT recommend it to anyone who is not certain about the field.

I believe Nephrology is staging a comeback in the employment market cycle. As noted, overall Renal disease burden is on the rise and there is heightened awareness among primary providers as well. As the physician workforce in Nephrology shrinks and the older workforce starts to retire, I believe there will be adequate demand in the field. But at least in private practice Nephrology, I have felt the starting salary has not risen yet in spite of there being a demand (it has risen for sure compared to prior years but not enough to attract more younger trainees). I believe Nephrologists are in general earning a very handsome amount among the physician group about 2 years from start, but lack of a good starting salary is causing young trainees to shy away.

It is a very interesting field and is based on core internal medicine knowledge and skills. It requires thinking and analyzing and involves interesting concepts like physiology, acid-base, volume status, critical care and hemodynamics. However, it remains a busy underappreciated and underpaid specialty which is a major obstacle.

Recommend the Specialty (cont.)

Fellows who would not recommend the specialty frequently mentioned employment challenges, low remuneration, and poor work-life balances in their free-text responses (Table 23).

TABLE 23: REPRESENTATIVE QUOTATIONS—NOT RECOMMENDING NEPHROLOGY

Too little pay starting out, too much driving, not enough respect among peers. I would definitely have not chosen it if I could make the decision again.

The training environments are always either patronizing or malignant; the quality of life during fellowship makes fellows want to quit, and the post-fellowship quality of life and pay will never justify the waste of two years that fellowship was.

Nephrology in US is not rewarding career and tough work environment. Most of jobs are with private practice that have abusing environment for non-partner physicians. Very rare hospital employed jobs. Nephrology practice is as hard as cardiology regarding work but as low as PA regarding payment.

Salaries are very low. Most people have so much debt that one would rather choose to be a hospitalist make greater than 250k and have 7 days on and 7 days off.

Compensation is one aspect of the fellowship, but lack of dignity is wide spread across the board both during and after training. Specifically, at one job interview I was told I would function as a Junior Fellow for 3 years before even being offered a share in the partnership. Racial discrimination is widespread and opportunities for growth are too little while work-life balance is out of question. At the end of fellowship, I still have a passion and desire to help patients but not at the cost of becoming a patient myself. There has been no significant revamp either by ACGME or ASN in how we are going to train future nephrologists.

Medical industry in the US continues to rely on a fee-for-service model of reimbursement. Reimbursement (including any aid for student debt) reflects to some degree appreciation for your services. Given the low reimbursement for nephrology, it appears that we are underappreciated/taken advantage of. We are overworked and underpaid. It is demoralizing as a fellow. Perception is open to change as time passes as our attendings appear quite content.

Also, the privilege that is dialysis appears to be overused and underappreciated by its patients and family members with no sense of responsibility. It is such a resource-intense privilege that should be treated (or at least valued) more like transplantation.

Nephrology is tacitly allowing other specialties to take over our field. Not particularly difficult to do since the rate of generation of novel concepts and therapeutics is so slow that it's possible to be up to date.

Too much clinical burden without sufficient pay for pediatric nephrologists or job offers in a state of your preference. Other specialties have more support, need less resources to rely upon, have better pay and better possibilities of getting a job of your choice.

Compensation is poor compared to other pediatric subspecialties and to adult counterparts.

Brutal fellowship and every attending seems dissatisfied with work/life balance.

“Pay” and “compensation” were the second and fourth most frequent terms (Figure 43), and “low reimbursement,” “job market” and “job opportunities” frequent bigrams among this cohort (Figure 44).

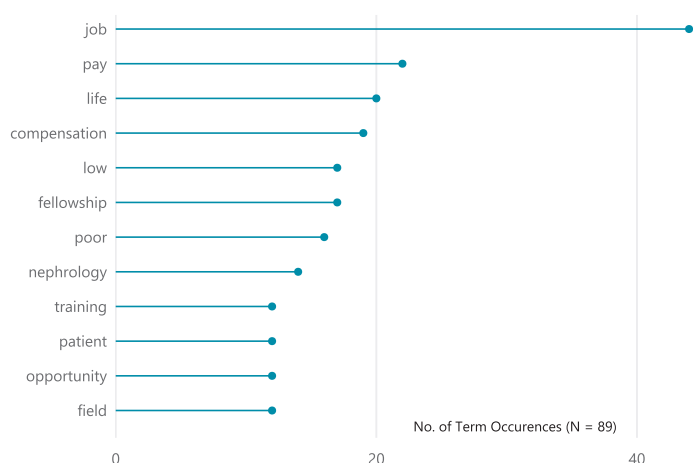


FIGURE 43: NOT RECOMMEND NEPHROLOGY—FREQUENT TERMS

Recommend the Specialty (cont.)



FIGURE 44: NOT RECOMMEND NEPHROLOGY—FREQUENT BIGRAMS

ASN Program Participation

Thirty-two percent of survey participants (157) had participated in at least one ASN program to increase interest in nephrology careers, with ASN Kidney STARS and the Karen L. Campbell, PhD, Travel Support Program most commonly reported (Figure 45).

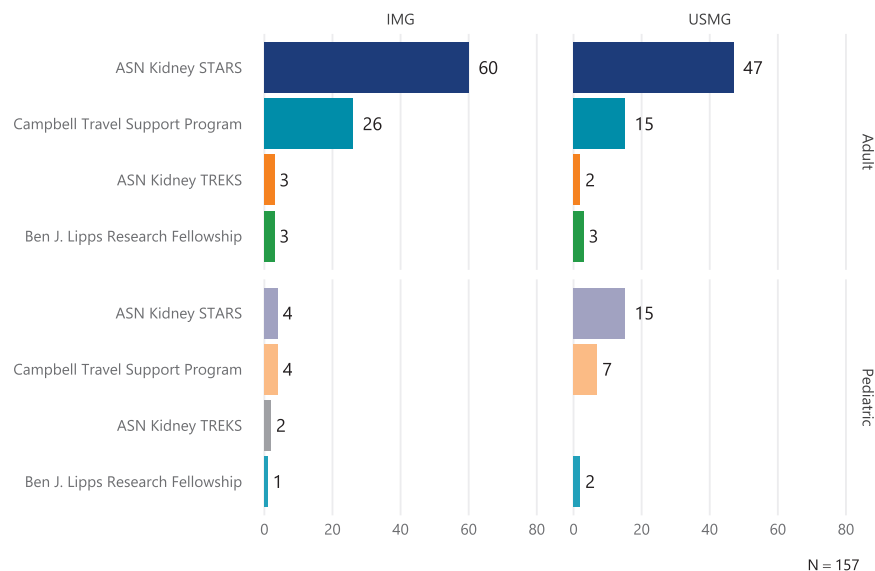


FIGURE 45: ASN PROGRAM PARTICIPATION

Did Fellows Consider Another Area of Medicine Before Choosing Nephrology?

More than half of fellow respondents had considered practicing in another area of medicine before entering nephrology fellowship, mostly another medical or pediatric subspecialty (Figure 46).

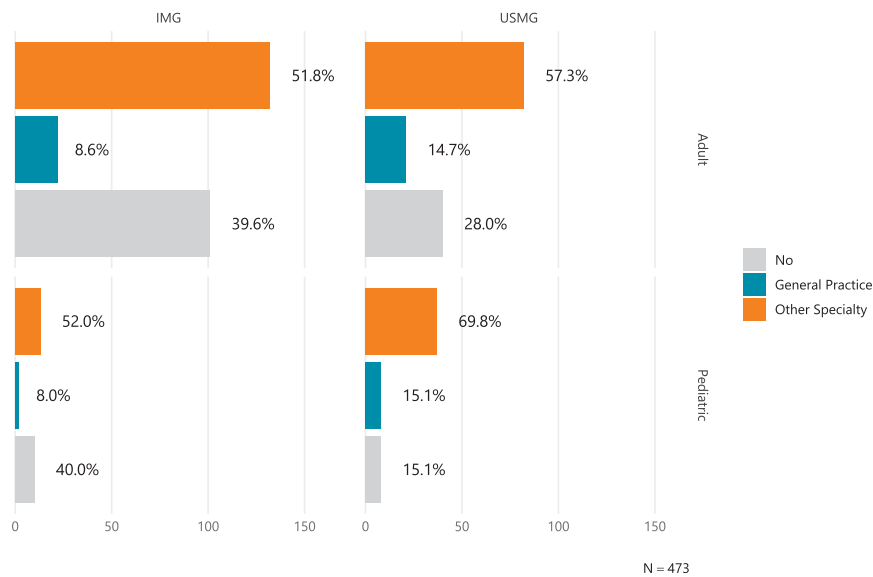


FIGURE 46: CONSIDER OTHER PRACTICE AREAS THAN NEPHROLOGY

Of note, a majority of respondents indicated they chose to subspecialize during their 2nd or 3rd years of pediatric or medical residency (Figure 47).

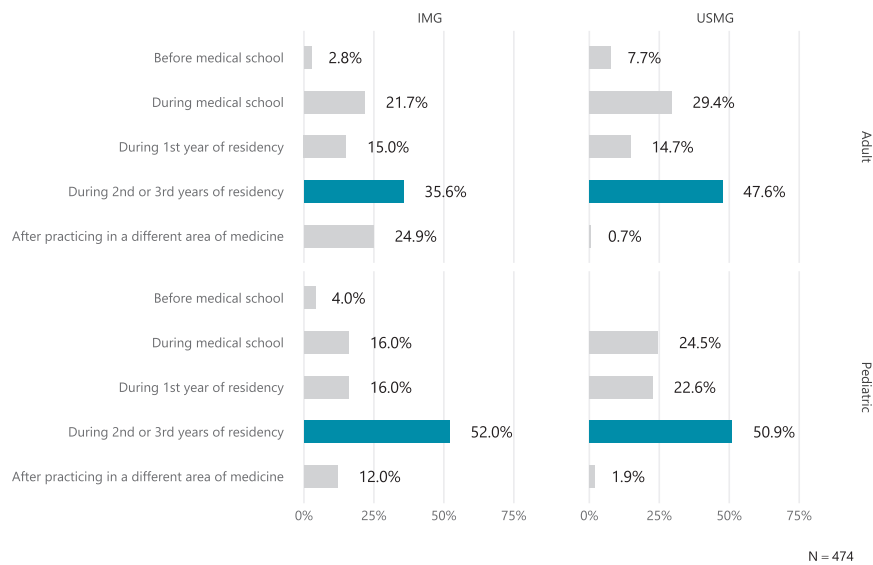


FIGURE 47: WHEN DID PARTICIPANTS CHOOSE NEPHROLOGY?

Current Preparedness Level

Most fellows at the completion of their ACGME-accredited training assessed themselves either “Fully” or “Moderately prepared,” although less than half felt they were “Fully prepared” (Figure 48).

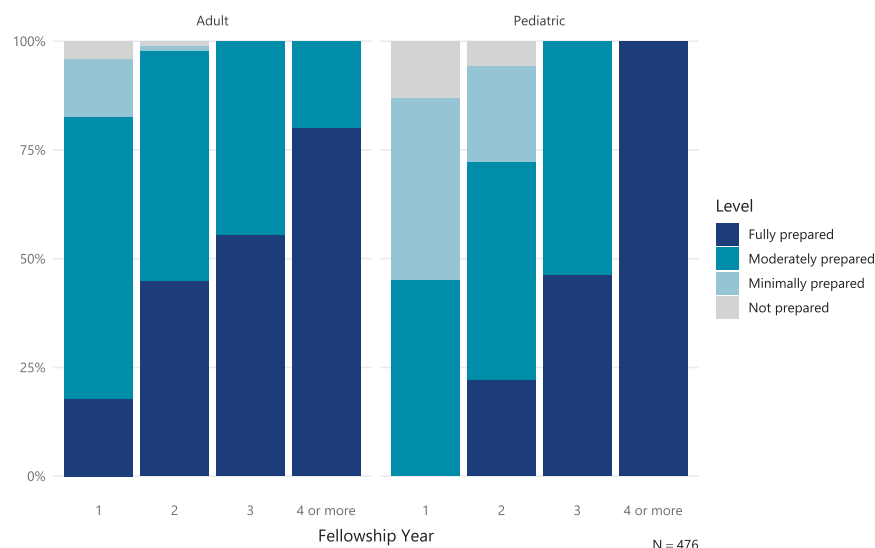


FIGURE 48: SELF-ASSESSMENT FOR INDEPENDENT PRACTICE

Career Mentorship

New questions added to assess the career mentorship participants received (Figure 49) and quantify the support for fellows’ job search and contract negotiations (Figure 50) found IMGs reported higher rates of satisfaction with the advice they’ve received about searching for a job and negotiating their first contract.

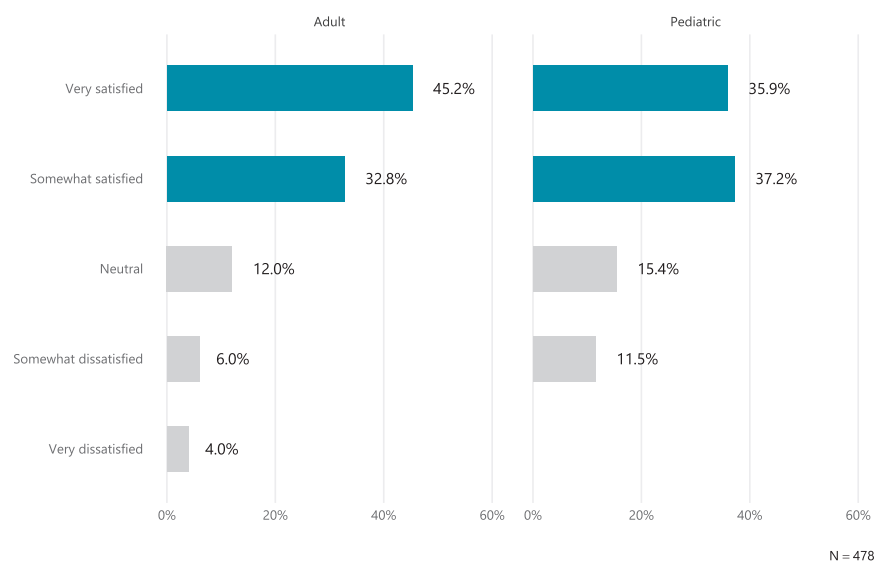


FIGURE 49: CAREER MENTORSHIP SATISFACTION

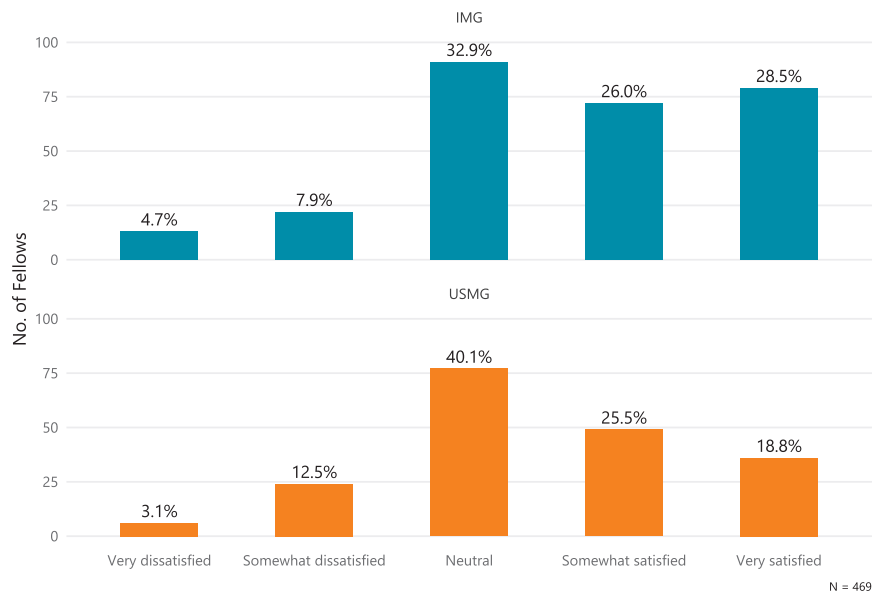


FIGURE 50: JOB SEARCH ADVICE SATISFACTION

Among the pediatric nephrology-specific questions added to this year’s survey was a question about length of training. A strong majority of pediatric fellows (82.1%) indicated that pediatric nephrology should move to a 2-year fellowship (Figure 51).

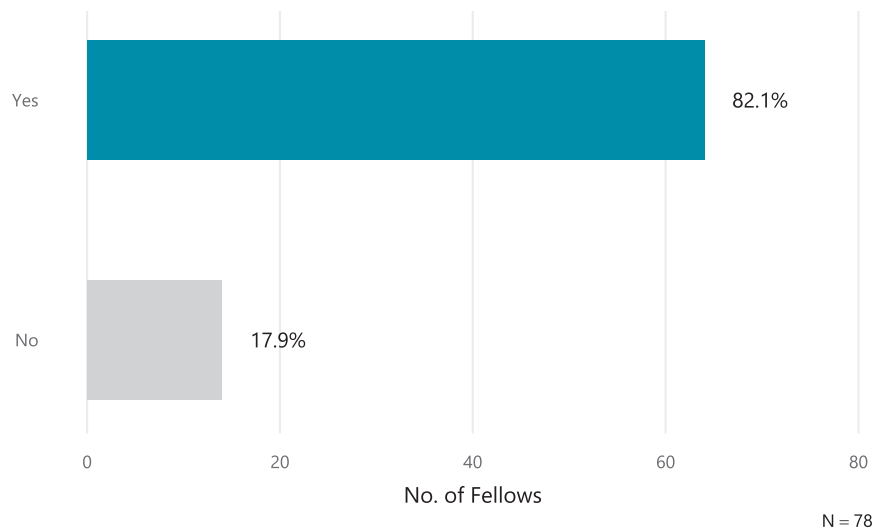


FIGURE 51: SHOULD PEDIATRIC NEPHROLOGY BE A 2-YEAR FELLOWSHIP?

Limitations and Future Directions

Limitations

By including all eligible nephrology fellows in training in the United States, we sought to reduce sampling bias. That respondent characteristics were similar to the most recent data from ACGME may indicate the responses collected were representative of nephrology fellows in training overall. However, even with a high (for physician surveys) net response rate—49.7%—there is still potential for nonresponse bias. New data capture methods designed to better measure monetary variables may have been susceptible to incorrect input, otherwise known as “fat-finger” error. Although the Qualtrics mobile survey platform renders well on mobile, the potential for incorrect responses still exist. And finally, while efforts were made to ensure the validity of survey data collected, there is a possibility that some responses were not accurate measures of the characteristics sought.

Future Directions

Starting in 2020, it will be possible to perform longitudinal analyses across the different training years. This will allow tracking and comparison of how perceptions of educational experiences, mentorship, and career opportunities evolve during time in fellowship. Comprehensive assessments of data from the 2014 survey through this year will examine trends and provide new areas for future survey research. Under the oversight of the ASN Data Subcommittee, the survey instrument will continue to be refined to collect the necessary data to address knowledge gaps in the kidney community and provide foundations for actionable insights. The ASN Data Subcommittee welcomes recommendations for gaps to be addressed and future iterations of survey at **workforce@asn-online.org**.

Questions? Comments?

The authors welcome feedback and criticism on this report, the ASN Nephrology Fellow Survey, and ASN's workforce research. Please email **workforce@asn-online.org**.

APPENDIX 1

Survey Audience Selection

Several data sources were integrated to ensure the survey frame comprised every adult and pediatric fellow in an Accreditation Council for Graduate Medical Education (ACGME)-accredited position. Adult recipients were identified from those US-based nephrology fellows who participated in the 2019 In-Training Exam (ITE), a service annually offered by ASN. Because programs with third-year tracks—for example, research—may not have these fellows participate in the ITE during non-ACGME accredited years, the sample frame was supplemented by those 2018 participants identified as not participating in the 2019 ITE but who retained an active ASN Fellow Membership. This yielded a total of 867 adult nephrology fellows in training. Data provided by the American Society of Pediatric Nephrology (ASPN) identified 121 pediatric nephrology fellows in US-based fellowship programs. Together, this yielded a total of 988 recipients.

Survey Instrument Revision and Dissemination Process

Previous iterations of the survey instrument were reviewed by the ASN Data Subcommittee to remove redundancies and improve question reliability and validity. Pediatric fellow-specific questions were developed by pediatric training program directors and collated by Shamir Tuchman, MD, MPH, in concert with ASPN. After multiple rounds of revisions, the survey tool was incorporated in the survey platform (Qualtrics, Johns Hopkins University School of Medicine) and pretested for accuracy and question exposure/skip patterns.

The research and survey instrument were reviewed by the Johns Hopkins University School of Medicine institutional review board and deemed exempt.

Opening Monday, May 6, 2019, the survey remained open for 41 days before closing Thursday, June 20, 2019. During this time recipients received reminders encouraging them to participate, and nephrology training program directors (TPDs), associate TPDs (APDs), division chiefs, and program coordinators were encouraged to facilitate fellow participation. Incentives were offered to encourage response—two complimentary ASN Board Review Course & Update registrations (a \$1395 value) and 10 complimentary one-year ASN Memberships upon completion of fellowship (a \$395 value).

Data Reporting

The ASN Nephrology Fellow Survey is subject to human subjects research regulations, thus participants could choose to skip questions they preferred not to answer. Depending on their responses, any two participants may not have been exposed to the same survey questions. For example, adult nephrology fellows would not be exposed to pediatric nephrology-specific questions. Total numbers of respondents are provided for each question to place the data in overall context.

Statistical Analysis

Data were analyzed using R statistical software (R Core Team (2019). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org>), using the following packages:

- Tidyverse. Hadley Wickham (2017).
<https://CRAN.R-project.org/package=tidyverse>.
- knitr. Yihui Xie (2019): A General-Purpose Package for Dynamic Report Generation in R. R package version 1.24.
- splitstackshape. Ananda Mahto (2019).
<https://CRAN.R-project.org/package=splitstackshape>.
- Tidytext. Silge J, Robinson D (2016).
<https://doi.org/10.21105/joss.00037>.
- ggalt. Bob Rudis, Ben Bolker, Jan Schulz (2017)
<https://CRAN.R-project.org/package=ggalt>.
- patchwork. Thomas Lin Pedersen (2017).
<https://github.com/thomasp85/patchwork>.
- ggribes. Claus O. Wilke (2018).
<https://CRAN.R-project.org/package=ggribes>.
- ggtext. Claus O. Wilke (2019).
<https://github.com/clauswilke/ggtext>.
- flextable. David Gohel (2019).
<https://CRAN.R-project.org/package=flextable>.
- ggalluvial. Jason Cory Brunson (2018).
<https://CRAN.R-project.org/package=ggalluvial>.
- ggbeeswarm. Erik Clarke and Scott Sherrill-Mix (2017).
<https://CRAN.R-project.org/package=ggbeeswarm>.

Where applicable, results of statistical tests of comparisons (solely for hypothesis generation) are considered statistically significant at $\alpha = 0.05$.