

## **Characteristics of Workers in the Healthcare Industry for Puerto Rico in 2005<sup>1</sup>**

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Ana J Montalvo, MS  
Housing and Household Economics Statistics Division  
Industry and Occupation Statistics Branch  
US Census Bureau  
4700 Silver Hill Road  
Suitland, MD 20746  
e-mail: [ana.j.montalvo@census.gov](mailto:ana.j.montalvo@census.gov)

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<sup>1</sup> This paper reports the results of research and analysis undertaken by Census Bureau staff. It has undergone a Census Bureau review more limited in scope than that given to official Census Bureau publications. This paper is released to inform interested parties of ongoing research and to encourage discussion of work in progress. The views expressed on statistical and methodological issues are those of the author and not necessarily those of the Census Bureau.

## **INTRODUCTION**

This paper provides a profile of the socio-demographic, economic and geographic mobility characteristics of the civilian employed population 16 years and over working in the healthcare industry in Puerto Rico for the year 2005. It uses new household survey data provided by the U.S. Census Bureau through the Puerto Rico Community Survey (PRCS). This description is intended to demonstrate the potential use of data collected by the Census Bureau through the American Community Survey (ACS) and the PRCS. Data acquired from these estimates may be of use to researchers in the development of public and private health-related programs and health policies, and the allocation of federal, state, and local funds in Puerto Rico.

In the healthcare industry, there is a demand for certain occupations and specialized jobs that are based on the needs of the population. In the 2000 World Health Report, the World Health Organization (WHO) highlights that the most important facet of the health system's inputs is human resources. The performance of healthcare systems depends on the knowledge, skills and motivation of this resource (World Health Organization, 2000). A higher demand for workers in the healthcare industry has been observed due to advances in medical technology that improve the survival rate of severely ill and injured patients who need extensive therapy (2000 Standard Occupational Classification Manual, 2000). WHO also establishes that there is a need for an expansion in preventative and chronic management, generating a need for a modification of the current workforce (World Health Organization, 2000).

Data on occupation describe the kind of work the person does on his or her job. In their report on occupations for the 2000 Decennial Census, Peter Fronczek and Patricia Johnson (2003) state, "a person's occupation has often been a defining characteristic, so much so that many of today's surnames reflect the occupation of a long ago relative." Information on occupations is used by a number of federal, state, and local agencies to distribute funds, develop policy, and measure compliance with laws and regulations (Fronczek and Johnson, 2003). These data can be useful for healthcare industry strategic planning decisions.

## **LITERATURE REVIEW**

Historically, men and women working in the healthcare industry held very different jobs. Grant, Robinson and Muir (2004) report that in New Zealand, 30 years ago, a clear dichotomy existed between the healthcare occupations of men and women, and that there was a developing trend towards equal numbers of men and women in occupations that were formerly male or female dominated.

In her research on women in the health professions in Puerto Rico in 1990, Luz E. León López (1998) observed that women are more highly concentrated than men in occupations relating to treatment and surveillance, and technicians and technologists. More detailed data showed that the highest proportion of women was observed in both 1980 and 1990 as speech therapists, registered nurses and practical nurses. Men made up

higher proportions of workers in diagnosing and managerial occupations. León López also observed that an increase had occurred between the 1980 and 1990 censuses in women's participation in occupations traditionally held by men (León López, 1998).

In the healthcare industry, educational attainment differs by occupation. In its *Career Guide to Industries*, the Bureau of Labor Statistics (BLS), states that professional occupations, such as physicians and surgeons, dentists, registered nurses, social workers, and physical therapists, usually require at least a bachelor's degree in a specialized field or higher education in a specific health field. It also states that other health professionals and technicians occupations, such as medical records and health information technicians and dental hygienists usually require specific formal training beyond high school, but less than 4 years of college. Little or no education is required for service occupations such as nursing aides, home health aides, building cleaning workers, dental assistants, medical assistants, and personal and home care aides.<sup>2</sup>

New amendments to certain laws have been implemented in Puerto Rico to increase median earnings for some occupations. In October 2006, a new law passed by the Puerto Rico legislature (*Reglamento para la implantación del salario mínimo para los profesionales de la enfermería en el servicio público*) approved an increase in salaries and wages by educational attainment for nurses of all levels. It is expected that the reported median earnings for this occupational group will increase in future surveys due to this law.<sup>3</sup>

States like Wisconsin are experiencing a demographic trend where more workers are retiring than entering health occupations (Potter and Peters, 2001). In *Making Sense of the System: How States Can Use Health Workforce Policies to Increase Access and Improve Quality of Care*, Edward Salsberg explains that the supply and demand of healthcare workers is affected by the aging of this workforce, the aging of the baby boom generation, and a decrease in new entrants into the health workforce. Using BLS data, the author reports that the median age in several health professions increased by five years or more between 1989 and 1999, compared with a national increase across all occupations of three years (Salsberg, 2002). The BLS' *Career Guide to Industries* also mentions that the median age of registered nurses is increasing, and not enough younger workers are replacing them. As a result, employers are reporting difficulties in attracting and retaining nurses, creating imbalances between the supply of and the demand for qualified workers.

BLS states that in the United States, workers in the health care industry are frequently on part-time schedules. Part-time workers made up about 20 percent of the workforce as a whole in 2004, but accounted for 39 percent of workers in offices of dentists and 33 percent of those in offices of other health practitioners. Students, parents with young children, dual jobholders, and older workers make up much of the part-time workforce. Shift work is common in occupations such as registered nurses, and some hold more than

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<sup>2</sup> For more detailed information see: <http://www.bls.gov/oco/cg/pdf/cgs035.pdf>.

<sup>3</sup> For more detailed information see: <http://www.salud.gov.pr/Articles/detail.asp?iArt=736&iType=23>

one job (Bureau of Labor Statistics, 2005.) In places such as England and Wales, it has been observed that women in the healthcare industry were more likely to work part-time hours. Part-time working was also higher among nurses and midwives than among physicians and dentists (Yar, Dix and Bajekal, 2006).

León López (1998) observed that women in the Puerto Rico healthcare industry were mostly employed in government jobs in 1990, and men were more frequently self-employed workers. She expects that structural changes will affect the distribution of class of worker in the healthcare industry. Under the Puerto Rico Healthcare Reform of the previous decade, the regionalized healthcare model was modified to a model based on privatization of public establishments. Puerto Rico was divided into regions so that the state government could manage funds that financed a health insurance program by way of the private sector. Therefore, differences from previous Censuses in the class of worker variable are expected. A higher proportion of workers at hospitals who had previously classified themselves as government workers are expected to classify themselves as private wage and salary workers. At the end of the year 2000, all municipios adopted the healthcare reform. At present, there are fewer government owned hospitals and health centers in Puerto Rico. In 2000, there were 71 hospitals. Of the 71 hospitals, 13 were public, 45 private, and 13 were privatized general hospitals (PAHO, 2000).

## **DATA**

In Census 2000, the population of Puerto Rico was counted, and additional information was collected to describe the characteristics of Puerto Rico's population and housing via the "long form" version of the Decennial Census. As part of the 2010 Census redesign, the ACS and PRCS have been implemented to collect long form type information about the population and housing characteristics throughout the decade on a yearly basis. These surveys use a series of monthly samples to produce annually updated data for the same small areas (census tracts and block groups) as the Decennial Census long-form sample formerly surveyed.<sup>4</sup>

The ACS and PRCS collect detailed information on household living arrangements, marital status, education, disability, employment activities, income, and housing characteristics. The resulting data provide a wealth of information with which to study many facets of society and human behavior. Resulting research benefits individuals and society as a whole, through the development of private and public endeavors to meet the needs and activities of the nation's people.

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<sup>4</sup> Since not all people included in the ACS and PRCS were interviewed at the same time, the reference period for the ACS and PRCS is neither fixed nor uniform, and it accounts for the 12 months before the date of the interview. Also, the Census long form was given to one in every six households, whereas the ACS and PRCS an individual household address has a chance of selection only once in a five-year period. For more detailed information on the ACS and ACS Design and Methodology technical paper issued in May 2006 by the ACS Office, see the following website: [www.census.gov/acs/www/Downloads/tp67.pdf](http://www.census.gov/acs/www/Downloads/tp67.pdf), and [http://www.census.gov/acs/www/SBasics/congress\\_toolkit/QandA.pdf](http://www.census.gov/acs/www/SBasics/congress_toolkit/QandA.pdf).

Data were gathered by employing three modes of data collection: Mailout/Mailback questionnaires, Computer Assisted Telephone Interview (CATI) and Computer Assisted Personal Interview (CAPI). During the first month, addresses determined to be mailable are sent a questionnaire via the U.S. Postal Service. In the second month, all mail non-responding addresses with an available phone number are sent to CATI. In the third month, a sample of mail non-responses without a phone number, CATI non-responses, and unmailable addresses are selected and sent to CAPI.<sup>5</sup>

For the ACS and the PRCS, edit and allocation procedures are applied when answers are either absent or inconsistent on the questionnaire. These procedures correct the inconsistencies in reported information or impute responses to missing items.<sup>6</sup> Around 3.8 percent of the data on industry and 4.0 percent on occupation were allocated in the 2005 PRCS.<sup>7</sup>

Data for Puerto Rico were first collected in 2005, the first year of full implementation of the ACS and PRCS. The surveys have been designed to provide demographic, social, economic, and housing characteristics on a yearly basis for areas of 65,000 people or more. Annually, the ACS housing unit (HU) sample includes approximately three million addresses throughout the United States and about 36 thousand addresses in Puerto Rico. In the 2005 PRCS, 21,813 interviews were conducted. The response rate, calculated as the initially weighted estimate of interviews divided by the initially weighted estimate of cases eligible to be interviewed in Puerto Rico, was 98.2 percent.<sup>8</sup>

Based on the PRCS data, the Census Bureau can provide data about the island more often than once a decade. The Census Bureau will produce, beginning in 2010, five-year data products for all geographies. The Census Bureau will also produce three-year and single-year data products for larger geographic areas. Like the Decennial Census, beginning in 2006, ACS and PRCS will include people living in both HUs and Group Quarters (GQ) facilities.<sup>9</sup>

In the 2005 PRCS, three questions relating to industry were asked of the population 16 years and over who had worked in the last five years: *“For whom did this person*

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<sup>5</sup> For detailed information on modes of collection, see <http://www.census.gov/acs/www/Downloads/ACS/accuracy2005.pdf>.

<sup>6</sup> All survey data contain two types of errors: sampling errors and nonsampling errors. Sampling error occurs because data in the ACS and PRCS products were estimates of the actual figures that would have been obtained by interviewing the entire population using the same methodology. Nonsampling errors may be introduced during any of the various complex operations used to collect and process survey data, such as data entry from questionnaires and editing. These errors introduce variability and bias. For a detailed explanation, see the ACS 2005 Accuracy of the Data pdf file website at <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>.

<sup>7</sup> For a detailed explanation on PRCS 2005 allocation rates, refer to the following website: [http://www.census.gov/acs/www/acs-php/quality\\_measures\\_alloc\\_2005.php](http://www.census.gov/acs/www/acs-php/quality_measures_alloc_2005.php)

<sup>8</sup> For detailed information on ACS/PRCS Response Rates, see the following website: [http://www.census.gov/acs/www/UseData/sse/res/res\\_def.htm](http://www.census.gov/acs/www/UseData/sse/res/res_def.htm), and [http://www.census.gov/acs/www/acs-php/quality\\_measures\\_response\\_2005.php](http://www.census.gov/acs/www/acs-php/quality_measures_response_2005.php).

<sup>9</sup> For detailed information on ACS/PRCS Quality Measures, see the following website: [http://www.census.gov/acs/www/acs-php/quality\\_measures\\_sample\\_2005.php](http://www.census.gov/acs/www/acs-php/quality_measures_sample_2005.php).

*work?,” “What kind of business or industry was this?,” and “Is this manufacturing, wholesale trade, retail trade, other (agriculture, construction, service, government, etc.)?”* Two questions relating to occupation were asked of this same universe: *“What kind of work was this person doing?”* and *“What were this person’s most important activities or duties?”*<sup>10</sup> (See Appendix A for facsimiles of the PRCS questionnaire.)

## **THE REGISTRY AND THE PRCS**

Prior to the development of the PRCS, the main source of information about the Puerto Rico healthcare industry was administrative records data. This type of data is “microdata records contained in files collected and maintained by administrative or program agencies and commercial entities.” Government and commercial entities maintain these files for the purpose of administering programs and providing services. Administrative records are distinct from systems of information collected exclusively for statistical purposes, such data from censuses and surveys (Census Bureau, 2001).

Since 1978, the Puerto Rico Department of Health has produced the Puerto Rico Health-Related Professionals Registry (Registry) to profile the general characteristics of the healthcare workforce. This administrative record collects three years of data to facilitate information analysis of the role of these professionals in the rendering of health services. Information is gathered by using all licenses expedited in Puerto Rico in the time frame analyzed in each Registry. The most recent Registry, the Eighth edition, was published in 2005 with data from 1998 to 2001. It included 64,890 professionals in 43 categories. The Registry allows researchers to measure increases and decreases in employment market demands and the introduction of new health related professions.<sup>11</sup>

The PRCS data presented here show estimates of the characteristics of all workers in Puerto Rico, those in the healthcare industry in Puerto Rico, and those in several occupational groups within the healthcare industry in Puerto Rico. It allows the user to examine in great detail the current state of the healthcare industry, and in future years, to examine trends within the healthcare industry.

The objective of this paper is not to prove one source of data about the healthcare industry is superior to the other. It is to demonstrate a new source of information, the PRCS. As such, it is important to note that both administrative and survey data have strengths and weaknesses (Taeber, 2002). Different statistics are used for different research objectives. Taeber (2002) states that data users need to understand where the data are from, how they are produced, what they measure, and their advantages and disadvantages for different purposes.

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<sup>10</sup> For more information on the ACS and PRCS questionnaire see the following website:  
<http://www.census.gov/acs/www/SBasics/SQuest/SQuest1.htm>

<sup>11</sup> The Registry is mandated by Act 11, Article 9, Integral Health Services Reform Law. Information was gathered by using all licenses expedited in Puerto Rico in the time frame analyzed in each Registry. For more detailed information about the Commonwealth of Puerto Rico Department of Health’s Health-Related Professionals in Puerto Rico Registry (2005), see the following website:  
<http://www.salud.gov.pr/Pdfs/Anuncios/Profesionales2001.pdf>

## **CLASSIFICATION SYSTEMS**

This paper focuses on the healthcare industry sector. The 2002 North American Classification System defined the sectors as establishments providing healthcare for individuals, ranging from those establishments providing medical care exclusively, to those providing healthcare related services.<sup>12</sup> Trained professionals with the necessary expertise deliver the services provided by establishments in this sector. In Puerto Rico, as in the United States, laws that regulate the practice of certain occupations in the healthcare industry exist, although they differ in some ways.<sup>13</sup> Many of the industries in the sector are defined based on the educational degree held by workers.

The PRCS industry and occupation statistics are compiled from data that are coded based on the detailed classification systems developed for Census 2000 and modified in 2002. For industry coding, the Census codes are based on the 2002 North American Classification System (NAICS), which includes 20 sectors. For occupation coding, the Census codes are based on the 2000 Standard Occupational Classification Manual (SOC), which includes 23 major groups and 821 detailed occupations.<sup>14</sup> This source is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All industries and occupations classified are placed in mutually exclusive categories. The Census Bureau classifies industries in 270 categories and occupations in 509 categories for employed people, including military (Table 1 presents the industry below for relevant Healthcare industry sectors).

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<sup>12</sup> For more detailed information on general NAICS coding, see the following website: <http://www.census.gov/epcd/www/naics.html>. This classification system was developed in cooperation with the US Economic Classification Policy Committee, Statistics Canada, and México's Instituto Nacional de Estadística, Geografía e Informática.

<sup>13</sup> For example, in Puerto Rico, nurse practitioners and physician's assistants are non-existent because there are no laws that allow a person to practice these occupations that exist in the United States healthcare system. Also, to practice acupuncture in Puerto Rico, one needs to be a licensed physician or surgeon. In most of the United States, people who practice acupuncture do not need to be physicians or surgeons or have supervised clinical experience. In Puerto Rico and in most states, classroom instructional hours in acupuncture related subjects are required. For more detailed information, see [www.lexjuris.com](http://www.lexjuris.com) (Ley para crear el Tribunal Examinador de Médicos y otras); Ley núm. 22 del 22 de abril de 1931, según enmendada), and [http://www.nccaom.org/pdffdocuments/Handbooks/NCCAOM\\_HB\\_APP\\_111706.pdf](http://www.nccaom.org/pdffdocuments/Handbooks/NCCAOM_HB_APP_111706.pdf) (pgs. 9 and 10). For a list of links to state legislation and regulations see: <http://www.acupuncture.com/statelaws/statelaw.htm#5>.

<sup>14</sup> For more detailed information on the 2000 SOC Manual see: <http://www.bls.gov/soc/>.

**Table 1. 2002 Census and 2002 NAICS<sup>15</sup> Industry Codes that Constitute the Healthcare Industry<sup>16</sup> in ACS and PRCS for 2005**

Code Title	2002 Census Industry Codes	2002 NAICS Code
Healthcare Industry	7970-8290	62
Offices of physicians	7970	6211
Offices of dentists	7980	6212
Offices of chiropractors	7990	62131
Offices of optometrists	8070	62132
Offices of other health practitioners	8080	6213 exc. 62131, 62132
Outpatient care centers	8090	6214
Home healthcare services	8170	6216
Other healthcare services	8180	6215, 6219
Hospitals	8190	622
Nursing care facilities	8270	6231
Residential care facilities, without nursing	8290	6232, 6233, 6239

Source: US Census Bureau, ACS and PRCS PUMS Occupation Code List, 2005. For more detailed information see: <http://www.census.gov/acs/www/Products/PUMS/C2SS/CodeList/2005/Industry.htm>.

<sup>15</sup>United States Census Bureau, North American Industry Classification System-Revisions for 2002 homepage, <http://www.census.gov/epcd/naics02/>.

<sup>16</sup> For more detailed information on the healthcare industry sector, see the following website: <http://www.bls.gov/oco/cg/cgs035.htm>

## **METHOD OF ANALYSIS**

This section describes the methods used to create summary tabulations of workers in the healthcare industry in Puerto Rico in 2005. This universe is a subset of all civilian employed workers in Puerto Rico. These workers are currently employed people age 16 years and over, who are not serving as active-duty military personnel. Overall, 1.2 million Puerto Ricans were civilian employed workers, with 89 thousand employed in the healthcare industry.

The analysis compares selected characteristics of all workers in Puerto Rico to those in the healthcare industry. These characteristics include employment status, sex, age, educational attainment, median earnings, class of worker, place of work, and occupation. Statistical testing was performed on comparative statements to determine if the reported differences were meaningful.<sup>17</sup>

Educational attainment is presented only for workers age 25 years and over, as most people have completed their education by that age.

For all categories in the healthcare industry, median earnings are presented in 2005 inflation-adjusted dollars and calculated using a linear interpolation method.

Place of work (inside or outside the municipio of residence) is measured for only those people employed and at work in the week preceding the survey.

Occupations were grouped into six broad categories classified by direct health-related occupations and those that support the healthcare industry.<sup>18</sup> These are:

1. Physicians and surgeons.
2. Registered nurses.
3. Other healthcare practitioners and technical occupations, which include other healthcare practitioners, such as chiropractors, dentists, and veterinarians, therapists and psychologists, social workers, counselors and miscellaneous community and social service specialists. It also includes technical occupations such as, health technologists and technicians.
4. Other health-related support occupations, which include nursing, psychiatric, and home health aides, and other healthcare support occupations, and personal and care service occupations.

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<sup>17</sup> For more information on how to perform statistical testing on ACS data, see the following website: [http://www.census.gov/acs/www/Products/users\\_guide/ACS\\_2005\\_Statistical\\_Testing.doc](http://www.census.gov/acs/www/Products/users_guide/ACS_2005_Statistical_Testing.doc). The estimates in this report are based on responses from a sample of the population. As with all surveys, estimates may vary from the actual values because of sampling variation or other factors. All comparative statements have undergone statistical testing and are significant at the 90-percent confidence level unless otherwise noted. The margin of error for the percent estimates can be found in Tables 2 and 3. When added to and subtracted from the estimate, the margin of error represents the 90-percent confidence interval.

<sup>18</sup> For a detailed list of occupations included in each occupational group, see Appendices B and C.

5. Management, professional and related occupations, and sales and office occupations, which includes medical and health services managers, secretaries and administrative assistants.
6. Other support occupations which include, service occupations, such as security guards and cooks, and construction, extraction, maintenance, and repair occupations, and production, transportation, and material moving occupations.

## **RESULTS**

Tables 2 and 3 present the characteristics of workers in Puerto Rico for all workers and those in the healthcare industry. Within the healthcare industry, workers are disaggregated by occupation (Table 3). A summary of findings is presented by worker characteristic.

### **Unemployment**

As seen in Table 2, the percentage of people unemployed of civilian labor force 16 years and over in Puerto Rico was 15 percent. In comparison, the percentage of people unemployed in the healthcare industry was lower at 6 percent. Within the healthcare industry, the percentage of people unemployed ranged from 1 percent for physicians and surgeons to 14 percent for other health-related support occupations. The latter percentage of people unemployed was significantly higher than all the other occupational categories in the healthcare industry.

### **Sex**

Women were a minority of the workers in Puerto Rico, while workers in the healthcare industry were predominantly female (72 opposed to 28 percent). There is, however, a variation in the proportion of women within occupations across the healthcare industry. Table 3 indicates that physicians and surgeons and other support occupations had relatively fewer women than in the healthcare industry as a whole (30 percent and 38 percent respectively). Registered nurses and other-health related occupations, such as nursing aides, have the highest percentages of female workers (86 percent and 87 percent respectively).

### **Age**

There were few differences in the age structure for both the total and healthcare industry workforces. There were more younger workers in the total population than in the healthcare industry population. In the healthcare industry there was variability in age across occupations. One of the occupational groups with the largest proportion in the 65 over age group was physicians and surgeons (10 percent). Management, professional, and related occupations, and sales and office occupations (12 percent), other healthcare practitioners and technical occupations (11 percent), and other related-support occupations (8 percent) had the largest proportion of young workers age 16 to 24. These and other category statistics are in Table 3.

### **Educational Attainment**

Overall, the healthcare industry had more highly educated workers than the population of all workers in Puerto Rico. In Puerto Rico, there is variation in educational attainment between the total workers and those in the healthcare industry, and across occupations in the healthcare industry. Table 2 shows that the most common educational attainment

level of workers age 25 years and over was an associate's or bachelor's degree (47 percent) in healthcare occupations. The majority of total workers age 25 years and over in Puerto Rico had some college or less (54 percent). In the healthcare industry as a whole, 35 percent of workers had an educational attainment of some college or less, with other support occupations having the largest proportion (89 percent).

About 18 percent of workers in the healthcare industry had a graduate or professional degree (Table 3). All physicians and surgeons had a graduate or professional degree, as law requires it. Ninety-six percent of registered nurses had an associate's or bachelor's degree. In comparison, around 11 percent of workers in other support occupations had an associate's or bachelor's degree.

### **Median Earnings**

Total median earnings in the healthcare industry were higher than those in the total civilian employed population 16 years and over. In the healthcare industry total median earnings were reported to be \$16,577, while the amount was \$15,496 for total workers. For all workers in Puerto Rico, there was no difference between men's median earnings and women's median earnings. Men earned more than women in the healthcare industry. Women's earnings in the healthcare industry were not different from those of all women workers. Table 3 shows that earnings varied across occupations in the healthcare industry. Median earnings for physicians and surgeons (\$63,580) were higher than for all other occupations in the healthcare industry. Registered nurses (\$20,687) and other healthcare practitioners and technical occupations (\$20,679) earned the next highest median earnings in this industry.

### **Class of worker**

The class of worker characteristic did not differ for all workers in Puerto Rico compared to healthcare industry workers. Within the healthcare industry, however, a variation was noted in the self-employed in own not incorporated business workers and unpaid family workers classification. A greater number of physicians and surgeons indicated this response (36.2 percent) compared to other occupations in the healthcare industry (Table 3).

### **Full-time, year-round workers**

Overall, in both populations, many workers work full time, year-round. Table 2 indicates that more men than women (77 percent compared with 72 percent,) were employed full time, year-round in the healthcare industry. Female workers in other support occupations had one of the lowest proportions of full-time, year-round workers (45 percent). The lowest total percentages of full-time, year-round workers were observed in other health-related support occupations (61 percent), physicians and surgeons (62 percent), and other support occupations (68 percent).

**Place of work**

Among all workers in Puerto Rico, there was no difference between those working in the municipio of residence compared to those working outside their municipio of residence in the total worker population. In the healthcare industry, most workers work outside their municipio of residence (56 percent) than not (44 percent). The percentage of registered nurses who do not work in their municipio of residence (70 percent) is higher than in all other occupational groups in the healthcare industry.

## **CONCLUSION**

This paper provided an updated profile of workers in the healthcare industry in Puerto Rico for 2005. Using PRCS estimates, differences were observed between total workers and those in the healthcare industry, and by occupational categories for each worker characteristic in the healthcare industry. There were more women than men in the healthcare industry, while men's median earnings were higher. Educational attainment varied by occupation depending on knowledge and skills needed. The profile showed that physicians and surgeons had the highest educational attainment and the highest median earnings. Most healthcare workers were employed as private wage and salary workers, while fewer women than men worked full-time year-round jobs. The majority of registered nurses worked out of the municipio of residence. In the future, trends could be measured using this data source. This analysis provides a baseline against which future trends can be measured using the PRCS.

This new research opens a discussion about the relationship between social, demographic, economic and geographic variables available in the ACS and PRCS, which will produce timely, detailed local area estimates. The surveys will replace the Census 2010 long form, consequently offering detailed data on an annual basis. By the year 2010, the first five-year products will be released based on data collected in 2005-2009, and will be produced for areas as small as census tracts and block groups. In the Commonwealth of Puerto Rico, the PRCS provides additional insight to the existing Department of Health Health-Related Professions Registry to assist in identifying important trends for certain occupations. This combination of data sources launches a great potential for studying the dynamics of industry and occupation in Puerto Rico. It could greatly aid as a foundation in the formulation of public policy among legislators and politicians, those in the academic and research field, providers, and consumers and patients themselves.

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## Appendix A

### 2005 PRCS Class of Worker, Industry and Occupation Items (English version)

**K** Answer questions 35–40 ONLY IF this person worked in the past 5 years. Otherwise, SKIP to question 41.

**35–40 CURRENT OR MOST RECENT JOB ACTIVITY.**  
Describe clearly this person's chief job activity or business last week. If this person had more than one job, describe the one at which this person worked the most hours. If this person had no job or business last week, give information for his/her last job or business.

**35** Was this person –

Mark (X) ONE box.

- an employee of a PRIVATE FOR PROFIT company or business, or of an individual, for wages, salary, or commissions?
- an employee of a PRIVATE NOT FOR PROFIT, tax-exempt, or charitable organization?
- a local GOVERNMENT employee (city, county, municipio, etc.)?
- a state GOVERNMENT employee?
- a Federal GOVERNMENT employee?
- SELF-EMPLOYED in own NOT INCORPORATED business, professional practice, or farm?
- SELF-EMPLOYED in own INCORPORATED business, professional practice, or farm?
- working WITHOUT PAY in family business or farm?

**36** For whom did this person work?

If now on active duty in the Armed Forces, mark (X) this box →  and print the branch of the Armed Forces.

Name of company, business, or other employer

**37** What kind of business or industry was this?

Describe the activity at the location where employed. (For example: hospital, newspaper publishing, mail order house, auto engine manufacturing, bank)

**38** Is this mainly – Mark (X) one box.

- manufacturing?
- wholesale trade?
- retail trade?
- other (agriculture, construction, service, government, etc.)?

**39** What kind of work was this person doing? (For

example: registered nurse, personnel manager, supervisor of order department, secretary, accountant)

**40** What were this person's most important

activities or duties? (For example: patient care, directing hiring policies, supervising order clerks, typing and filing, reconciling financial records)

**Appendix A, cont.**  
**2005 PRCS Class of Worker, Industry and Occupation Items (Spanish version)**

**K** Conteste las preguntas 35–40 SÓLO Si esta persona trabajó durante los últimos 5 años. De lo contrario, PASE a la pregunta 41.

**35–40 ACTIVIDAD DE TRABAJO ACTUAL O LA MÁS RECIENTE.** Describa en forma clara la actividad principal de esta persona en su empleo o negocio la semana pasada. Si esta persona tenía más de un empleo, describa el empleo en el cual la persona trabajó más horas. Si esta persona no tenía empleo la semana pasada, dé la información correspondiente a su empleo o negocio más reciente.

**35** ¿Era esta persona – Marque (X) UN cuadrado.

- Empleada de una empresa o un negocio PRIVADO CON FINES DE LUCRO o de un individuo a jornal, por salario o comisiones?
- Empleada de una organización PRIVADA SIN FINES DE LUCRO exenta de impuestos, o de una organización de caridad?
- Empleada del GOBIERNO local (ciudad, condado, municipio, etc.)?
- Empleada del GOBIERNO estatal?
- Empleada del GOBIERNO federal?
- Empleada POR CUENTA PROPIA en su negocio, práctica profesional o finca NO INCORPORADA?
- Empleada POR CUENTA PROPIA en su negocio, práctica profesional o finca INCORPORADA?
- Trabajador SIN PAGA en un negocio o finca de la familia?

**36** ¿Para quién trabajaba esta persona?

Si está ahora en servicio activo en las Fuerzas Armadas, marque (X) este cuadrado →   
 y escriba en letra de molde el nombre de la rama de las Fuerzas Armadas.

Nombre de la compañía, negocio u otro patrono

**37** ¿Qué tipo de negocio o industria era éste(a)?

Describa la actividad en el lugar de empleo, (Por ejemplo: hospital, publicación de periódicos, casa de ventas por catálogo, manufactura de motores de automóviles, banco)

**38** ¿Es éste(a) principalmente de – Marque (X) UN cuadrado.

- Manufactura?
- Comercio al por mayor?
- Comercio al detal?
- Otro (agricultura, construcción, servicio, gobierno, etc.)?

**39** ¿Qué tipo de trabajo hacía esta persona? (Por ejemplo: enfermera graduada, gerente de personal, supervisor del departamento de encargos (órdenes), secretaria, contable)

**40** ¿Cuáles eran las actividades o deberes más importantes de esta persona? (Por ejemplo: cuidar pacientes, dirigir políticas de empleo, supervisar personal del departamento de encargos, escribir a máquina y archivar, reconciliar registros financieros)

<b>Appendix B. 2002 Census and 2000 SOC Occupational Codes that Constitute Healthcare Occupations in the Healthcare Industry by Occupational Groups in the PRCS for 2005</b>		
<b>Code Title</b>	<b>2002 Census Occupation Code</b>	<b>2000 SOC Code</b>
<b>Management, Professional and Related Occupations</b>	<b>3060-3530</b>	<b>11-0000 to 29-0000</b>
<i>Healthcare Practitioner Occupations</i>	<b>3060-3130</b>	29-0000
Physicians and surgeons	3060	29-1060
Registered nurses	3130	29-1111
<i>Other healthcare practitioners and technical occupations, including Therapists, and Psychologists, Social Workers, Counselors and miscellaneous community and social service specialists, and Health technologists and technicians</i>	<i>1820-3530</i>	<i>19-0000 to 29-0000</i>
Psychologists	1820	19-3030
Counselors	2000	21-1010
Social workers	2010	21-1020
Miscellaneous community and social service specialists	2020	21-1090
Occupational therapists	3150	29-1122
Physical therapists	3160	29-1123
Radiation therapists	3200	29-1124
Respiratory therapists	3220	29-1126
Speech-language pathologists	3230	29-1127
Therapists, all other	3240	29-1129
Audiologists	3140	29-1121
Chiropractors	3000	29-1011
Dentists	3010	29-1020
Dietitians and nutritionists	3030	29-1031
Optometrists	3040	29-1041
Other healthcare practitioners and technical occupations	3540	29-9000
Pharmacists	3050	29-1051
Physician assistants	3110	29-1071
Podiatrists	3120	29-1081
Veterinarians	3250	29-1131
Health diagnosing and treating practitioners, all other	3260	29-1199
Clinical laboratory technologists and technicians	3300	29-2010
Dental hygienists	3310	29-2021
Diagnostic related technologists and technicians	3320	29-2030
Emergency medical technicians and paramedics	3400	29-2041
Health diagnosing and treating practitioner support technicians	3410	29-2050
Licensed practical and licensed vocational nurses	3500	29-2061
Medical records and health information technicians	3510	29-2071
Opticians, dispensing	3520	29-2081
Miscellaneous health technologists and technicians	3530	29-9000
<b>Service Occupations</b>	<b>3600-4620</b>	<b>31-0000</b>
<i>Healthcare Support Occupations</i>	<i>3600-4620</i>	<i>31-0000</i>
Nursing, psychiatric, and home health aides	3600	31-1010
Occupational therapist assistants and aides	3610	31-2010
Physical therapist assistants and aides	3620	31-2020
Massage therapists	3630	31-9011
Dental assistants	3640	31-9091

<b>Appendix B. 2002 Census and 2000 SOC Occupational Codes that Constitute Healthcare Occupations in the Healthcare Industry by Occupational Groups in the PRCS for 2005, continuation</b>		
Medical assistants and other healthcare support occupations, except dental assistants	3650	31-909X <sup>19</sup>
<i>Personal Care and Service Occupations</i>	<i>4320-4620</i>	<i>39-0000</i>
First-line supervisors/managers of personal service workers	4320	39-1021
Personal and home care aides	4610	39-9021
Recreation and fitness workers	4620	39-9030

Source: ACS and PRCS 2005 PUMS Occupation Code List. For more detailed information see:  
<http://www.census.gov/acs/www/Products/PUMS/C2SS/CodeList/2005/Occupation.htm>

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<sup>19</sup> When a code has an “X” as part of one of its 6 SOC classification digits, it means that nationwide the category consisted of less than 10,000 coded people, and it was aggregated into a larger occupational category.

<b>Appendix C. 2002 Census and 2000 SOC Occupational Codes that Constitute the Support Occupations that Form Part of the Healthcare Industry in ACS and PRCS for 2005</b>		
<b>Code Title</b>	<b>2002 Census Occupation Code</b>	<b>2000 SOC Code</b>
<b>Management, Professional and Related Occupations, and Sales and Office Occupations</b>	<b>0020-5930</b>	<b>11-0000 to 43-0000</b>
<i>Managers, (including medical and health services managers)</i>	<b>0020-0430</b>	<b>11-0000</b>
General and operations managers	0020	11-1021
Financial managers	0120	11-3031
Human resources managers	0130	11-3040
Food service managers	0310	11-9051
Lodging managers	0340	11-9081
Medical and health services managers	0350	11-9111
Social and community service managers	0420	11-9151
Miscellaneous managers including postmasters and mail superintendents	0430	11-9199
<i>Business and Financial Operations occupations</i>	<b>0530-0830</b>	<b>13-0000</b>
Purchasing agents, except wholesale, retail, and farm products	0530	13-1023
Cost estimators	0600	13-1051
Human resources, training, and labor relations specialists	0620	13-1070
Accountants and auditors	0800	13-2011
Credit analysts	0830	13-2041
<i>Professional and Related Occupations</i>	<b>1010-1240</b>	<b>15-0000</b>
Computer programmers	1010	15-1021
Network and computer systems administrators	1100	15-1071
Miscellaneous mathematical science occupations	1240	15-2090
<i>Life, Physical, and Social Science Occupations</i>	<b>1760</b>	<b>19-0000</b>
Physical scientists, all other	1760	19-2099
<i>Education, Training, and Library Occupations</i>	<b>2340</b>	<b>25-0000</b>
Other teachers and instructors	2340	25-3000
<i>Arts, Design, Entertainment, Sports, and Media Occupations</i>	<b>2600-2820</b>	<b>27-0000</b>
Public relations specialists	2600	27-1010
Artists and related workers	2820	27-3031
<i>Sales and office occupations</i>	<b>4710-5930</b>	<b>41-0000 to 43-0000</b>
<i>Sales and related Occupations</i>	<b>4710</b>	<b>41-0000</b>
First-line supervisors/managers of non-retail sales workers	4710	41-1012
<i>Office and administrative support occupations</i>	<b>5000-5930</b>	<b>43-0000</b>
First-line supervisors/managers of office and administrative support workers	5000	43-1011
Telephone operators	5020	43-2021
Billing and posting clerks and machine operators	5110	43-3021
Bookkeeping, accounting, and auditing clerks	5120	43-3031
Payroll and timekeeping clerks	5140	43-3051
Customer service representatives	5240	43-4051
File Clerks	5260	43-4071
Interviewers, except eligibility and loan	5310	43-4111
Receptionists and information clerks	5400	43-4171
Couriers and messengers	5510	43-5021
Stock clerks and order fillers	5620	43-5081
Secretaries and administrative assistants	5700	43-6010

<b>Appendix C. 2002 Census and 2000 SOC Occupational Codes that Constitute the Support Occupations that Form Part of the Healthcare Industry in ACS and PRCS for 2005</b>		
Data entry keyers	5810	43-9021
Office clerks, general	5860	43-9061
Office and administrative support workers, all other	5930	43-9199
<b>Service Occupations, and Construction and Extraction, Maintenance and Repair Occupations, and Production, Transportation and Material Moving Occupations</b>	<b>3730-9620</b>	<b>33-0000 to 53-0000</b>
<i>Protective service occupations</i>	<b>3730-3920</b>	<b>33-0000</b>
Supervisors, protective service workers, all other	3730	33-1099
Security guards and gaming surveillance officers	3920	33-9030
<i>Food preparation and serving related Occupations</i>	<b>4010-4120</b>	<b>35-0000</b>
First-line supervisors/managers of food preparation and serving workers	4010	35-1012
Cooks	4020	35-2010
Food preparation workers	4030	35-2021
Food servers, nonrestaurant	4120	35-3041
Food preparation and serving related workers, all other	4160	35-9099
<i>Construction and Extraction Occupations</i>	<b>6230-6440</b>	<b>47-0000</b>
Carpenters	6230	47-2031
Construction laborers	6260	47-2061
Electricians	6350	47-2111
Painters, construction and maintenance	6420	47-2141
Pipelayers, plumbers, pipefitters, and steamfitters	6440	47-2150
<i>Installation, Maintenance, and Repair Occupations</i>	<b>6440-7340</b>	<b>49-0000</b>
First-line supervisors/managers of mechanics, installers, and repairers	7000	49-1011
Computer, automated teller, and office machine repairers	7010	49-2011
Electronic home entertainment equipment installers and repairers	7120	49-2097
Automotive service technicians and mechanics	7200	49-3023
Heating, air conditioning, and refrigeration mechanics and installers	7310	49-9021
Maintenance and repair workers, general	7340	49-9042
<i>Production Occupations</i>	<b>8300-8960</b>	<b>51-0000</b>
Laundry and dry-cleaning workers	8300	51-6011
Miscellaneous plant and system operators	8630	51-8090
Medical, dental, and ophthalmic laboratory technicians	8760	51-9080
Other production workers, including semiconductor processors and cooling and freezing equipment operators	8960	51-9199
<i>Transportation and Material Moving Occupations</i>	<b>9000-9620</b>	<b>53-0000</b>
Supervisors, transportation and material moving workers	9000	53-1000
Ambulance drivers and attendants, except emergency medical technicians	9110	53-3011
Driver/sales workers and truck drivers	9130	53-3030
Taxi drivers and chauffeurs	9140	53-3041
Parking lot attendants	9350	53-6021
Laborers and freight, stock, and material movers, hand	9620	53-7062

Source: US Census Bureau, ACS and PRCS 2005 PUMS Occupation Code List. For more detailed information see: <http://www.census.gov/acs/www/Products/PUMS/C2SS/CodeList/2005/Occupation.htm>

## **APPENDIX D**

### **DEFINITION OF VARIABLES<sup>20</sup>**

#### **Industry**

Data on industry were derived from answers to questionnaire items 36 through 38 and relates to the kind of business conducted by a person's employing organization. Written responses to the industry questions are coded using the industry classification system developed for Census 2000 and modified in 2002. This system consists of 270 categories for employed people, including military, classified into 20 sectors. The modified 2002 census industry classification was developed from the 2002 NAICS published by the Executive Office of the President, Office of Management and Budget. The NAICS was developed to increase comparability in industry definitions between the United States, Mexico, and Canada. It provides industry classifications that group establishments into industries based on the activities in which they are primarily engaged. The NAICS was created for establishment designations and provides detail about the smallest operating establishment, while ACS data are collected from households and differ in detail and nature from those obtained from establishment surveys.

#### **Occupation**

Data on occupation were derived from answers to questionnaire items 39 and 40. The questions were asked of all people 15 years old and over, who had worked in the past 5 years, describing the kind of work the person does on the job. Employment status data shown in ACS tabulations relate to people 16 years old and over.

For employed people, data refer to the person's job during the previous week. For those who worked two or more jobs, the data refer to the job where the person worked the greatest number of hours. For unemployed people, the data refer to their last job. Written responses to the occupation questions are coded using the occupational classification system developed for the 2000 census and modified in 2002. This system consists of 509 specific occupational categories, including military, for employed people, arranged into 23 major occupational groups. This classification was developed based on the *Standard Occupational Classification (SOC) Manual: 2000*, published by the Executive Office of the President, Office of Management and Budget. Some occupation groups are related closely to certain industries.

#### **Class of Worker**

The data on class of worker were derived from answers to questionnaire item 35. The information on class of worker refers to the same job as a respondent's industry and

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<sup>20</sup> Definitions of variables used in this research are obtained from the ACS/ ACS, 2005 Subject Definitions. For more detailed information see:  
[http://www.census.gov/acs/www/Downloads/2005/usedata/Subject\\_Definitions.pdf](http://www.census.gov/acs/www/Downloads/2005/usedata/Subject_Definitions.pdf)

occupation and categorizes people according to the type of ownership of the employing organization. Data are derived from data coded in the same manner as in previous censuses.

The class of worker categories is defined as follows:

**Private wage and salary workers** -- Includes people who worked for wages, salary, commission, tips, pay-in-kind, or piece rates for a private for-profit employer or a private not-for-profit, tax-exempt or charitable organization. Self-employed people whose business was incorporated are included with private wage and salary workers because they are paid employees of their own companies. Some ACS tabulations present data separately for these subcategories:

- “Private for-profit wage and salary workers,”
- “Private not-for-profit wage and salary workers”
- “Self-employed in own incorporated business workers”
- “Own not incorporated business workers.”

**Government workers** -- Includes people who were employees of any local, state, or federal governmental unit, regardless of the activity of the particular agency. For ACS tabulations, the data were presented separately for the three levels of government.

**Self-employed in own not incorporated business workers** -- Includes people who worked for profit or fees in their own unincorporated business, profession, or trade, or who operated a farm.

**Unpaid family workers** -- Includes people who worked 15 hours or more a week without pay in a business or on a farm operated by a relative.

### Educational Attainment

Data on educational attainment were derived from answers to questionnaire item 11, which was asked of all respondents and tabulated for people 18 years old and over. Respondents are classified according to the highest degree or the highest level of school completed. If more than one box was filled, the response was edited to the highest level or degree reported. The instructions further specified that schooling completed in foreign or ungraded school systems should be reported as the equivalent level of schooling in the regular American system. The instructions specified that certificates or diplomas for training in specific trades or from vocational, technical or business schools were not to be reported. Honorary degrees awarded for a respondent's accomplishments were not to be reported.

### Labor Force Status

The data on employment status were derived from questionnaire Items 23 and 29 to 31 in the 2005 ACS. The questions were asked of all people 15 years old and over, although

the employment status data shown in ACS tabulations relate to people 16 years old and over.

**Civilian Employed** – This category includes all civilians 16 years old and over who either (1) were “at work” – those who did any work at all during the reference week as paid employees, worked in their own business or profession, worked on their own farm, or worked 15 hours or more as unpaid workers on a family farm or in a family business; or (2) were “with a job but not at work”--those who did not work during the reference week but had jobs or businesses from which they were temporarily absent due to illness, bad weather, industrial dispute, vacation, or other personal reasons. Excluded from the employed are people whose only activity consisted of work around the house or unpaid volunteer work for religious, charitable, and similar organizations; also excluded are all institutionalized people and people on active duty in the United States Armed Forces.

**Unemployed** – All civilians 16 years old and over are classified as unemployed if they (1) were neither “at work” nor “with a job but not at work” during the reference week, and (2) were looking for work during the last 4 weeks, and (3) were available to start a job. Also included as unemployed are civilians who did not work at all during the reference week, were waiting to be called back to a job from which they had been laid off, and were available for work except for temporary illness.

**Civilian Labor Force** – Consists of people classified as employed or unemployed in accordance with the criteria described above.

**Unemployment Rate** – The unemployment rate represents the number of unemployed people as a percentage of the civilian labor force.

Full-Time Year-Round Employment Status: Usual Hours Worked per Week in the Past 12 Months and Usual Weeks Worked per Year Worked

Hours worked per week:

The data on usual hours worked per week worked in the past 12 months were derived from answers to questionnaire item 34. This question was asked of people 16 years old and over who indicated that they worked during the past 12 months. The data pertain to the number of hours a person usually worked during the weeks worked in the past 12 months. The respondent was to report the number of hours worked per week in the majority of the weeks he or she worked in the past 12 months. If the hours worked per week varied considerably during the past 12 months, the respondent was to report an approximate average of the hours worked per week.

People 16 years old and over who reported that they usually worked 35 or more hours each week during the weeks they worked are classified as “Usually worked full time”; people who reported that they usually worked 1 to 34 hours are classified as “Usually worked part time.”

### Weeks Worked in the Past 12 Months:

The data on weeks worked in the past 12 months were derived from responses to questionnaire item 33. It was asked of people 16 years old and over who indicated that they worked during the past 12 months for pay or profit (including paid vacation and paid sick leave) or worked without pay on a family farm or in a family business. Weeks of active service in the Armed Forces are also included.

### Median Earnings

Data on earnings were derived from questions 41 and 42. Earnings are defined as the sum of wage or salary income and net income from self-employment. “Earnings” represent the amount of income received regularly for people 16 years old and over before deductions for personal income taxes, Social Security, bond purchases, union dues, Medicare deductions, etc. An “earner” is one who has either wage/salary income or self-employment income, or both. Respondents who “break even” in self-employment income and therefore have zero self-employment earnings also are considered earners.

The median divides the earnings distribution into two equal parts: one-half of the cases falling below the median and one-half above the median. Median earnings is restricted to individuals 16 years old and over with earnings and is computed on the basis of a standard distribution. Median earnings figures are calculated using linear interpolation if the width of the interval containing the estimate is \$2,500 or less.

### Age

The data on age were derived from answers to questionnaire item 2. The age classification is based on the age of the person in complete years at the time of interview. Both age and date of birth are used in combination to calculate the most accurate age at the time of the interview. Inconsistently reported and missing values are assigned or imputed based on the values of other variables for that person, from other people in the household, or from people in other households (“hot deck” imputation).

### Place of Work

Data on place of work were derived from answers to questionnaire item 24, which were asked of people who indicated in item 23 that they worked at some time during the reference week. Data on place of work refer to the geographic location at which workers carried out their occupational activities during the reference week.

In the PRCS, the question asked for the exact address, including the development or condominium name, as well as the place; whether or not the place of work was inside or outside the limits of that city or town; the municipio or U.S. county. Respondents also were asked to “enter Puerto Rico or name of U.S. state or foreign country” and the ZIP Code. If the respondent's employer operated in more than one location, the exact address of the location or branch where he or she worked was requested. When the number and

street name were unknown, a description of the location, such as the building name or nearest street or intersection, was to be entered. People who worked at more than one location during the reference week were asked to report the location at which they worked the greatest number of hours. People who regularly worked in several locations each day during the reference week were requested to give the address at which they began work each day. For cases in which daily work did not begin at a central place each day, the respondent was asked to provide as much information as possible to describe the area in which he or she worked most during the reference week.