

Sex, Race, and Ethnic Diversity of U.S. Health Occupations (2011-2015): Technical Documentation

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**U.S. Department of Health and Human Services
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National Center for Health Workforce Analysis**



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Introduction

The Sex, Race, and Ethnic Diversity of the U.S. Health Occupations (2011 – 2015) brief provides sex, race, and Hispanic or Latino ethnic distribution data on 30 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 (2011 – 2015) brief uses data from the 2011-2015 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 2011-2015 ACS data file is approximately a 5 percent sample of the U.S. working-age population by combining the 1 percent samples from the 2011 to 2015 ACS. The ACS data are collected throughout each calendar year and represent aggregate characteristics over a 5-year period. There are a total of 15,637,457 records in the entire 5-year (2011-2015) ACS data file.

The 5-year ACS file is used, rather than the most recent single-year ACS file, in order to have sufficient sample sizes. Although the 5-year ACS has over 15 million records, the occupations in the brief encompassed less than 730,000 records. While the health occupation with the greatest number of practitioners—Registered Nurses—has a substantial sample size ($n = 149,724$), 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 too few cases to have the results tabulated.

Definitions

The 30 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 sample sizes in the 2011-2015 5-year ACS data files to be reliably estimated;

Of the approximately 75 occupations in the original list, the 30 largest occupations were selected. These include occupational *categories* that encompass several occupations which, alone, may not have been on the list of the eligible health occupations (e.g., Diagnostic Related Technologists and Technicians). Although these categories may have a mixture of different

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.

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 *Personal Care and Service Occupations*, and *Community and Social Service Occupations* (i.e., Counselors and Social Workers). The list of the SOC numbers used for each occupation is provided in Section Four of this document.

Within the 5-year period represented in the 2011-2015 ACS, there may have been changes in the race, ethnic or sex distribution of an occupation, but the analysis does not address changes between 2011 and 2015.

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 2011-2015 were derived from the 2011-2015 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 5-year period, 2011 through 2015—a property consistent with the estimates for each occupation based upon the 2011-2015 ACS.

³This category scheme for analysis of race and ethnicity follows OMB's minimum standard for maintaining, collecting and presenting data for all Federal reporting purposes as stated in *Federal Register* Notice October 30, 1997. Available at https://www.whitehouse.gov/omb/fedreg_1997standards accessed June 12, 2017

Standard Error Calculations

Standard Error Calculation for 2011-2015 5-year American Community Survey Sample Data

The 2011-2015 5-year ACS public use file contains 80 replicate weights for direct calculation of standard errors. As stated in the documentation for 2011-2015, 5-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.

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

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

⁴

U.S. Census Bureau. 2011-2015 PUMS Accuracy of the Data. https://usa.ipums.org/usa/resources/codebooks/AccuracyACS_1115.pdf.

⁵See 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 30 Health Occupations and Standard Occupational Classification Codes

<u>Health Occupations</u>	<u>SOC Code</u>
1. Psychologists	19-3031 Clinical, Counseling, and School Psychologists
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. Social Workers	21-1022 Medical and Public Health Social Workers 21-1023 Mental Health and Substance Abuse Social Workers
4. Nurse Anesthetists, Midwives, and Practitioners (Advanced Practice Registered Nurses)	29-1151 Nurse Anesthetists 29-1161 Nurse-Midwives 29-1171 Nurse Practitioners
5. Chiropractors	29-1011 Chiropractors
6. Dentists	29-1021 Dentists
7. Dietitians and Nutritionists	29-1031 Dietitians and Nutritionists
8. Optometrists	29-1041 Optometrists
9. Pharmacists	29-1051 Pharmacists
10. Physicians	29-1060 Physicians
11. Physician Assistants	29-1071 Physician Assistants
12. Occupational Therapists	29-1122 Occupational Therapists
13. Physical Therapists	29-1123 Physical Therapists
14. Respiratory Therapists	29-1126 Respiratory Therapists
15. Speech-Language Pathologists	29-1127 Speech-Language Pathologists
16. Registered Nurses	29-1141 Registered Nurses
17. Dental Hygienists	29-2021 Dental Hygienists
18. 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

Health Occupations	SOC Code
19. Emergency Medical Technicians and Paramedics	29-2041 Emergency Medical Technicians and Paramedics
20. Health 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
21. Licensed Practical and Licensed Vocational Nurses	29-2061 Licensed Practical and Licensed Vocational Nurses
22. Medical and Clinical Laboratory Technologists and Technicians	29-2011 Medical and Clinical Laboratory Technologists 29-2012 Medical and Clinical Laboratory Technicians
23. Medical Records and Health Information Technicians	29-2071 Medical Records and Health Information Technicians
24. Opticians, Dispensing	29-2081 Opticians, Dispensing
25. Dental Assistants	31-9091 Dental Assistants
26. Massage Therapists	31-9011 Massage Therapists
27. Medical Assistants	31-9092 Medical Assistants
28. Nursing, Psychiatric, and Home Health Aides	31-1011 Home Health Aides 31-1012 Nursing Aides, Orderlies, and Attendants 31-1013 Psychiatric Aides
29. Physical Therapist Assistants and Aides	31-2020 Physical Therapist Assistants and Aides
30. Personal Care Aides	39-9021 Personal Care Aides