Sex, Race, and Ethnic Diversity of U.S. Health Occupations (2010-2012): Technical Documentation

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Introduction

The Sex, Race, and Ethnic Diversity of the U.S. Health Occupations (2010 – 2012) brief provides sex, race, and Hispanic or Latino ethnic diversity data on 32 health occupations. This document provides details on the data sources and methodology used in the brief.

Data Sources

The Sex, Race, and Ethnic Diversity of the U.S. Health Occupations (2010 – 2012) brief uses data from the 2010-2012 American Community Survey Public Use Microdata Sample (ACS PUMS).

The American Community Survey (ACS) data were downloaded from the U.S. Census Bureau.[1] The 2010-2012 ACS data file is approximately a 3 percent sample of the U.S. working-age population by combining the 1 percent samples from the 2010, 2011, and 2012 ACS. The ACS data are collected throughout each calendar year and represent aggregate characteristics over a 3-year period. There are a total of 9,286,739 records in the entire 3-year (2010-2012) ACS data file.

The 3-year ACS file is used, rather than the most recent single-year ACS file, in order to have sufficient sample sizes. Although the 3-year ACS has over 9 million records, the occupations in the brief encompassed less than 464,000 records. While the health occupation with the greatest number of practitioners—Registered Nurses—has a substantial sample size (n = 86,786), most occupations in this brief have much smaller sample sizes. Sample size is particularly important in the comparison of race and ethnicity across the seven (7) categories discussed below in that some categories are likely to have fewer cases than other categories.

Definitions

The 32 health occupations included in this brief were selected from a larger list of approximately 75 health occupations included in the 2010 U.S. Bureau of Labor Statistics (BLS) reporting of occupational employment projections to 2020.[2] The Standard Occupational Classification (SOC) System was used to select the subset of occupations included in this brief. The inclusion criteria for the occupations were:

a. be associated with the provision of healthcare or public health services;
b. have adequate data (i.e., sample sizes) available in the 2010-2012 3-year ACS data files; and
c. be among the largest 30-35 health occupations.

Of the approximately 75 occupations in the original list, slightly more than half were excluded once these criteria were applied. The remaining 32 occupations include occupational *categories* that encompass several occupations which, alone, may not have been on the list of the largest health occupations (e.g., Diagnostic Related Technologists and Technicians). Although these

[1]U.S. Census Bureau at http://www2.census.gov/acs2010_3yr/pums/. See U.S. Census Bureau. A Compass for Understanding and Using American Community Survey Data: What PUMS Data Users Need to Know. Washington, DC: U.S. Government Printing Office; February 2009 (http://www.census.gov/acs/www/guidance_for_data_users/handbooks/).
[2]Bureau of Labor Statistics, Employment Outlook: 2010-2020. Occupational employment projections to 2020.

categories may have a mixture of different occupations (such as technologists and technicians) which are dissimilar in their duties and training requirements, they are used in the brief to be consistent with the Standard Occupation Classification code (SOC - the official Government occupational reporting system), to use available Government data, and to demonstrate the diversity among a broader set of health occupations. Thus, there are limitations in making characterizations about these occupations because of the inability to separate the data within these health occupation categories.

The majority of the occupations included in this brief are found within the two BLS/SOC categories: (1) *Health Care Practitioners and Technical Occupations* and (2) *Healthcare Support Occupations*. A few occupations were selected from other categories such as *Office and Administrative Support Occupations* (i.e., Medical Secretaries), *Personal Care and Service Occupations,* and *Community and Social Service Occupations* (i.e., Counselors and Social Workers). For Medical Secretaries, ACS data are limited to individuals working in Medical and "Individual and Family Services" settings. The list of the SOC numbers used for each occupation is provided in Section Four of this document.

Within the 3-year period represented in the 2010-2012 ACS, there may have been changes in the race, ethnic or sex distribution of an occupation—for example, a greater number of Asian or Native Hawaiian and Other Pacific Islanders in 2012 than in 2010), but the analysis does not address changes between 2010 and 2012.

The race and ethnicity categories reported are White (non-Hispanic), Black/African-American (non-Hispanic), Asian (non-Hispanic), American Indian and Alaska Native (non-Hispanic), Native Hawaiian and Other Pacific Islander (non-Hispanic), Multiple/Other Race (non-Hispanic), and Hispanic or Latino ethnicity.[3]

For each occupation, the workforce is defined as individuals currently employed in the occupation as well as those individuals whose last job was in the occupation and who are still in the workforce seeking employment (e.g., individuals unemployed because they were laid off). This definition of workforce includes individuals who may have been affected by the recession that began in 2008, thereby reducing any bias related to the economic downturn in the latter part of the decade. The ACS PUMS has a variable that distinguishes between nonworking individuals in the workforce from those no longer in the workforce.

The U.S. Working-Age Population estimates of the race, ethnicity, and sex distributions used to describe the distributions for each occupation for 2010-2012 were derived from the 2010-2012 ACS for the population 16 years of age or older to represent the working age population. Even though the entry age for different occupations varies, for convenience and uniformity, the race and ethnicity and sex distributions of the U.S. working age population as defined in the preceding sentence were used. The population estimates represent the average annual population distributions for the 3-year period, 2010 through 2012—a property consistent with the estimates for each occupation based upon the 2010-2012 ACS.

[3]This category scheme for analysis of race and ethnicity is commonly used to capture Hispanic as an ethnicity apart from race among Non-Hispanics. See, for example, the use of this reporting scheme in U.S. Department of Health and Human Services, Health Resources and Services Administration, Women's Health USA 2010, Rockville, Maryland: U.S. Department of Health and Human Services, 2010; available at http://mchb.hrsa.gov/whusa10/pdfs/w08.pdf.

Standard Error Calculations

Standard Error Calculation for 2010-2012 3-year American Community Survey Sample Data

The 2010-2012 3-year ACS public use file contains 80 replicate weights for direct calculation of standard errors. As stated in documentation for 2010-2012 3-year ACS:[4]

> *The standard error of X can be computed after the replicate estimates X1 through X80 are computed [using each replicate weight]. The standard error is estimated using the sum of squared differences between each replicate estimate Xr and the full sample estimate X.*

The standard error (SE) formula using replicate weights is:

$$SE(X) = \sqrt{\left(\frac{4}{80}\right) \sum_{r=1}^{80} (X_r - X)^2}$$

The balance repeated replication (BRR) method in the SUDAAN statistical software package was used to calculate standard errors using the replicate weights. Using BRR for the formula above, the code for a crosstab procedure in SUDAAN is:[5]

```
proc crosstab data=[name] design = BRR;
weight pwgtp;
repwgt pwgtp1-pwgtp80 / adjfay = 4;
```

where **pwgtp** is the name of the person weight variable in the ACS data file and **pwgtp1-pwtp80** are the names of the respective replicate weight variables. The statement "adjfay=4" adjusts for the "4/80" in the formula.[6]

Using BRR for the formula above, the code for the survey means procedure in SAS is:

```
proc surveymeans data=[name] varmethod=brr nobs sum mean stderr clm cv;
repweights pwgtp1-pwgtp80;
weight pwgtp;
class [variables];
var [variables];
run;
```

[4]U.S. Census Bureau. 2010-2012 PUMS Accuracy of the Data.
http://www.census.gov/acs/www/Downloads/data_documentation/pums/Accuracy/2010_2012AccuracyPUMS.pdf
[5]See U.S. Census Bureau. Estimating ASEC Variances with Replicate Weights. Available at the link "Estimating ASEC Variances with Replicate Weights" on the web page at http://usa.ipums.org/usa/repwt.shtml.

The Health Occupation-SOC Crosswalk

Table 1. Crosswalk of 32 Health Occupations and Standard Occupational Classification Codes

Health Occupations	SOC Code
1. Chiropractors	29-1011 Chiropractors
2. Counselors	21-1011 Substance Abuse and Behavioral Disorder Counselors 21-1013 Marriage and Family Therapists 21-1014 Mental health counselors 21-1015 Rehabilitation counselors
3. Dentists	29-1021 Dentists
4. Dental Assistants	31-9091 Dental Assistants
5. Dental Hygienists	29-2021 Dental Hygienists
6. Diagnostic Related Technologists and Technicians	29-2031 Cardiovascular Technologists and Technicians 29-3032 Diagnostic Medical Sonographers 29-3033 Nuclear Medicine Technologists 29-2034 Radiologic technologists and technicians 29-2035 Magnetic Resonance Imaging Technologists
7. Dietitians and Nutritionists	29-1031 Dietitians and Nutritionists
8. Emergency Medical Technicians and Paramedics	29-2041 Emergency Medical Technicians and Paramedics
9. Health Diagnosing & Treating Practitioner Support Technologists & Technicians	29-2051 Dietetic Technicians 29-2052 Pharmacy Technicians 29-2053 Psychiatric Technicians 29-2054 Respiratory Therapy Technicians 29-2055 Surgical Technologists 29-2056 Veterinary Technologists and Technicians
10. Licensed Practical and Licensed Vocational Nurses	29-2061 Licensed Practical and Licensed Vocational Nurses
11. Massage Therapists	31-9011 Massage Therapists
12. Medical and Clinical Laboratory Technologists and Technicians	29-2011 Medical and Clinical Laboratory Technologists 29-2012 Medical and Clinical Laboratory Technicians
13. Medical and Health Services Managers	11-9111 Medical and Health Services Managers
14. Medical Assistants & Other Healthcare Support Occupations, except Dental Assistants	31-9092 Medical Assistants 31-9093 Medical Equipment Preparers 31-9094 Medical Transcriptionists 31-9095 Pharmacy Aides 31-9096 Veterinary Assistants and Laboratory Animal Caretakers

Health Occupations	**SOC Code**
	31-9097 Phlebotomists 31-9099 All other health care support workers
15. Medical Records and Health Information Technicians	29-2071 Medical Records and Health Information Technicians
16. Medical Secretaries	43-6013 Medical Secretaries
17. Nursing, psychiatric, and home health aides	31-1011 Home Health Aides 31-1012 Nursing Aides, Orderlies, and Attendants 31-1013 Psychiatric Aides
18. Occupational Therapists	29-1122 Occupational Therapists
19. Opticians, dispensing	29-2081 Opticians, dispensing
20. Optometrists	29-1041 Optometrists
21. Personal Care Aides	39-9021 Personal Care Aides
22. Pharmacists	29-1051 Pharmacists
23. Physical Therapist Assistants and Aides	31-2020 Physical Therapist Assistants and Aides
24. Physical Therapists	29-1123 Physical Therapists
25. Physician Assistants	29-1071 Physician Assistants
26. Physicians	29-1060 Physicians
27. Psychologists	19-3031 Clinical, Counseling, and School Psychologists
28. Registered Nurses	29-1141 Registered Nurses
29. Respiratory Therapists	29-1126 Respiratory Therapists
30. Social Workers	21-1022 Medical and Public Health Social Workers 21-1023 Mental Health and Substance Abuse Social Workers
31. Speech-Language Pathologists	29-1127 Speech-Language Pathologists
32. Nurse Anesthetists, Midwives, and Practitioners (Advanced Practice Registered Nurses)	29-1151 Nurse Anesthetists 29-1161 Nurse-Midwives 29-1171 Nurse Practitioners