CHAPTER TWO: SURVEY OF FEDERAL STATISTICAL AGENCY TRAINING

It became clear in the early deliberations of the subcommittee that little was known about the composition of the workforce within statistical agencies and the spectrum of training opportunities within those agencies. While members of the subcommittee could provide information related to their particular agency, the subcommittee decided that a data collection effort targeted at the larger statistical agencies would provide a baseline for understanding the composition of the workforce, the funds spent on statistical training, and the nature of the courses taken by employees within those agencies.

To the best of the subcommittee members' knowledge, this is the first time that there has been an attempt to collect data on educational and training opportunities across federal statistical agencies. Having learned from the individual case studies of the vast differences among agencies with respect to the organization and storage of training information, the subcommittee was concerned with the feasibility of obtaining this information and, no less, the quality of the data. The limited resources available for the data collection effort compelled the subcommittee to rely on a self-administered data collection effort. As with any self-administered questionnaire, respondents had limited opportunity to obtain clarification with respect to the survey questions. Accordingly, the subcommittee views this effort as a demonstration project, one which is subject to issues of consistency and potential measurement error. Concerns with consistency of responses, potential measurement error, and other concerns that may limit inferences drawn from these data are highlighted throughout the discussion below.

1. Methodology

The data collection effort was targeted at statistical agencies that were either members of the Office of Management and Budget's Interagency Council for Statistical Policy or the Federal Committee on Statistical Methodology. In limiting the data collection to these nineteen agencies, the subcommittee recognizes that the entire population of statistical agencies or agencies which employ statisticians is not represented. The choice of the population of interest was based on several factors, including a desire to target the subcommittee's efforts at agencies employing the largest number of statisticians, given limited time and budget to collect the data. (See Table 2 in Chapter One for a list of agencies included in the data collection.)

For the purposes of this data collection, the subcommittee chose to broadly define "statistician" as individuals classified in any of ten different federal job series. Profiles of the education requirements for the mathematical statistician and statistician series are readily available. (*Eldridge, et al.*) Information was collected dealing with the following ten quantitative employment series:

- mathematical statisticians (Series 1529)
- statisticians (Series 1530)
- statistical assistants (Series 1531)
- student assistants (Series 1599)
- operations research (Series 1515)

- computer specialists (Series 334)
- economists (Series 110)
- sociologists (Series 101)
- psychologists (Series 180)
- anthropologists (Series 190)

The questionnaire was designed to be a self-administered form, mailed to each of the agencies. Its content and structure were subjected to several rounds of revisions within the subcommittee and, prior to finalization, was pretested with two agencies using cognitive interviewing techniques. The content of the questionnaire included questions concerning:

- The number and distribution by grade of employees within each of the job series enumerated above for FY 1996;

- The statistical courses taken by employees of the agency during FY 1996. These courses were categorized by content type, length, vendor type, and cost per participant. In particular,

  type of course:

  - statistical analysis (e.g., analysis of complex sample data, categorical data analysis, applied time series analysis)
  - sampling (e.g., applied sampling, introduction to survey sampling, complex sampling designs)
  - other mathematics and statistics courses (e.g., elements of statistics, introduction to biostatistics, small area estimation, applied probability and statistics)
  - statistical computing (e.g., introduction to SAS, fundamentals of SUDAAN and Wesvar, getting the most out of SAS)
  - other survey methods (e.g., questionnaire design, nonsampling error in surveys, cognitive and communicative aspects of survey methodology, conducting focus groups)
  - other (e.g., survey management)

  the length of the course:

  - one day
  - two days
  - three or more days
  - college credit-bearing course

  course vendor:

  - in-house trainer
  - private vendor or consultant

- N USDA graduate school
- N Joint Program in Survey Methodology (JPSM)
- N other university
- N SAS Institute
- N other (e.g., professional organization)

" Whether the agency conducted statistical training for individuals outside their agency and if so, a brief description of the type of courses;

" Whether FY 1996 was in any way anomalous with respect to the amount of training taken by employees and, if so, a description of how the year differed from other years; and

" Operating expenditures, total training expenditures, and statistical training expenditures.

A copy of the questionnaire is included in Appendix B. Given the variety of topics covered by the questionnaire, the subcommittee expected that multiple respondents would be involved in the completion of the instrument.

Questionnaires were mailed in mid-March of 1997 to the director (administrator or commissioner) of the respective federal statistical agency, with a request that the questionnaire be returned in the self-addressed, stamped envelope by the end of April 1997. Telephone nonresponse follow-up began in early May and continued until early June at which point eighteen of the nineteen agencies had completed the questionnaire and one agency, the Environmental Protection Agency, responded by indicating the information was unavailable.

The questionnaire was not designed to distinguish between the three types of human resource development, that is, training, education, and development. To do so would require that federal statistical agencies maintain information as part of their training data bases which distinguishes among these three types of human resources development. Although some agencies clearly have career development programs, information maintained at the course level by the agencies does not distinguish between courses taken as part of those development programs as compared to courses taken as part of general training or education.

2. Findings

As noted above, the committee members see this data collection effort as a first attempt to document the composition of the statistical workforce, both by job series and grade, and examine the diversity of "statistical" courses being taken by staff at the various agencies. The findings suggest that the federal statistical workforce is composed of professionals that come from a diverse set of educational backgrounds. Composition of the workforce varies by agency, for example, the large number of economists employed at the BLS is unique among the agencies included in the study. The courses taken by staff at the different agencies varied on all the dimensions measured by the study: course content, the

provider of the course, and the length of the course**.**

Agency Composition. Agencies were requested to report the total number of statistical employees by series number and grade for fiscal year 1996. The list of occupational series is by no means an exhaustive list of all series in which individuals may be engaged in statistical activities, as defined by the committee. For example, the Energy Information Agency utilizes a number of Energy Industry Specialists to collect and analyze survey data; other agencies most likely employ individuals classified according to substantive specialty whose duties, nonetheless, involve the types of statistical activities of interest to the committee. Therefore, these figures are most likely an underestimate of the total workforce involved in "statistical" activities. It is also important to note that some agencies reported these figures for the beginning of the fiscal year while others indicated the counts as of the end of the fiscal year. Therefore, the number and distribution of employees displayed in Table 1 should be viewed as an approximation of the statistical workforce within the eighteen responding agencies at various points during the fiscal year.

It is probably useful to clarify the distinction between mathematical statistician (Series 1529) and statistician (Series 1530) before examining the findings from the table. To qualify as a mathematical statistician, an employee must have a minimum of 24 hours of courses in and statistics, of which at least twelve are in mathematics and six in statistics. The twelve hours of mathematics must be "advanced," that is, for which elementary calculus is a prerequisite. Statisticians must have completed either fifteen hours in statistics or six hours in statistics plus nine hours of math; regardless of the number of hours of statistics, statisticians must also have completed at least nine hours of course work in business, social science, physical science, or biological science.

As can be seen from the table, mathematical statisticians (Series 1529) account for only 8.6 percent of the "statistical" staff within the eighteen agencies represented in Table 1. The majority of these mathematical statisticians (91.1%) were Grades 12 to 15 with 62.0 percent classified as Grade 12 or Grade 13. Statisticians (Series 1530) make up 26.0 percent of the statistical work force within the participating agencies; the majority of statisticians (88.8%) were Grades 12 to 15, with 67.6 percent classified as Grade 12 or Grade 13.

Computer specialists, of which there are over 2,200 in the federal statistical workforce, form the largest group of "statistical" employees (32.3 percent). This is the only professional series that does not uniformly require a Bachelors degree. Like mathematical and other statisticians, the majority of computer specialists, economists, sociologists, psychologists and operations research employees were classified as Grade 12 or Grade 13.

The majority of the statistical and student assistants were classified in the Grades 5 through 7 range; the requirements for these jobs do not minimally require a Bachelors degree.

Table 1: Number and Distribution of Employees by Statistical Job Series and Grade: FY 1996

Statistical Job Series	Total Employees (Grades 5-15)	Grades 5-7	Grades 9-11	Grades 12-13	Grades 14-15
Mathematical Statistician	610 (8.6%)	3	51	378	178
Statistician	1844 (26.0%)	22	184	1246	392
Statistical Assistant	521 (7.4%)	450	69	2	0
Student Assistant	13 (0.2%)	10	3	0	0
Operations Research	78 (1.1%)	0	2	39	37
Computer Specialist	2283 (32.2%)	82	351	1503	347
Economist	1526 (21.6%)	24	219	802	481
Sociologist, Psychologist, Anthropologist	204 (2.9%)	5	14	112	73
TOTAL	7079 (100%)	596 (8.4%)	893 (12.6%)	4082 (57.7%)	1508 (21.3%)

Note: The figures given for Total Employees exclude 29 statistical assistants grade 4 or lower and 16 employees in the seven other statistical series who hold grades higher than grade 15. These 45 employees are included in the individual cells of Table 2.

Source: FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for list of participating agency organizations.

Table 2 provides the detailed distribution of total agency employees for all grades by statistical job series within each agency for FY 1996. The number of employees within a given job series at a particular agency is shown directly, while the corresponding percentage (within the agency) is shown in parentheses.

In FY 1996, across the 18 agencies shown in Table 2, computer specialists represented the highest proportion of statistical series employees, with 2,286 employees in this series out of a total of 7,124 "statistical" employees. Computer specialists formed the largest cohort of statistical series employees within the CDC, FRB, IRS, and the Smithsonian.

Of the 612 mathematical statisticians shown in Table 2, 45.4 percent of these employees worked at BoC in FY 1996. However, these 278 mathematical statisticians comprised only 11.4 percent of BoC's statistical series employees. An additional 36.8 percent of the mathematical statisticians were employed by the BLS, CDC, and NASS. Of 1,846 statisticians, 54.1 percent were at BoC; 24.2 percent at NASS; 7.9 percent at NCHS. In addition, statisticians comprised the highest proportion of the statistical series employees within each of seven agencies, specifically BoC, BJS, BTS, INS, NASS, NCES, and NCHS. Note, from Table 2, that there were almost as many statisical assistants (550) as there were mathematical statisticians (612) in FY 1996. The bulk of these assistants (78.7%) were employed by BoC and NASS.

Of the 1,529 economists shown in Table 2, 43.4 percent worked at BLS in FY 1996. An additional 22.3 percent were employed by ERS. Economists formed the largest cohort of statistical series employees within AHCPR, BEA, BLS, and ERS. Economists and the pooled series of sociologists, psychologists, and anthropologists made up an equally high proportion (40.6 percent) of the NSF's statistical series employees. Sociologists, psychologists, and anthropologists (pooled) and operations research employees formed the largest cohort of statistical series employees within SSA and EIA, respectively.

Funds for Training. Although the questionnaire was designed to collect information on the total operating budget (appropriations and reimbursable receipts funding), total training expenditures, and total statistical training expenditures for each of the responding agencies, examination of the data suggested that quality of the reports was questionable and that inclusion of the findings may lead to inappropriate comparisons among agencies. For example, many of the agencies provide "in-house" training which may be paid from funds earmarked for specific programs or divisions, rather than from funds allocated specifically for training. Such funds are not necessarily recorded as training or educational expenditures.

Training Course Opportunities. The primary charge of this FCSM subcommittee was to examine the training and educational courses taken by statistical employees throughout the federal statistical system. This section examines the course-level information provided by fourteen of the agencies and divisions. No statistical courses were taken by staff at three agencies (AHCPR, BTS, and IRS) during FY 1996. A fourth agency, the Smithsonian, did not provide course level information. Note that for this section, the information is limited to courses paid by agency training funds and does not include

educational opportunities that individuals pursued on their own.

Keep several caveats in mind when examining the distributions concerning the number of courses, type of course, and vendor. Note: "Training" is variously defined across the statistical agencies.

Table 2: Number and Distribution (Percentage) of Employees by Statistical Job Series and Statistical Agency: FY 1996

Statistical Job Series	AHCPR	BoC	BEA	BJS	BLS	BTS	CDC	ERS	EIA	FRB	INS	IRS	NASS	NCES	NCHS	NSF	SSA	SMTH
Mathematical Statistician n=612	2 (9.1)	278 (11.4)		1 (3.1)	84 (7.9)		67 (13.6)		33 (14.3)	5 (0.9)		23 (16.5)	73 (9.3)	14 (16.9)	25 (10.0)		6 (7.5)	1 (0.4)
Statistician n=1,846	5 (22.7)	998 (41.1)	4 (1.7)	27 (84.4)	30 (2.8)	2 (40.0)	52 (10.6)	4 (0.9)	37 (16.0)	2 (0.4)	9 (52.9)		446 (56.6)	64 (77.1)	146 (58.6)	5 (15.6)	13 (16.3)	2 (0.8)
Statistical Assistant n=550		269 (11.1)	22 (9.1)	3 (9.4)	8 (0.8)		20 (4.1)	22 (5.2)		2 (0.4)	8 (47.1)	17 (12.2)	164 (20.8)	3 (3.6)	10 (4.0)		2 (2.5)	
Student Assistant n=13		3 (0.1)								5 (0.9)			5 (0.6)					
Operations Research n=82		1 (0.0)			5 (0.5)	1 (20.0)	1 (0.2)	2 (0.5)	72 (31.2)									
Computer Specialist n=2,2826	3 (13.6)	818 (33.7)	46 (19.0)	1 (3.1)	264 (24.8)	1 (20.0)	289 (58.9)	48 (11.3)	36 (15.6)	335 (61.4)		52 (37.4)	100 (12.7)	1 (1.2)	66 (26.5)	1 (3.1)	15 (18.8)	210 (84.7)
Economist n=1,529	10 (45.5)	13 (0.5)	169 (69.8)		663 (62.3)	1 (20.0)	3 (0.6)	341 (80.2)	53 (22.9)	197 (36.1)		47 (33.8)		1 (1.2)	1 (0.4)	13 (40.6)	17 (21.3)	
Sociologist, Psychologist, Anthropologist n=206	2 (9.1)	50 (2.1)	1 (0.4)		10 (0.9)		59 (12.0)	8 (1.9)							1 (0.4)	13 (40.6)	27 (33.8)	35 (14.1)
Total Across Job Series n=7,124	22 (100)	2430 (100)	242 (100)	32 (100)	1064 (100)	5 (100)	491 (100)	425 (100)	231 (100)	546 (100)	17 (100)	139 (100)	788 (100)	83 (100)	249 (100)	32 (100)	80 (100)	248 (100)

Note: Numbers in parentheses represent the percentage share of that agency's total number of statistical employees falling within the identified job series. Empty cells indicate that no employees of that agency fell within that particular job series.

Source: FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for list of participating statistical agency organizations.

Some agencies include attendance at professional conferences as a training cost and therefore recorded courses such as "American Statistical Association" as one of the courses taken by staff. Although these could have been edited from the list of courses, in many cases, they represent legitimate training or educational costs, especially if the attender has participated in short courses offered as part of the conference. These represent less than 5 percent of all of the courses listed.

Agencies differ as to whether training costs processed by means other than SF-182s (Request, Authorization, Agreement and Certification of Training) were included in the list of courses reported by the agency. Most agencies included only those courses for which SF-182 records existed; however, both ERS and FRB reported courses taught by "in-house trainers" for which no fee per participant was assessed. Most agencies, however, did not include courses taught by in-house trainers in the list of courses; for this reason the subcommittee has not included these courses in the description of training opportunities taken by statistical staff. Hence, the total number of courses listed for each agency should be viewed as a lower-bound estimate. To the degree that agencies vary in their offering of in-house training, comparisons of the number of courses taken by staff at the respective agencies should be interpreted cautiously.

Responses for type of course and vendor (shown in Tables 3 and 4) were reviewed and edited by members of the committee. This editing most likely resulted in a reduction in classification differences across agencies, but did not eliminate measurement error for these two dimensions. Classification of the type of course was often based solely on the name of the course; editing across the agencies resulted in consistent classification of courses which appeared to be the same course taken by staff at various agencies. Most agencies maintain information on the name of the organization or individual (and his or her affiliation) paid to deliver a course. After the data was collected the subcommittee realized that several courses classified as "other university" were in fact JPSM courses; the problem arose since the SF-182s indicated payment to the University of Maryland. When it could be determined that the course was clearly a JPSM course (either short course or semester course), due to the uniqueness of the course title, the course was reclassified as a JPSM course. However, for several courses with titles such as "Statistical Methods" it was not possible to determine whether the course was a JPSM course or an offering at another university. Accordingly, the total number classified as JPSM offerings may be understated.

Table 3 shows the distribution of type of statistical courses taken during FY 1996 by agency and type of course. The table indicates the total number of *different* courses taken by staff at the respective agencies as well as the total number of employees enrolled in the courses. The data do not permit one to make a statement concerning which staff took a specific course. As noted earlier, statistical courses were defined as courses in statistics, mathematics, statistical computing, and survey methodology (including both short courses offered by professional groups or universities, and credit-bearing college courses).

Overall, the largest number of statistical courses taken by employees of the fourteen agencies were statistical analysis courses (25.8%), while statistical computing courses were the second most popular type of course (23.0%). It is clear that employees from some agencies (e.g. BoC, BLS, NASS, and

NCHS) take courses across the full spectrum of statistical offerings; employees of other agencies tend to concentrate on specific types of courses (e.g. statistical computing courses for BEA and FRB).

Table 3: Number and Distribution of Statistical Courses by Agency and Type of Course: FY 1996

Agency (Number of Employees Enrolled)	Number of Courses	Statistical Analysis	Sampling	Other Math. and Statistical Courses	Statistical Computing	Other Survey Methods	All Other
BoC (1,008)	52 (15.8%)	11	10	11	9	9	2
BEA (74)	13 (3.9%)	3			10		
BJS (25)	4 (1.2%)	2	1		1		
BLS (180)	65 (19.8%)	10	10	21	12	12	
CDC (666)	42 (12.7%)	13	2	13	12	2	
ERS (19)	12 (3.6%)	4	2	2	2	2	
EIA (34)	20 (6.1%)	2	1	1	1	11	4
FRB (154)	25 (7.6%)	4		6	11	3	1
INS (8)	3 (0.9%	1			2		
NASS (50)	45 (13.6%)	21	3	6	6	5	4
NCES (88)	9 (2.7%)	4		2		3	
NCHS (280)	28 (8.5%)	5	1	4	7	11	
NSF (17)	6 (1.8%)	4				2	
SSA (14)	6 (1.8%)	1	2		3		
TOTAL	330 (100%)	85 (25.8%)	32 (9.7%)	66 (20.0%)	76 (23.0%)	60 (18.2%)	11 (3.3%)

Note: AHCPR, BTS, and IRS are not included (no statistical employees took courses during FY 1996); data for the Smithsonian were not provided. Empty cells indicate no courses of that type take by staff. The table does not include 31 courses reported by ERS and 5 reported by FRB that were provided by in-house trainers.

Source: FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for complete list of participating agency organizations.

Table 4 shows the number and distribution of courses taken by each agency's employees by the type of vendor offering the various statistical courses. Overall, the largest portion (30.6%) of the courses taken by employees of the 14 agencies listed in Table 4 were university-based courses other than those offered by the USDA and JPSM. Almost 24 percent of the courses taken by statistical employees were offered by JPSM. These comprise a mix of short courses and semester-long credit bearing courses. Although not shown in Table 4, the majority (54%) of the statistical courses taken by agency employees in FY 1996 cost less than $500 per participant. About 35 percent of these courses cost $500 to $1,000 per participant and approximately 11 percent exceeded $1,000 per participant.

University courses (other than JPSM) comprised the highest portion (41.5% to 55.6%) of the survey/statistical courses taken by BoC, BJS, BLS, and NASS employees. The majority of the statistical courses taken by employees from EIA, NCES, and NCHS were JPSM offerings; JPSM courses also represent a large proportion of the courses taken by staff from BoC, FRB, and NASS. The largest portion of statistical courses taken by BEA, CDC, FRB, INS, and SSA employees were courses offered by the SAS Institute.

Although not shown in any of the tables, the subcommittee also examined the distribution of type of course by type of course provider. As one would expect, the SAS institute was the primary provider of statistical computing courses. For all other types of courses, the majority were University-based courses, including those offered by JPSM.

Table 5 shows the number and distribution of statistical courses taken by each agency's employees by course length. The number of courses is shown directly with the corresponding percentage in parentheses. Based on the 330 statistical courses listed, 36.1 percent were taken for college credit, 29.1 percent of the courses lasted three or more days, 26.6 percent were two-day courses, and 8.2 percent of the courses lasted for one day or less.

The majority of statistical courses taken by BoC and EIA employees (75.0% and 55.0%, respectively) were taken for college credit. Although not representing a majority, the larger portion (42.2%) of courses taken by NASS employees were also college credit-bearing courses. Courses taken by BEA, BLS, and CDC employees lasting three or more days represented the most frequent course length while the larger portion of courses taken by NCES and NCHS employees were two-day courses.

Table 4: Number and Distribution of Statistical Courses by Agency and Course Vendor: FY 1996

Agency	Number of Courses	Vendor, Consultant	USDA Grad School	JPSM	Other University-Based	SAS Institute	Other
BOC	52 (15.8%)	6		18	24	4	
BEA	13 (3.9%)		1		2	10	
BJS	4 (1.2%)	1			2		1
BLS	65 (19.8%)		2	8	27	10	18
CDC	42 (12.7%)	14		2	6	15	5
ERS	12 (3.6%)	4	1	2	1	2	2
EIA	20 (6.1%)	1	1	11	3		4
FRB	25 (7.6%)	2		7	6	9	1
INS	3 (0.9%)					3	
NASS	45 (13.6%)			10	25	4	6
NCES	9 (2.7%)	3		5	1		
NCHS	28 (8.5%)	5	1	14	3	2	3
NSF	6 (1.8%)	1		2			3
SSA	6 (1.8%)	2			1	3	
TOTAL	330 (100%)	39 (11.8%)	6 (1.8%)	79 (23.9%)	101 (30.6%)	62 (18.8%)	41 (11.6%)

Note: AHCPR, BTS, and IRS are not included (employees took no courses during FY 1996); data for the Smithsonian were not provided. Empty cells indicate no courses of that type taken by staff at the respective agency. The table does not include 31 courses reported by ERS and 5 reported by FRB that were provided by in-house trainers.

Source: FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for list of participating organizations.

Table 5: Number and Distribution of Statistical Courses by Agency and Course Length: FY 1996

Agency	Total Courses	1 Day or Less	2 Days	3+ Days	College Credit
BoC	52 (15.8%)		10	3	39
BEA	13 (3.9%)		3	7	3
BJS	4 (1.2%)	1	1	1	1
BLS	65 (19.8%)	5	15	24	21
CDC	42 (12.7%)	5	13	17	7
ERS	12 (3.6%)	1	3	5	3
EIA	20 (6.1%)	4	1	4	11
FRB	25 (7.6%)		11	8	6
INS	3 (0.9%)			3	
NASS	45 (13.6%)	6	8	12	19
NCES	9 (2.7%)	2	4		3
NCHS	28 (8.5%)	2	15	5	6
NSF	6 (1.8%)		2	4	
SSA	6 (1.8%)	1	2	3	
TOTAL	330 (100%)	27 (8.2%)	88 (26.6%)	96 (29.1%)	119 (36.1%)

Note: AHCPR, BTS, and IRS are not included (employees took no courses during FY 1996); data for the Smithsonian were not provided. Empty cells indicate no courses of that type taken by staff at the respective agency. The table does not include 31 courses reported by ERS and 5 reported by FRB that were provided by in-house trainers.

Source: FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for list of participating organizations.

Statistical Training for Non-employees. Six of the agencies — BoC, BLS, ERS, NASS, NCES, and NCHS — indicated that they provide survey or statistical training to persons outside their agency. This encompasses training for data collectors (non-agency employee interviewers); data providers or collectors (establishment respondents or other government producer); data users (researchers or program sponsors); collaborators (reimbursable survey clients); and other statistical organizations (other government, international agencies, or private organizations).

Three agencies — BoC, NASS, and BLS — provide survey and statistical training for interviewers. The interviewers for BoC are agency employees; those for NASS are contract employees; those for BLS include federal agency, contract, and state employees. The training for interviewers is discussed in Chapter Five. In addition, EIA provides some limited training for interviewers (see Appendix p. A-12).

The NCHS sponsors training for state employees who collect vital statistics data and for state mortality medical coders of administrative data used in NCHS programs and provides training for state employees who collect educational administrative data used in NCES data programs.

Five agencies were identified that provide survey and statistical training for data users — BoC, BLS, ERS, NCES, and NCHS. BLS provides training for data users of the National Longitudinal Survey through a contract with Ohio State University. NCES also provides training for school district staff and state education agency staff (who act as both data providers and data users). Training is also offered to the universities and professional associations where graduate students, researchers, and analysts learn how to use NCES data. These courses cover general statistical aspects of using agency data products, e.g., data analysis, survey operations, and the use of data for decision making. These courses are targeted to researchers and program sponsors. The NASS provides survey and statistical training for its reimbursable survey clients. For these survey data collections, NASS invites clients to participate with state office statisticians in survey training.

Three statistical agencies provide ongoing training for individuals from other countries — BoC, BLS, and NASS. The Census Bureau provides international training seminars of three to eight weeks in duration, both overseas and at its training facilities in Washington, D.C. These seminars are designed to meet the needs of the participants with an overall goal of strengthening the participants' ability to collect and analyze economic, labor, and social data and to use data in the formulation of policy. Examples of courses include sampling and statistical methods, building an integrated data dissemination system, improving organizational effectiveness, and planning for the 2000 round of population and housing censuses. (*Petroni*)

The National Agricultural Statistics Service provides an annual four-week course for agricultural statisticians from other countries. This course provides instruction in basic agricultural statistics and methods. NASS statisticians teach practical uniform principles for all phases of sample surveys and censuses. Participants learn to apply those principles to sampling, planning, management, training, questionnaire design, data collection, processing, and dissemination. Visits to a NASS State Statistical Office and a farm are included.

Each year the Bureau of Labor Statistics conducts several seminars that are designed to collect and analyze economic and labor statistics. Examples of courses are Measuring Wages, Salaries and other Benefits, Constructing Price Indices, Measuring Employment and Unemployment. The seminars include trips to BLS regional offices. The BLS also offers a short program on Training of Trainers as an optional component for these seminars.

3. Discussion

For these eighteen agencies the majority of the statistical workforce — defined for this survey as employees within the ten job classification series noted — consisted of computer specialists (32% of the statistical employees), statisticians (26% of the employees), and economists (22%). Within CDC, FRB, IRS, and the Smithsonian, computer specialists comprise between 34 and 85 percent of the statistical employees, although the largest number of computer specialists were employed by the BoC.

Statisticians (GS-1530) account for 26 percent of the statistical workforce across all agencies; within several agencies (BoC, BJS, BTS, INS, NASS, NCES, and NCHS) statisticians are the most prevalent statistical employee. As noted above, economists account for 22 percent of the statistical workforce within these eighteen agencies, the majority of whom are employed by BLS or ERS. More than half of the statistical staff at BEA, BLS and ERS are economists.

Mathematical statisticians (GS-1529) comprise a small percentage (less than 9%) of the statistical workforce among the eighteen responding agencies. Across agencies, that percentage varied from a low of less than 1 percent (Smithsonian and FRB) to over 15 percent (NCES and IRS). In most statistical agencies, mathematical statisticians make up between 7 and 15 percent of the statistical workforce. Of the 612 mathematical statisticians employed by the eighteen responding agencies, the majority are employed by four agencies — BoC, BLS, CDC, and NASS.

The number, type, and length of courses taken by statistical employees varied greatly from agency to agency. Looking at the distribution of courses taken by employees across all of the agencies included in the study, one sees that the majority of courses were statistical analysis courses (26% of all classes), followed by statistical computing classes (23%), other statistical courses (20%), other survey courses (18%), sampling courses (10%) and other courses (3%). Four agencies, BLS, BoC, CDC, and NASS, account for over half of all of the courses taken by statistical employees. Three agencies, AHCPR, BTS, and IRS, indicated that no statistical training was paid for with agency funds in FY 1996.

As noted earlier, the discussion of courses taken by statisticians within the federal statistical system does not include those courses offered by in-house trainers. Most agencies included only those courses for which SF-182 records existed; therefore, the subcommittee focused its attention on courses paid for by agency funds. Hence, the training opportunities discussed in this chapter should be viewed as a low estimate of training opportunities for statisticians.

In FY 1996, almost a third of statistical courses taken by relevant employees were university-based courses, other than those offered by the USDA and JPSM. The second-ranking vendor was the JPSM,

offering both credit-bearing and two-day short courses. More than a third of the courses in statistical analysis, sampling, and survey methods were taken for college credit (even though a considerable number were two-day JPSM short courses). Statistical computing courses were somewhat evenly distributed among the offerors of courses of one-, two-, and three-day duration. The majority of these classes were offered by the SAS Institute.

Obtaining cost data proved to be particularly problematic. There was no common interpretation of the operating budget. The agencies measured survey and training costs differently, particularly in relation to inclusion or exclusion of conference related training. Also agencies provided a number of training courses for which total costs or costs per participant were not easily accessible to the respondent of the FCSM survey.

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