

ASA Caucus of Academic Representatives Report on the 2010 Survey of Departments of Statistics and Biostatistics

This survey was conducted by Keith Crank, ASA liaison, and the report was prepared by Keith Crank, with guidance and approval of the Caucus Board's Executive Committee, which consisted of Jim Albert (Chair), Douglas Simpson, Kathryn Chaloner, Françoise Seillier-Moiseiwitsch, and Don Edwards.

Introduction:

On April 13, 2010, 94 departments of statistics and biostatistics at US institutions were sent links to an online survey form. The goal was to obtain information about Ph.D. 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. This was the third such survey conducted by ASA. The first survey was conducted in 2008. The department survey is expected to be an annual event.

The e-mails were sent to the Chair or Head of the department, and they were asked to complete the form by the middle of May. Reminders were sent weekly prior to the survey deadline.

Sixty-three departments responded to the survey. Of the 63 surveys summarized in this report, 40 were from statistics departments and 23 were from biostatistics departments. This is an increase of 11 statistics departments and 11 biostatistics departments, when compared to the 2009 survey. Of the 40 statistics departments that reported in 2010, 29 also provided data in 2009. Of the 23 biostatistics departments that reported in 2010, 11 also provided data in 2009.

Degrees Offered:

Of the 40 Ph.D. granting statistics departments that responded to the survey, 31 offer a Bachelor's degree, all offer a Master's degree, four also offer a Ph.D. in biostatistics, and four offer a Master's in biostatistics. For the 23 Ph.D. granting biostatistics departments, none offer a Bachelor's degree, but 22 offer a Master's degree. (Note: Departments that offer degrees in both statistics and biostatistics were grouped with statistics departments for summary purposes.)

Faculty:

The number of full-time faculty is higher in biostatistics departments than in statistics departments, on average. Although the average number of Full Professors is essentially the same in both sets of departments, the average

number of faculty in most other categories is higher in biostatistics departments. However, in the Associate and Assistant Professor categories much of the difference is in the number of Research Only appointments. (See Table 1.)

Biostatistics departments appear to be slightly more diverse than statistics departments. (See Table 2.) However, Table 3 shows that some departments are more diverse than others. (As a point of comparison it is worth noting that in 2007, 56% of the Ph.D.s in biometry and biostatistics went to women, while only 41% of the Ph.D.s in statistics went to women. (This data comes from the IPEDS database at the National Center for Education Statistics.))

Undergraduate Students:

Since none of the biostatistics departments offer a Bachelor's degree, this section deals only with statistics departments. Thirty-one of these departments indicated that they offered a Bachelor's degree in statistics.

For the 31 departments that are summarized in Table 4, there was an average of 13.6 degrees awarded and an average of 56.8 undergraduate statistics majors. Of the degrees awarded, 82% went to U.S. citizens and 36% went to women. The survey forms identified 4% of the degree recipients as underrepresented minority (URM). No information was collected on what happened to the students upon graduation.

Graduate Students:

Graduate programs in statistics and biostatistics tend to be larger than undergraduate programs in statistics. The number of undergraduate statistics majors appears to be growing, but still trails the number of graduate students in statistics at these institutions. Most of the graduate students are Ph.D. students, but the number of Master's students is increasing, while the number of Ph.D. students is not. (See tables 5, 7, and 10.)

Not surprisingly, given recent trends, the percentage of degrees going to U.S. citizens decreases as one progresses from Bachelor's to Master's to Ph.D. (For statistics the percentages are essentially the same for Master's and Ph.D. degrees.) On the other hand, this is not happening with degrees awarded to women. A higher percentage of graduate degrees go to women than do undergraduate degrees. There were very few underrepresented minorities (URMs) in any of the graduate programs. At the Master's level, about 2.6% of the statistics degrees and 7% of the biostatistics degrees went to URMs. At the Ph.D. level these percentages were 5.4% for both types of departments.

Upon receiving their Master's degree, about 24% of biostatistics students and 42% of statistics students continue on for a Ph.D. (These figures include students already in a Ph.D. program who receive a Master's degree along the way.) Of the

MS graduates who continue for a PhD, about a third go into a Ph.D. degree program other than statistics or biostatistics. However, there are many Master's degree recipients who are in a status unknown to the department. (Statistics departments seem to do better at following their Master's students after graduation than do biostatistics departments.) (See Table 6.)

For biostatistics Ph.D. graduates, 30% went to tenure track positions, while 27% of statistics Ph.D. graduates went to tenure track positions. The percentages of both groups going to postdoctoral positions were very similar (around 15%). The percentage of Ph.D.s going to nonacademic positions was higher for statistics Ph.D.s (50%) than for biostatistics Ph.D.s (35%). (See Table 8.)

Five of the 334 Ph.D. recipients were reported as being unemployed. But 14 were listed as in an unknown status, so the total unemployment could be around 6%. We did not collect unemployment information for those with a Master's degree.

Additional Information:

In 2009 and 2010, we asked about applications for graduate school. In 2010 the average number of applications for graduate school was 110 for a statistics Master's program, 121 for a statistics Ph.D. program, 43 for a biostatistics Master's program, and 66 for a biostatistics Ph.D. program. These are all increases over the 2009 averages. (See Table 9.)

The changes in expected enrollments increased for statistics departments, but remained the same as the previous year for biostatistics departments at both the Master's and Ph.D. levels.

We also asked about the most important limiting factors to increasing Ph.D. production. For both types of departments, a lack of funding was cited as the biggest reason for not increasing the size of their Ph.D. program. The second most cited reason was a lack of faculty.

Comparisons with Previous Years:

Tables 10 and 11 provide year to year comparisons of some of the basic information about these departments of statistics and biostatistics. It is too early to tell if the year to year changes are signs of change or simply random fluctuations, but a few things are worth mentioning.

First, the number of Master's degrees awarded by statistics departments appears to be decreasing. Hopefully, this is a short-term phenomenon, since the number of Master's students is higher in 2010 than in the previous two years. And the number of new graduate students expected to enter these programs in the fall of

2010 appears to be higher than in 2009. (See Table 9.) But, it would be cause for concern, if there is a continued decrease in the number of degrees awarded.

On the other hand biostatistics departments appear to be growing, in numbers of full-time faculty, as well as in their graduate programs. Some of the (apparent) faculty growth is simply due to the inclusion of data from more (and bigger) departments. The 2010 average number of full-time faculty for those departments that also responded in 2009 is 20.4, while the corresponding average for those departments that did not respond in 2009 is 24.8.

Comparisons with other Information:

For most of the data collected in this survey, there is no other place to find the information. (Of course, that's why the survey was conducted.) But, for number of Ph.D. degrees, there are other sources of information.

For Ph.D. degrees, the American Mathematical Society (AMS) conducts a yearly survey of math, statistics, and biostatistics departments. Their February 2010 report shows 245 Ph.D.s awarded by statistics departments and 107 Ph.D.s awarded by biostatistics departments for the same time period as this survey. (Note that these are simple counts of the number of Ph.D.s awarded by those departments that responded to their survey. It is not an estimate of total Ph.D.s awarded by statistics and biostatistics departments.) Based on our data, we would estimate a total of 361 Ph.D.s in statistics and 137 Ph.D.s in biostatistics from these departments between July 1, 2008, and June 30, 2009, if nonresponding departments are similar to the departments that responded to our survey.

Separately, the National Center for Education Statistics collects data on Ph.D. degrees awarded by discipline (IPEDS data). For 2008, they provide a figure of 225 Ph.D.s in statistics and 105 Ph.D.s in biostatistics and biometry. This corresponds to the data we collected in 2009. Our estimates of the number of statistics and biostatistics Ph.D.s just from statistics and biostatistics departments was 354 and 146. (AMS for this time period had corresponding numbers of 215 and 76.)

Final Comments:

In this third year of the survey of departments, we are finally reaching a response rate that can provide reliable estimates. I expect the response rate to continue to improve, and the future estimates to also improve. The estimates from the first two years may not provide good indicators of trends. I hope to match data across years from the same department to improve the prior year estimates.

Tables

	Full Professor (Research Only)	Associate Professor (Research Only)	Assistant Professor (Research Only)	Other Full Time	Adjunct or Part Time	Total Faculty
Statistics (40):						
Mean	7.9 (0.2)	3.8 (0.2)	4.4 (0.2)	2.1	3.1	21.4
Median	7 (0)	3.5 (0)	4 (0)	2	1	19
Range	1 – 20	0 – 11	0 – 16	0 – 9	0 – 24	9 – 54
Biostatistics (23):						
Mean	7.7 (0.7)	5.7 (1.0)	7.6 (2.2)	1.7	6.4	29.1
Median	5 (0)	5 (0)	6 (2)	0	2	27
Range	0 – 29	1 – 12	1 – 18	0 – 14	0 – 38	7 – 72

Table 1. Faculty at Ph.D. granting departments of statistics and biostatistics. Numbers in parentheses after type of department are for number of responses. Numbers in parentheses within table are for research only appointments.

	Total Faculty	Female (% of total)	Hispanic (% of total)	URM (% of total)
Statistics (40):				
Mean	21.4	5.2 (24%)	0.3 (1%)	0.5 (2%)
Median	19	5	0	0
Range	9 – 54	1 – 13	0 – 2	0 – 5
Biostatistics (23):				
Mean	29.1	8.8 (30%)	0.5 (2%)	1.0 (3%)
Median	27	8	0	1
Range	7 – 72	2 – 29	0 – 2	0 – 5

Table 2. Female and Minority faculty at Ph.D. granting departments of statistics and biostatistics. Numbers in parentheses after type of department are for number of responses. URM is underrepresented minority. It includes Hispanics, African-Americans, and Native Americans and Pacific Islanders (but not Asians).

	0%	0-10%	10-20%	20-30%	30-40%	40-50%	>50%
Statistics (40):							
Female	0	3	12	11	9	5	0
Hispanic	32	6	0	0	0	0	0
URM	28	8	2	0	0	0	0
Biostatistics (23):							
Female	0	0	7	6	8	0	2
Hispanic	12	8	0	0	0	0	0
URM	8	12	0	0	0	0	0

Table 3. Frequency counts for percentages of department faculty who are female, Hispanic, or URM. Columns include the upper end of the range, but not the lower end (i.e., if a department has exactly 20% of its faculty female, it is counted in the column 10-20%).

	Undergraduate Statistics Majors	Bachelor's Degrees Awarded	U.S. Citizens	Female
Statistics (31):				
Mean	48.7	13.6	10.2 (82%)	4.9 (36%)
Median	46	9	7	4
Range	8 – 140	2 – 45	0 – 41	0 – 16

Table 4. Undergraduate students and Bachelor's degrees awarded by Ph.D. granting statistics departments. (The column for U.S. citizens includes permanent residents.) The final two columns are a subset of degrees awarded (not all undergraduate majors). Degrees awarded cover the period from July 1, 2008 through June 30, 2009.

	Master's Students	Master's Degrees Awarded	U.S. Citizens	Female
Statistics (40):				
Mean	31.7	16.9	5.9 (35%)	7.9 (46%)
Median	23.5	12	5	6
Range	0 – 147	0 – 98	0 – 23	0 – 38
Biostatistics (22):				
Mean	21.2	11.9	6.8 (56%)	6.6 (56%)
Median	16.5	8	5	4.5
Range	1 – 62	3 – 63	1 – 31	1 – 23

Table 5. Master's students and Master's degrees awarded by Ph.D. granting statistics and biostatistics departments. (The column for U.S. citizens includes permanent residents.) The final two columns are a subset of degrees awarded (not all Master's students). Degrees awarded cover the period from July 1, 2008 through June 30, 2009.

	Ph.D. Program Statistics	Ph.D. Program Other	Employed Business & Industry	Employed Government	Employed Academia	Other or Unknown
Statistics (40):						
Mean	4.6	2.5	4.3	0.6	0.5	2.4
Median	3	1	3	0	0	2
Range	0 – 18	0 – 27	0 – 18	0 – 5	0 – 4	0 – 11
Biostatistics (22):						
Mean	2.0	0.8	2.1	0.5	1.8	4.7
Median	1.5	0	1	0	1	1.5
Range	0 – 10	0 – 5	0 – 11	0 – 3	0 – 8	0 – 45

Table 6. Placement of Master's degree statistics and biostatistics graduates. (Ph.D. Program Statistics refers to either statistics or biostatistics.)

	Ph.D. Statistics Students	Ph.D. Degrees Awarded	U.S. Citizens	Female
Statistics (40):				
Mean	33.9	6.0	2.2 (36%)	2.4 (39%)
Median	28	5.5	2	1.5
Range	7 – 115	0 – 16	0 – 7	0 – 8
Biostatistics (23):				
Mean	28.9	4.0	1.7 (41%)	2.0 (48%)
Median	22	3	1	2
Range	4 – 95	0 – 11	0 - 6	0 – 7

Table 7. Ph.D. students and Ph.D. degrees awarded by statistics and biostatistics departments. (The column for U.S. citizens includes permanent residents.) The final two columns are a subset of degrees awarded (not all Ph.D. students). Degrees awarded cover the period from July 1, 2008 through June 30, 2009.

	Tenure- Track	Postdoc	Nonacademic	Unemployed, Other, or Unknown
Statistics (40):				
Mean	1.6	0.9	3.0	0.5
Median	1	1	3	0
Range	0 – 8	0 – 5	0 – 11	0 – 3
Biostatistics (23):				
Mean	1.2	0.7	1.4	0.8
Median	1	0	1	0
Range	0 – 5	0 – 5	0 – 7	0 – 5

Table 8. Placement of Ph.D. statistics and biostatistics graduates.

	Master's		Ph.D.	
	2009 Means (s.e.)	2010 Means (s.e.)	2009 Means (s.e.)	2010 Means (s.e.)
Statistics:				
Applications	69.4 (9.7)	113.4 (17.1)	116.8 (17.1)	121.3 (15.0)
Expected to Enter	8.7 (1.4)	15.5 (3.0)	7.1 (1.2)	11.3 (3.2)
Biostatistics:				
Applications	34.6 (10.6)	43.0 (7.8)	46.5 (13.7)	66.1 (11.5)
Expected to Enter	8.2 (2.2)	8.6 (2.0)	6.7 (1.5)	6.7 (1.0)

Table 9. Applications and expected admissions to statistics and biostatistics graduate programs.

Variable	2008 (s.e)	2009 (s.e)	2010 (s.e)
Full-Time Faculty	19.2 (2.0)	17.8 (1.6)	18.2 (1.4)
Bachelor's Degrees	15.2 (3.6)	13.0 (1.9)	13.6 (2.1)
Bachelor's Students	44.8 (8.0)	46.2 (5.9)	48.7 (6.4)
Master's Degrees	23.1 (4.3)	20.5 (2.2)	16.9 (2.6)
Master's Students	29.7 (6.6)	26.9 (2.7)	31.7 (5.1)
Ph.D. Degrees	6.5 (0.8)	6.2 (0.7)	6.0 (0.6)
Ph.D. Students	31.7 (4.4)	33.7 (4.0)	33.9 (3.9)

Table 10. 2008-2010 Comparisons for Statistics Departments. Degrees awarded are for the one-year period from July 1 to June 30 of the year before the survey was conducted. (So, the 2010 numbers are for the period from July 1, 2008 through June 30, 2009.)

Variable	2008 (s.e)	2009 (s.e)	2010 (s.e)
Full-Time Faculty	15.7 (2.4)	18.6 (2.0)	22.7 (2.5)
Master's Degrees	9.0 (1.9)	8.8 (2.4)	11.9 (2.9)
Master's Students	17.2 (3.3)	18.3 (3.9)	21.2 (3.6)
Ph.D. Degrees	3.1 (1.1)	4.1 (1.2)	4.0 (0.7)
Ph.D. Students	24.0 (6.6)	25.2 (5.8)	28.9 (5.0)

Table 11. 2008-2010 Comparisons for Biostatistics Departments. Degrees awarded are for the one-year period from July 1 to June 30 of the year before the survey was conducted. (So, the 2010 numbers are for the period from July 1, 2008 through June 30, 2009.)