Report on 2008 Survey of
Departments of Statistics and Biostatistics
September 5, 2008

Introduction:

On April 2, 2008, 94 departments of statistics and biostatistics at US institutions were sent links to an online survey form. The goal was to begin 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 first such survey conducted by ASA. It 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 end of April. Reminders were sent in the middle of April and again about a week before the survey deadline.

Forty departments responded to the survey, but three completed information only about their degree programs and faculty. Additionally, three of the departments do not offer a Ph.D. and were not included in the summary report that follows. Of the 34 surveys summarized in this report, 24 were from statistics departments and 10 were from biostatistics departments.

From a photo of department faculty, it would be difficult to distinguish a statistics department from a biostatistics department. Both have an average of 21 faculty members, of whom 5 are female and almost none are under-represented minorities. They range in size from about 10 to about 50.

But, looking at students and degrees, the differences begin to be noticeable. Most statistics departments (75%) offer a Bachelor's degree, but none of the biostatistics departments do. The size of the graduate programs is also different. Statistics departments award more Master's degrees (23 vs. 9) and Ph.D.s (6 vs. 3) than do biostatistics departments.

Of course, the biggest difference between the two types of departments (based on the data we collected) is the amount of external funding and where it comes from. Biostatistics departments receive a lot more external funding, with most of it coming from NIH. Statistics departments also get NIH money, but even more of their external funding comes from NSF and from other federal agencies.

Degrees Offered:

Thirty-seven departments that offer a Ph.D. in statistics or biostatistics provided information about their degrees offered. Twenty-six of these were statistics departments and 11 were biostatistics departments. Of the 26 statistics departments, 20 offer a Bachelor's degree, all offer a Master's degree, two also offer a Ph.D. in biostatistics, and three offer a Master's in biostatistics. For the 11 biostatistics departments, none offer a Bachelor's degree, but all offer a Master's degree.

Faculty:

The sizes of statistics departments compared to biostatistics departments are very similar. The average number of faculty is about 21 with a range between 8 and 51-2. However, there are differences in the makeup of these departments. Statistics departments tend to have a larger number of full professors, while biostatistics departments have a larger number of part-time and adjunct faculty. (See Table 1.)

As with the total size, there is not much difference in the average gender/ethnic/racial makeup of the two different types of departments. Approximately 25% of the faculty are female, while the number of underrepresented minorities is very small. (See Table 2.) However, Table 3 shows that some departments are more diverse than others.

Most of the departments operate on a semester basis. The normal teaching load is 3-4 classes per year for statistics faculty. There is a roughly equal split between the departments that have a 3 course teaching load and those that have a four course teaching load, though faculty on a quarter system are more likely to have a four course teaching load. For biostatistics faculty the range is from 1-3 courses per year with a two course load being the most common.

Teaching loads are often reduced for beginning assistant professors and for faculty with a large number of administrative duties. In addition, research grants can often be used to buy out teaching responsibilities. A few places offer reduced teaching for new parents. While not as common as reduced teaching loads, some faculty get higher teaching loads due to lack of research activity, or for biostatistics faculty, lack of external funding.

Class sizes are much larger (on average) for statistics faculty than for biostatistics faculty. Statistics faculty average more than 60 students per class, while biostatistics faculty average fewer than 25 students per class. Presumably, this is primarily due to the larger number of undergraduate introductory classes taught by statistics faculty.

Service to the profession/community is generally a part of every faculty's responsibility. Most departments indicate that it is taken into account during annual performance reviews and factors into merit raises and promotions. From the comments it appears that this is often done in an ad hoc manner (except for being a journal editor, which often comes with a reduced teaching load). Some departments do not evaluate service to the profession. For others, there are university awards that are used to reward these activities.

Undergraduate Students:

Since none of the biostatistics departments offer a Bachelor's degree, this section deals only with statistics departments. Although 20 of the responding departments indicated they offer a Bachelor's degree in statistics, two of these departments provided no information about their students, and two more are just beginning their Bachelor's degree programs. Data from three other departments was not broken out or had other problems.

For the thirteen departments that are summarized in Table 4, there was an average of 13.5 degrees awarded and an average of 42.5 undergraduate statistics majors. Of the degrees awarded, 86% went to U.S. citizens and 36% went to women. There were very few URMs (6) among the degree recipients. 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 students in graduate statistics and biostatistics programs averages between 50 and 60 compared to an average of about 40 undergraduate statistics majors. Most of the graduate students are Ph.D. students, but because of the longer time needed to complete a Ph.D. there are 2-3 times as many Master's degrees awarded as Ph.D.s. (See tables 5 and 7.)

Not surprisingly, the percentage of degrees going to U.S. citizens decreases as one progresses from Bachelor's to Master's to Ph.D. 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. It will be interesting to see if this continues in future surveys. There were very few underrepresented minorities (URMs) in any of the graduate programs. At the Master's level, about 2% of the statistics degrees and 8% of the biostatistics degrees went to URMs. At the Ph.D. level these percentages were 7% and 0%, respectively.

Between 30% and 40% of Master's students go into a Ph.D. program, once they receive their Master's degree. (Many of these may already be in a Ph.D. program, but receive a Master's degree along the way.) Of these, about half go into a Ph.D. degree program other than statistics and biostatistics, if they received their Master's degree from a statistics department. For those that do not go to a Ph.D. program, about half 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, 20% went to tenure track positions, while 40% of statistics Ph.D. graduates went to tenure track positions. The percentages of both groups going to postdoctoral positions was very similar (around 15%). A higher percentage of Ph.D.s in biostatistics go to nonacademic positions. From the comments, it's clear that some of those listed under the "other" category are in academic research positions (apparently, non-tenure-track).

Unemployment for graduating Ph.D.s was less than 2% (3 of the 162 summarized in Table 7.) But the same number were listed as in an unknown status, so the total unemployment could be between 3% and 4%. We did not collect unemployment information for those with a Master's degree.

Funding:

External funding information for statistics and biostatistics departments is provided in Tables 9 and 10. As expected, most of the external funding for biostatistics departments comes from NIH, and this provides support to about 75% of their faculty. The external funding for statistics departments is more evenly divided. Over 70% comes from federal sources other than NIH, with NSF accounting for slightly more than half of those funds. From the survey information it appears that biostatistics departments receive about two and a half times as much external funding as do statistics departments.

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 and for NSF funding, 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 2008 report shows 215 Ph.D.s awarded by statistics departments and 64 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.) Separately, NSF collects data on Ph.D. degrees awarded by discipline. For 2006, they provide a figure of 301 Ph.D.s in statistics and 106 Ph.D.s in biostatistics and biometry. (I believe the NSF data is for the calendar year. Both this survey and the AMS survey asked for degrees awarded between July 1, 2006, and June 30, 2007.)

From the data collected in this survey, we can estimate the total number of Ph.D.s awarded by statistics departments (N=59) and biostatistics departments (N=35). The estimates are 385 (s.e.=46) for statistics and 108 (s.e.=39) for biostatistics. While the (point) estimate for statistics may be a little high, the one for biostatistics looks very good.

For NSF funding, the comparisons are not as good. The Statistics Program at NSF spends about $12-13 million each year. Estimating the total amount of NSF funding for statistics and biostatistics departments, we get a point estimate of $38 million with a standard error of $16 million. This suggests that the statistics departments that provided external funding information may be very different from the ones that did not. (The $38 million estimate is a stratified estimate with statistics departments and biostatistics departments forming the two strata. Most of the $38 million comes from the statistics strata.) An alternative explanation is that much of NSF's funding comes as (approximately) three year grants and the amounts reported are the total grant sizes, rather than a one year amount.

To see if there were major differences between the departments that provided information about external funding and those that did not, I calculated the means for each group for the following items: total faculty, undergraduate majors, Bachelor's degrees awarded, Master's students, Master's degrees awarded, Ph.D. students, and Ph.D. degrees awarded. The results are in Table 11. For the biostatistics departments, the differences between the two groups appear to be minor. For the statistics departments, there is consistency in total faculty, Bachelor's degrees awarded, and Ph.D. degrees awarded. But there appear to be differences in the other items. How this relates to the funding issue is not clear.

Final Comments:

This report documents the results of the first of what should be regular surveys of statistics and biostatistics departments. It contains few surprises. But it does begin to provide information based on survey data that, over time, will have much more validity about things we "know" than do our individual guesses and anecdotal information.

It raises questions about what future surveys should look like and how they should be conducted. Questionnaire design is important and the design of this first questionnaire may have led to a poorer response to some items than was warranted. In particular, asking the funding questions before asking about students and degrees awarded may have led some respondents to stop prematurely.

The survey also only included statistics and biostatistics departments that offer a Ph.D. in statistics or biostatistics. Many Bachelor's and Master's degrees (and a few Ph.D.s) come from departments that include other disciplines (generally mathematics) or that don't offer a Ph.D. In the future it would be good to sample some of these other departments, but the logistics of this are not simple and would require a large time commitment.

Another survey that could provide valuable information is a survey of our students and alumnae. What induces a student to major in statistics? What happens to our students when they graduate? What are their career paths? How can we continue to provide resources that they would find useful? This, also, would be more complicated than what we are currently doing and would require a large time commitment.

Tables

	Full Professor (Research Only)	**Associate Professor** (Research Only)	**Assistant Professor** (Research Only)	Other Full Time	Adjunct or Part Time	Total Faculty
Statistics (26):						
Mean	**8.6** (.04)	**3.3** (.12)	**4.8** (.04)	2.4	2.4	21.6
Median	6 (0)	3 (0)	4 (0)	2	1	21
Range	3 – 22	1 – 10	1 – 21	0 – 9	0 – 11	8 – 52
Biostatistics (11):						
Mean	**5.4** (.4)	**3.9** (.3)	**5.4** (1.7)	1.0	5.4	21.2
Median	5 (0)	4 (0)	4 (0)	0	3	16
Range	3 – 9	1 – 9	1 – 15	0 – 9	0 – 24	8 – 51

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 (24):				
Mean	**20.9**	**4.8** (23%)	**0.2** (1%)	**0.3** (1%)
Median	20.5	3	0	0
Range	8 – 52	1 – 18	0 – 2	0 – 2
Biostatistics (11):				
Mean	**21.2**	**5.4** (26%)	**0.4** (2%)	**1.3** (6%)
Median	16	4	0	1
Range	8 – 51	2 – 11	0 – 2	0 – 4

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 Asian).

	0%	0-10%	10-20%	20-30%	30-40%	40-50%
Statistics (24):						
Female	0	4	7	7	6	0
Hispanic	20	4	0	0	0	0
URM	18	6	0	0	0	0
Biostatistics (11):						
Female	0	0	5	2	2	2
Hispanic	7	4	0	0	0	0
URM	4	5	1	1	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 (13):				
Mean	42.5	13.5	11.6 (86%)	4.8 (36%)
Median	33	8	7	4
Range	16 – 97	1 – 43	1 – 41	0 – 18

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).

	Master's Students	Master's Degrees Awarded	U.S. Citizens	Female
Statistics (15):				
Mean	22.5	17.4	5.9 (34%)	8.6 (49%)
Median	17	13	5	6
Range	6 – 54	6 – 46	1 – 16	2 – 21
Biostatistics (7):				
Mean	19.1	10.4	5.1 (49%)	5.6 (53%)
Median	18	8	5	5
Range	8 – 38	6 – 21	1 – 9	1 – 9

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).

	Ph.D. Program Statistics	Ph.D. Program Other	Employed Business & Industry	Employed Government	Other or Unknown
Statistics (14):					
Mean	3.6	3.1	5.1	0.4	4.6
Median	3	0.5	4	0	1
Range	1 – 10	0 – 23	0 – 22	0 – 2	0 – 14
Biostatistics (6):					
Mean	3.5	0	1.3	1.0	5.0
Median	1.5	0	0.5	0.5	1
Range	0 – 4	0 – 0	0 – 3	0 – 4	0 – 8

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 (20):				
Mean	31.9	6.6	2.0 (30%)	2.8 (42%)
Median	28	5.5	1.5	2
Range	0 – 95	1 – 15	0 – 6	0 – 9
Biostatistics (6):				
Mean	31.5	5.0	1.7 (33%)	3.3 (67%)
Median	26	4.5	1.5	3
Range	7 – 62	2 – 9	0 - 5	1 – 6

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).

	Tenure-Track	Postdoc	Nonacademic	Unemployed, Other, or Unknown
Statistics (19):				
Mean	2.7	1.1	2.5	0.3
Median	2	1	2	0
Range	0 – 6	0 – 5	0 – 8	0 – 2
Biostatistics (6):				
Mean	1.0	0.7	2.0	1.3
Median	0.5	0	1	1
Range	0 – 4	0 – 2	0 – 6	0 – 3

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

	Source of Funds:				
	NSF	**NIH**	**Other Federal**	**Non-Federal Government**	**Non-Government**
Total $ Spent (000)	$625 (150)	$300 (75)	$550 (50)	$25 (0)	$150 (50)
Number of Faculty Receiving some Salary Support	7.2 (5)	2.8 (2)	2.2 (0)	0.8 (0)	1.2 (0)
Number of Graduate Students Supported	9.3 (6)	3.8 (3)	2.2 (2)	1.0 (0)	5.5 (2)
Number of Postdocs Supported (at least partially)	0.7 (0)	1.1 (0)	0.2 (0)	0.0 (0)	0.2 (0)

Table 9. Funding sources and faculty, postdoctoral, and student support for statistics departments. Twelve departments responded to the first row. Thirteen departments responded to the remaining rows. First figure is the mean. Medians are in parentheses. Dollar figures are rounded to nearest $25K.

	Source of Funds:				
	NSF	**NIH**	**Other Federal**	**Non-Federal Government**	**Non-Government**
Total $ Spent (000)	$50 (0)	$3050 (1825)	$475 (150)	$150 (25)	$275 (250)
Number of Faculty Receiving some Salary Support	1.2 (0)	15.3 (14.5)	4.2 (2.5)	3.2 (1)	4.2 (4)
Number of Graduate Students Supported	0.7 (0)	18.8 (9.5)	3.0 (1)	3.5 (2)	0.8 (0)
Number of Postdocs Supported (at least partially)	0.0 (0)	2.0 (0.5)	0.0 (0)	0.0 (0)	0.0 (0)

Table 10. Funding sources and faculty, postdoctoral, and student support for biostatistics departments. Six departments responded. First figure is the mean. Medians are in parentheses. Dollar figures are rounded to nearest $25K.

	STAT 12	STAT Other	BIOSTAT 6	BIOSTAT Other
Total Faculty	21.2	21.9	21.7	20.6
Undergraduate Majors	53.2	36.3	NA	NA
Bachelor's Degrees	15.4	15.0	NA	NA
Master's Students	23.9	36.0	18.3	15.5
Master's Degrees	19.7	26.9	8.6	9.5
Ph.D. Students	37.0	26.4	25.8	21.2
Ph.D. Degrees	6.0	7.1	3.2	3.0

Table 11. Comparison of the responses of the statistics and biostatistics departments that provided data on external funding (STAT 12, BIOSTAT 6) and those that did not (STAT Other, BIOSTAT Other). Entries are means for each group.