

# **ASA Caucus of Academic Representatives Report on the 2013 Survey of Departments of Statistics and Biostatistics**

## **Introduction:**

In October 2013, 105 caucus representatives from departments of statistics and biostatistics at US institutions were contacted by email and asked to complete an online survey form. The goal was to obtain information about PhD granting departments that would be useful to Chairs and Heads when dealing with their upper level administration and with their faculty. The information would also be useful to ASA in understanding the current state of graduate level statistics education. The department survey has been conducted by ASA each year since 2008.

Forty-five departments responded to the survey (43% response rate). Of the 45 surveys summarized in this report, 28 were from statistics degree granting departments and 19 were from biostatistics degree granting departments, with two departments counted in both categories (offered both types of degrees). Responses included five universities with separate responses from both a statistics department and a biostatistics department. In 2013 there were three less statistics degree granting departments responding and an increase of six biostatistics degree granting departments responding when compared to the 2012 survey.

## **Degrees Offered:**

Of the 28 statistics granting departments that responded to the survey, 26 offer a PhD in statistics. One department offers a MS and PhD in applied mathematics which includes a statistics specialization. 27 departments offer a Master's degree in statistics, two offer a Professional Master's in statistics, and 21 offer a Bachelor's degree in statistics. In addition, two offer a PhD in biostatistics, four offer a Master's in biostatistics, and one offers an "other academic master's" in biostatistics. 20 departments offer all three bachelor's, master's, and PhD degrees in statistics.

For the 19 biostatistics degree granting departments, 17 offer a PhD in biostatistics, three offer a DrPH in biostatistics, and one offers a ScD in biostatistics. 17 offer a Master's degree in biostatistics, nine offer a Master's of public health in biostatistics, four offer an "other academic master's in biostatistics," and two offer a Bachelor's in biostatistics. In addition, two also offer a PhD in statistics, two offer a Master's in statistics, and two offer a Bachelors in statistics. One department reported offering no degrees in statistics or biostatistics but offers degrees in collaboration with other departments and is included with the biostatistics grouping due to its department name. Two departments offer all three bachelor's, master's, and doctoral degrees in biostatistics.

## **Faculty:**

The number of full-time faculty is, on average, higher in biostatistics departments than in statistics departments. This is true at all ranks and for other full time and adjunct or part time categories. See Table 1.

Table 2 shows faculty size over time, including average and median sizes. Biostatistics departments in almost all years have a slightly higher number of faculty compared to statistics departments.

Biostatistics departments also appear to be slightly more diverse than statistics departments. (See Table 3.) While the percentage of women in both types of departments are either at or near 40%, Hispanics and blacks remain at 4% or less. In addition, one comment stated that, "most of our female faculty members are in non-tenure positions (instructors or adjunct faculty) so our proportion of female faculty may seem inflated."

Table 4 shows more details about these distributions. The most frequent category in each row is bolded. For statistics departments, the mode for females is included in 20-30%. For biostatistics departments there are multiple modes for females from 10-20% to over 50%. In statistics departments, 20 out of 27 departments have no Hispanic faculty and 19 out of 27 have no black faculty members. In biostatistics, 10 out of 19 departments have no Hispanic faculty, and 14 out of 19 have no black faculty.

## **Bachelor's Degree Students:**

Because only two of the departments offers a bachelor's degree in biostatistics, this section deals primarily with statistics departments. Twenty of these departments indicated that they offered a bachelor's degree in statistics and awarded at least one degree in 2013, and results are summarized in Table 5. The average number of degrees awarded and average number of undergraduate statistics majors were both much higher than the respective medians. This is due to a few very large departments. Of the degrees awarded, the majority went to U.S. citizens about a third went to women. The proportion of Hispanics and blacks being awarded these degrees is low.

In addition, 8 out of 20 departments awarding degrees reported 100% were to US citizens or permanent residents; median number of awarded bachelor's degrees in these 8 departments was 6.5 (quartiles 4.5, 8.5). Two departments stated they awarded zero US citizens/ permanent residents or females (out of 20 or 58 bachelor degrees awarded). However both departments stated zero for each of these above four categories.

Also, 16 out of 20 departments reported no Hispanic bachelor's degree awarded students; 12 out of 18 reported no black bachelor degree awarded students.

2 out of 19 biostatistics departments stated they awarded biostatistics bachelor's degrees, but only one department stated these degrees were awarded last year (number of biostatistics bachelor's awards=14).

The average and median size of undergraduate statistics majors and degrees awarded appears to be increasing, particularly in the last year, as shown in Table 6.

### **Master's Students:**

This year we have more information about the number of master's applications, the number of these applicants who are US citizens (or permanent residents), the number of entering students, the number of degrees awarded and the number of these degrees that were joint, secondary or double-major (Table 7). The average proportion of applications from US citizens is about 16% for statistics and 29% for biostatistics. The average proportion of students who enter the program of those who apply is 11% for statistics and 15% for biostatistics. Relatively few joint/secondary/double majors are awarded, especially for biostatistics programs.

Only two departments offer a professional degree in statistics. In the time period July 1, 2012 through June 30, 2013, one department did not award any professional master's degrees and one department awarded four professional master's degrees.

Table 8 shows that an average of 50% statistics masters degrees are awarded to US citizens and 65% of biostatistics masters degrees are awarded to US citizens. The averages are much lower for blacks (3.5% and 4%) and for Hispanics (2% and 3%).

Table 9 shows that master's degree graduates (statistics and biostatistics) most frequently become employed in business / industry and a slightly smaller number go into a PhD program in statistics or biostatistics.

Table 10 summarizes the average and median number of statistics and biostatistics degrees over time.

### **Doctoral Students:**

The average number of applicants to doctoral programs is shown in Table 11. In addition, the average number of US applicants, entering doctoral students, and the number of doctoral degrees awarded is also shown. The proportion of US applications is on average 20% for statistics programs and 39% for biostatistics. The entering proportion of students averages 9% for both statistics and biostatistics and the proportion of degrees awarded is about 5% for both.

Table 12 shows that an average of 36% statistics doctoral degrees are awarded to US citizens and 58% of biostatistics doctoral degrees are awarded to US citizens. The averages are much lower for blacks (3.3% and 5%) and for Hispanics (1.3% for both).

The most frequent placement for doctoral students (see Table 13) is non-academic in statistics (for both statistics and biostatistics) followed by tenure-track academic then postdoc for statistics; biostatistics is most closely followed (on average) by non-tenure track academic and postdoc, then tenure-track academic, but all three follow-up categories are close.

Table 14 shows the average and median number of doctoral degrees, which appear to be mostly stable over time.

### **Final Comments:**

On average, biostatistics departments in almost all years have a slightly higher number of faculty compared to statistics departments.

Master's degree graduates (statistics and biostatistics) most frequently become employed in business / industry, and a slightly smaller number go into a PhD program in statistics or biostatistics.

The most frequent placement for doctoral students is non-academic in statistics (for both statistics and biostatistics) followed by tenure-track academic, postdoc and non-tenure track academic.

Although the proportion of women appears to be at a fairly high level for both faculty and students, the proportion of blacks and Hispanics remains low. However, we were not able to look at the proportion of women faculty by rank because that question was not asked on this survey. (The 2013 salary survey showed that women are not as frequently found at higher ranks.)

For bachelor degrees, US citizens are in the majority in statistics departments (on average, 81%), while this proportion is lower for master's (50% to 65%) and doctoral degrees (36% and 58%).

Please send feedback to Lynn Palmer ([palmer@amstat.org](mailto:palmer@amstat.org)) for future reports.

## Tables

	<b>Total Full Time Faculty</b>	<b>Full Professor</b>	<b>Associate Professor</b>	<b>Assistant Professor</b>	<b>Other Full Time</b>	Adjunct or Part Time
<b>Statistics (N=28)</b>						
Average (std dev)	<b>17.6 (9)</b>	7.5 (5)	4.5 (4)	3.6 (2)	1.9 (2)	6.5 (6)
Median	<b>16</b>	5.5	3	3	1.5	5
Quartiles	<b>11, 20.5</b>	4, 9	2, 5.5	2, 5	0, 3	0.5, 10
Range	<b>8 - 42</b>	1 - 20	0 - 14	0 - 9	0 - 6	0 - 24
<b>Biostatistics (N=19)</b>						
Average (std dev)	<b>22.8 (11)</b>	9.4 (7)	5.4 (3)	5.3 (3)	2.6 (6)	8.3 (13)
Median	<b>22</b>	7	4	5	0	3
Quartiles	<b>15, 28</b>	4, 11	4, 8	3, 7	0, 1	0, 8
Range	<b>6 - 44</b>	2 - 27	1 - 10	1 - 13	0 - 18	0 - 46

Table 1. Faculty at statistics and biostatistics degree granting departments

Year	2008*	2009*	2010*	2011	2012	2013
<b>Statistics:</b>						
Average # Faculty	21.6	19.9	21.4	18.0	16.1	17.6
Median # Faculty	21	18	19	18	14	16
Number responses	26	29	40	47	31	28
<b>Biostatistics:</b>						
Average # Faculty	21.2	24.4	29.1	23.7	23.0	22.8
Median # Faculty	16	22	27	24.5	21	22
Number responses	11	12	23	18	13	19

Table 2: Faculty size over time. \*Adjunct or part-time faculty were included in total faculty summary in 2008, 2009 and 2010; years 2011, 2012, 2013 include full-time faculty only.

	<b>Total Full Time Faculty</b>	<b>Female</b>	<b>Hispanic</b>	<b>Black</b>	<b>Other URM</b>	<b>Female Minority</b>
<b>Statistics (N=27*)</b>						
<b>Average (std dev)</b>	<b>18.0* (9)</b>	<b>6.2 (4)</b>	<b>0.4 (.7)</b>	<b>0.5 (1.1)</b>	<b>0.04 (.2)</b>	<b>0.37 (.8)</b>
Average % total		37%	1.8%	2.6%	0.2%	1.8%
<b>Median</b>	<b>16</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Quartiles	11, 21	4, 8	0, 1	0, 1	0, 0	0, 0
Range	8 - 42	1 - 16	0 - 3	0 - 4	0 - 1	0 - 3
Median % total		32%	0%	0%	0%	0%
<b>Biostatistics (N=19)</b>						
<b>Average (std dev)</b>	<b>22.8 (11)</b>	<b>10.1 (10)</b>	<b>0.7 (.9)</b>	<b>0.3 (.6)</b>	<b>0</b>	<b>0.44</b>
Average % total		40%	4%	1%	0%	2%
<b>Median</b>	<b>22</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Quartiles	15, 28	4, 13	0, 1	0, 1	0, 0	0, 1
Range	6 - 44	2 - 37	0 - 3	0 - 2	0 - 0	0 - 3
Median % total		36%	0%	0%	0%	0%

Table 3. Female and minority faculty at statistics and biostatistics degree granting departments. Other URM is other underrepresented minority, including Native Americans and Pacific Islanders (but not Asians). \*One department did not answer demographic questions.

	<b>0%</b>	<b>0.1-10%</b>	<b>10.1-20%</b>	<b>20.1-30%</b>	<b>30.1-40%</b>	<b>40.1-50%</b>	<b>&gt;50%</b>
<b>Statistics (N=27*):</b>							
Female	0	1	2	<b>10</b>	5	6	3
Hispanic	<b>20</b>	7	0	0	0	0	0
Black	<b>19</b>	7	0	1	0	0	0
Other URM	<b>26</b>	1	0	0	0	0	0
<b>Biostatistics (N=19):</b>							
Female	0	0	<b>4</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>4</b>
Hispanic	<b>10</b>	8	0	1	0	0	0
Black	<b>14</b>	5	0	0	0	0	0
Other URM	<b>19</b>	0	0	0	0	0	0

Table 4. Frequency counts for percentages of department faculty who are female, Hispanic, black or Other URM. \*One department did not answer demographic questions.

	Undergrad Statistics Majors	<b>Bachelor's Degrees Awarded</b>	US Citizens / Permanent Residents	Female	Hispanic	Black
Average % total		<b>100%</b>	<b>68%</b>	<b>34%</b>	<b>1.8%</b>	<b>5.4%</b>
Average (std dev)	99.3 (110)	31.6 (50)	13.2 (21)	9.4 (17)	0.35 (.8)	0.55 (.8)
Median % total			81%	33%	0%	0%
Median	71.5	11.5	7.5	4	0	0
Quartiles	26.5, 118.5	6.5, 29	3, 14.5	1.5, 7.5	0, 0	0, 1
Range	4 - 432	1 - 189	0 - 94	0 - 70	0 - 3	0 - 3

Table 5. Undergraduate students and bachelor's degrees awarded by statistics degree granting departments with at least one degree awarded. Although 21 statistics departments offer an undergraduate degree, only 20 awarded a degree July 1, 2012 through June 30, 2013. The right four columns are a subset of degrees awarded.

<b>Year</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013*</b>
Average # bachelor's degrees	13.5	10.8	13.6	15.2	17.8	31.6
Median # bachelor's degrees	8	9	9	10	8.5	11.5
Average # undergraduate statistics majors	42.5	41.3	48.7	69.7	62.4	99.3
Median # undergraduate statistics majors	33	49	46	51	48	71.5

Table 6: Average and median number bachelor's degrees and undergraduate statistics major students from statistics degree granting departments over time. \*In 2013, these results are based on only those departments who offer an undergraduate degree in statistics and awarded at least one degree in the interval July 1, 2012 through June 30, 2013.



If master's degree offered and awarded	Total Master's Applications	Master's Applications US	Entering Master's Students	Master's Degrees Awarded	Joint, secondary or double-major
<b>Statistics (N=27<sup>a</sup>):</b>					
Average (std dev)	151.9 (117)	24.8 (18)	16.3 (13)	16.7 (12)	2.7 (6)
Median	132.5	20	11.5	15	0
Quartiles	43, 231	11, 31	5, 27	8, 24	0, 3
Range	17 - 393	2 - 72	0 - 41	2 - 54	0 - 24
<b>Biostatistics (N=18<sup>b</sup>):</b>					
Average (std dev)	90.4 (92)	26.4 (19)	13.5 (14)	9.4 (6)	0.8 (2)
Median	83	23.5	11.5	9	0
Quartiles	36, 121	5, 43	5, 14	5, 14	0, 0
Range	4 - 393	3 - 59	0 - 55	1 - 25	0 - 10

Table 7: Master's student applications and citizenship; master's students in program and number of degrees. Time period is from July 1, 2012 through June 30, 2013.

<sup>a</sup>One department did not offer a master's in statistics. <sup>b</sup>One department did not offer any biostatistics master's degrees (including a master's of public health in biostatistics or other academic master's in biostatistics).

	<b>Master's Degrees Awarded</b>	US Citizens / Permanent Residents	Hispanic	Black	Other
<b>Statistics (25<sup>a</sup>):</b>					
Average (std dev)	16.1 (12)	8.5 (5)	0.4 (.8)	0.6 (.8)	0.2 (.4)
Median	15	8	0	0	0
Quartiles	7, 22.5	4, 12	0, 1	0, 1	0, 0
Range	0 - 54	0 - 22	0 - 3	0 - 2	0 - 1
<b>Biostatistics (18<sup>b</sup>):</b>					
Average (std dev)	9.4 (6)	6.1 (4)	0.28 (.6)	0.39 (.5)	0.17 (.4)
Median	9	6	0	0	0
Quartiles	5, 14	3, 9	0, 0	0, 1	0, 0
Range	1 - 25	0 - 15	0 - 2	0 - 1	0 - 1

Table 8: Master's degrees awarded and citizenship, number of master's degrees that are joint, secondary, or double-major and by race. Five right columns are subsets of master's degrees awarded. Degrees awarded cover the period from July 1, 2012 through June 30, 2013.

<sup>a</sup>One department did not offer a master's in statistics and two departments did not complete demographic information. <sup>b</sup>One department did not offer any biostatistics master's degrees (including a master's of public health in biostatistics or other academic master's in biostatistics).

Master's Placement:	PhD Prog Stat	PhD Prog Other	Employed Business / Industry	Employed Govt	Employed Academia	Other	Un-known
<b>Statistics (27<sup>a</sup>):</b>							
Ave (std dev)	4.3 (4)	2.2 (5)	4.9 (8)	0.6 (1)	0.3 (.6)	0.2 (.6)	4.3 (5)
Median	3	0	2	0	0	0	3
Quartiles	1, 5	0, 2	0, 5	0, 1	0, 1	0, 0	1, 6
Range	0 – 17	0 – 24	0 – 32	0 – 5	0 – 2	0 – 2	0 - 19
<b>Biostatistics (18<sup>b</sup>):</b>							
Ave (std dev)	2.2 (2)	0.4 (.6)	3.3 (3)	0.1 (.3)	2.6 (4)	0.4 (.8)	1.2 (3)
Median	2	0	3	0	1	0	0
Quartiles	1, 3	0, 1	1, 4	0, 0	0, 2	0, 1	0, 1
Range	0 – 6	0 – 2	0 – 11	0 – 1	0 – 15	0 – 3	0 - 12

Table 9: Placement of master's degree statistics and biostatistics graduates. The first column, PhD Program Statistics, refers to either statistics or biostatistics. This includes professional and academic master's degree students.

<sup>a</sup>One department did not offer a master's in statistics.

<sup>b</sup>One department did not offer any biostatistics master's degrees (including a master's of public health in biostatistics or other academic master's in biostatistics).

Year	2008	2009	2010	2011	2012	2013
<b>Statistics:</b>						
Average number Master's Degrees	17.4	16.4	16.9	18.1	21.8	16.1
Median number Master's Degrees	13	14	12	12	16	15
<b>Biostatistics:</b>						
Average number Master's Degrees	10.4	8.5	11.9	8.8	10.8	9.4
Median number Master's Degrees	8	5	8	7	8	9

Table 10: Average and median number of master's degrees over time, by degree.

	Total Doctoral Applications	Doctoral Applications US	Entering Doctoral Statistics Students	Doctoral Degrees Awarded
<b>Statistics (N=26<sup>a</sup>):</b>				
Average (std dev)	115.3 (100)	23.5 (27)	11.1 (15)	6.1 (4)
Median	106.5	14	9	5.5
Quartiles	31, 200	4, 35	3, 12	2, 8
Range	0 - 324	0 - 90	0 - 78	2 - 14
<b>Biostatistics (N=15<sup>b</sup>):</b>				
Average (std dev)	99.5 (78)	38.4 (28)	9.0 (6)	5.3 (3)
Median	86	32	9	4
Quartiles	32, 166	19, 64	4, 12	3, 7
Range	4 - 262	3 - 95	2 - 24	2 - 12

Table 11: PhD and other doctoral applications; by citizenship, number of students and PhD degrees awarded. Degrees awarded cover the period from July 1, 2012 through June 30, 2013. Department included if at least one doctoral degree awarded.

<sup>a</sup>Two departments did not award a PhD in Statistics.

<sup>b</sup>Four departments did not award a PhD, a ScD or a DrPh in Biostatistics.

	<b>Doctoral Degrees Awarded</b>	US Citizens/ PermRes	Hispanic	Black	Other
<b>Statistics (N=26<sup>a</sup>):</b>					
Ave (std dev)	6.1 (4)	2.2 (2)	0.08 (.3)	0.23 (.5)	0.12 (.4)
Median	5.5	2	0	0	0
Quartiles	2, 8	1, 3	0, 0	0, 0	0, 0
Range	2 - 14	0 - 9	0 - 1	0 - 2	0 - 2
<b>Biostatistics (N=15<sup>b</sup>):</b>					
Ave (std dev)	5.3 (3)	3.1 (2)	0.07 (.3)	0.27 (.6)	0.07 (.3)
Median	4	3	0	0	0
Quartiles	3, 7	1, 4	0, 0	0, 0	0, 0
Range	2 - 12	0 - 8	0 - 1	0 - 2	0 - 1

Table 12: PhD degrees by citizenship and race. Degrees awarded cover the period from July 1, 2012 through June 30, 2013. Department included if at least one doctoral degree awarded.

<sup>a</sup>Two departments did not award a PhD in Statistics.

<sup>b</sup>Four departments did not award a PhD, a ScD or a DrPh in Biostatistics.

<b>Doctoral Placement:</b>	Tenure-track academic	Non-tenure track academic	Postdoc	Non-academic in statistics	Not employed or outside statistics	Unknown
<b>Statistics (N=26<sup>a</sup>):</b>						
Ave (std dev)	1.2 (2)	0.5 (1)	0.9 (1)	3.1 (2)	0.1 (.3)	0.2 (.5)
Median	1	0	0	2.5	0	0
Quartiles	0, 2	0, 1	0, 1	1, 5	0, 0	0, 0
Range	0 – 6	0 - 5	0 – 5	0 – 7	0 – 1	0 - 2
<b>Biostatistics (N=15<sup>b</sup>):</b>						
Ave (std dev)	0.9 (.9)	1.1 (1)	1.1 (2)	1.9 (2)	0.3 (.8)	0.05 (.2)
Median	1	1	0	1	0	0
Quartiles	0, 1	0, 2	0, 2	1, 3	0, 0	0, 0
Range	0 – 3	0 - 3	0 – 7	0 – 6	0 – 3	0 - 1

Table 13: Placement of Ph.D. statistics and biostatistics graduates. Department included if at least one doctoral degree awarded.

<sup>a</sup>Two departments did not award a PhD in Statistics.

<sup>b</sup>Four departments did not award a PhD, a ScD or a DrPh in Biostatistics.

Variable	2008	2009	2010	2011	2012	2013
<b>Statistics:</b>						
Average number doctoral degrees	6.6	6.0	6.0	5.9	4.8	6.1
Median number doctoral degrees	5.5	7	5.5	5	3	5.5
<b>Biostatistics:</b>						
Average number doctoral degrees	5.0	4.2	4.0	4.0	3.7	5.3
Median number doctoral degrees	4.5	3	3	3	3	4

Table 14: Average and median number of doctoral degrees over time.