## Original Article

# Using names as a measure of cultural diversity among radiology residents in the United States

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## Abstract

**Background:** Names can potentially carry pertinent information regarding cultural background and familial socioeconomic and educational status. This study was performed to utilize first names as a measure of cultural diversity, and in addition, describe the frequency and distribution of women and international medical graduates in radiology residency in the United States.

**Methods:** The websites of all 181 ACGME accredited diagnostic radiology residency programs were evaluated to extract the first name, gender, and medical school (US medical graduate or international medical graduate) of residents. These names were compared with the 100 most common names for girls and boys from each decade from 1940 through 2000 from the Social Security website.

**Results:** The websites from 151 programs included information for a total of 4083 residents. Female residents constituted 25.0% of all radiology residents. International medical graduates constituted 11.7%. Overall 37.5% of the residents had uncommon names, including 32.0% of US medical graduates. There was no significant association between having a female program director with a higher number of female residents (p=0.153). In addition, there was no significant correlation between program directors with uncommon names and residents with uncommon names (p=0.691). International medical graduates were more prevalent in the Northeast and Midwest, corresponding to the higher overall percentage of non-common names. However, uncommon names were also higher in the same regions after excluding international medical graduates. Female radiology residents demonstrated higher percentages in the West, Southwest, and East.

**Conclusion**: Names may represent an index of cultural diversity. Further investigation may prove useful.

**Keywords: Cultural Diversity; Internship and Residency; Sex Distribution.**

## Introduction

Names have been shown to represent a measure of culture (1-4), and Ethnic, non-local, or non-common names have repeatedly and consistently been shown to be associated with discrimination (5-13). An individual's name may carry pertinent information regarding cultural background and familial socioeconomic and educational status. The measures of diversity, equity, and inclusion

in education and economics is usually based on self-reported ethnicity, which may subject to bias due to both an absence of a concrete definition and its self-reported nature. With the growing relevance of diversity in the United States (US) in the current cultural climate, names may provide an objective measure of cultural diversity. The premise of our study was to derive relevant patterns and trends in names among radiology residents.

Another variable that can be derived from residency program websites is the gender breakdown of radiology residents. Campbell et al (14) employed publicly available information to describe the gender breakdown of radiology residents from programs affiliated with the 50 highest ranking medical schools (plus Cleveland Clinic) in 2017. Their study reported that a female program director was associated with a higher number of female residents and documented a higher representation of female residents in the Northeast and West. Our current study is an opportunity to further evaluate these findings with regard to the distribution of female residents in radiology with similar methodology, but with a larger sample size including all ACGME (Accreditation Council for Graduate Medical Education) accredited radiology residency programs.

## Methods

All 181 ACGME accredited diagnostic radiology residency programs were evaluated for website content to extract the first names of their residents. Additional variables extracted from the websites included resident gender and medical school (US medical graduate or international medical graduate), and program director first name and gender.

The 100 most common names for girls and boys from each decade were obtained from the Social Security database (15) from 1940 through 2000. These years were chosen to reflect the ages of the residents and program directors. The result after removing

redundancy included a database of 865 names. Microsoft Excel 2003 (Redmond, WA) was used to compare each resident and program director's name with the database of common names. Names that demonstrated a correlate within the database were designated as "common", while those that did not were deemed "non-common".

Statistical analysis was performed using the SPSS 13.0 (Chicago, IL) software package for descriptive calculations and Chi square testing. Choropleth intensity maps were drawn using eSpatial mapping software online (Herndon, VA).

## Results

The websites from 181 programs were surveyed, 151 of which included information about their residents. The first names were available for 4083 residents. Information for gender was available for 3954 residents (96.8%) and information regarding their status as US graduates or international medical graduates was available for 3143 residents (77.0%). A total of 2964 residents were male (75.0%) and 990 were female (25.0%); 2775 were US medical graduates (88.3%) and 368 were international medical graduates (11.7%). Overall, 2553 residents had common names (62.5%) and 1530 had non-common names (37.5%). Among US graduates 68.0% had common names.

There was no significant correlation between having a female program director with a higher number of female residents (p=0.153). In addition, there was no significant correlation between program directors with non-common names and residents with non-common names (p=0.691) amongst US graduates. Including international medical graduates, program directors with non-common names were associated with a higher number of residents with non-common names (p=0.004). Female gender was associated with a higher rate of non-common names (p=0.039), although gender was not

Table 1. The percentage of female, international medical graduates, and non-common names in radiology residencies

|  | N | 2013 | 2014 | 2015 | 2016 | Overall |
|---|---|---|---|---|---|---|
| Female Residents | 3954 | 25.5% | 26.2% | 25.7% | 22.3% | 25.0% |
| International Medical Graduates | 3143 | 8.0% | 9.4% | 15.2% | 14.1% | 11.7% |
| Non-common names | 4083 | 37.0% | 36.0% | 38.2% | 39.1% | 37.5% |
| Non-common names among US graduates | 2775 | 32.2% | 31.8% | 31.7% | 32.6% | 32.0% |

associated with being an international medical graduate (p=0.633).

Most program websites contained up to date information regarding residents matched into the programs from 2013 through 2016. Some programs displayed older information from 2012 and some displayed the incoming class to their website. The percentage of women enrolled in radiology residency programs was 25.5% in 2013, 26.2% in 2014, 25.7% in 2015, and 22.3% in 2016. The percentage of international medical graduates was 8.0% in 2013, 9.4% in 2014, 15.2% in 2015, and 14.1% in 2016. Common names showed a proportion of 63.0% in 2013, 64.0% in 2014, 61.8% in 2015, and 60.9% in 2016, which likely reflected the higher percentage of international medical graduates during 2015 and 2016, since the proportion of common names excluding international medical graduates remained relatively stable at 67.8% in 2013, 68.2% in 2014, 68.3% in 2015, and 67.4% in 2016. These results are summarized in table 1.

Radiology residents had 1719 unique names. The most common name among radiology residents was "Michael", followed by "David" and "Matthew". The most common name for women was "Sarah", followed by "Jessica" and "Jennifer". The top three male and female names were all ranked within the top ten names of the 1980s (15). The most prevalent uncommon name was "Ali" which was the 48th most prevalent name among radiology residents.

The geographical distribution of the percentage of female residents,

international medical graduates, and non-common names (overall and including US graduates only) is demonstrated in figures 1-4. International medical graduates are more prevalent in the Northeast and Midwest, corresponding to the higher overall percentage of non-common names. However, uncommon names are also higher in the same regions after excluding international medical graduates. Women demonstrate higher percentages in the West, Southwest, and East.

**Discussion**

The premise of this study was that names contain objective information regarding cultural backgrounds. To be able to use and decode this information, further studies are needed, especially to define background percentages of common and non-common names in different geographical regions.

Comparing names with the most common names of the time is a simple method and can be easily applied to any data set that includes first names. Using names in lieu of self-reported ethnicity also has the advantage of being more objective and less variable. In addition, names potentially encompass information about ethnicity, nationality, culture and subculture within a certain ethnicity or nationality. For example, names may highlight differences in second or third generation Arab / Middle Eastern populations, which may be considered as White or Caucasian on racial and ethnicity categorization and may face discrimination, nonetheless. Another well described example is that of distinctly Black names (2) for which discrimination has been studied and documented (5-12),

consistently showing that being African-American and having a distinctly Black name are two different experiences. In addition to "Blackness" (2), which is the measure of how much more prevalent a name is among non-hispanic Black individuals in comparison with non-Hispanic White individuals, Figlio (9) describes several factors that are associated with lower socioeconomic status, independent of race. Such factors include prefixes such as "Lo-", "Ta-", and "Qua-"; suffixes such as "-isha" and "-ious"; and including an apostrophe (9). Radiology residents in general have a higher socioeconomic status, which is consistent with the finding that these factors were seen in only two out of 4083 residents (0.049%).
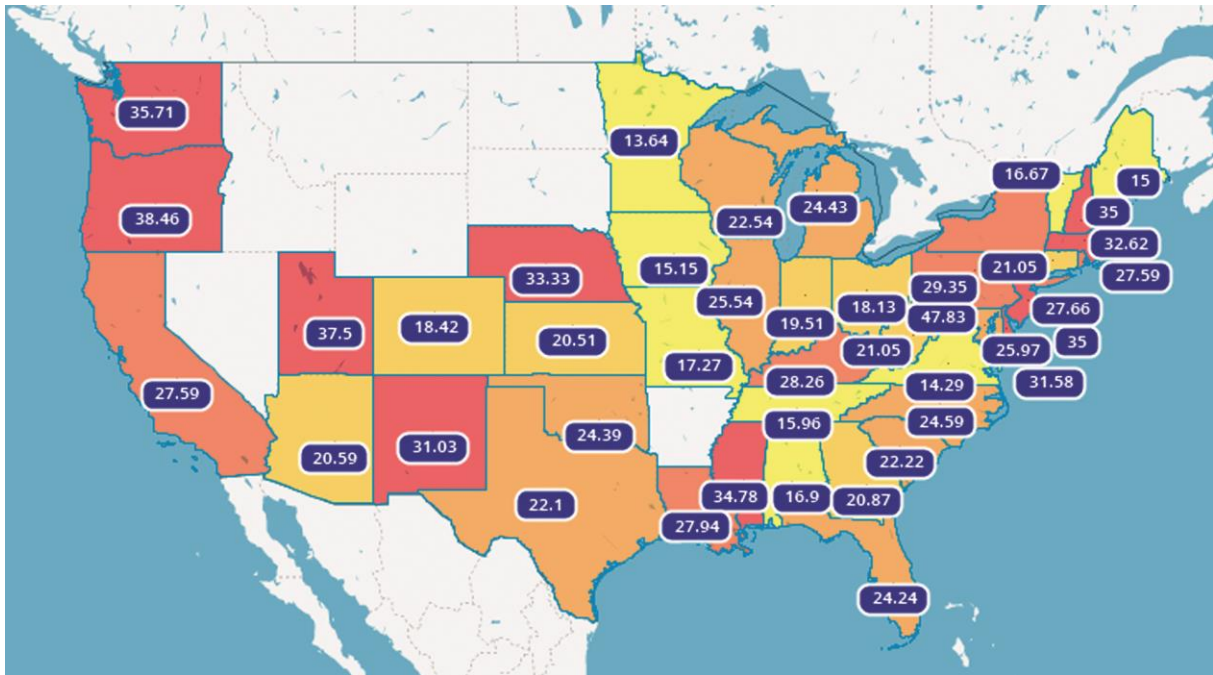


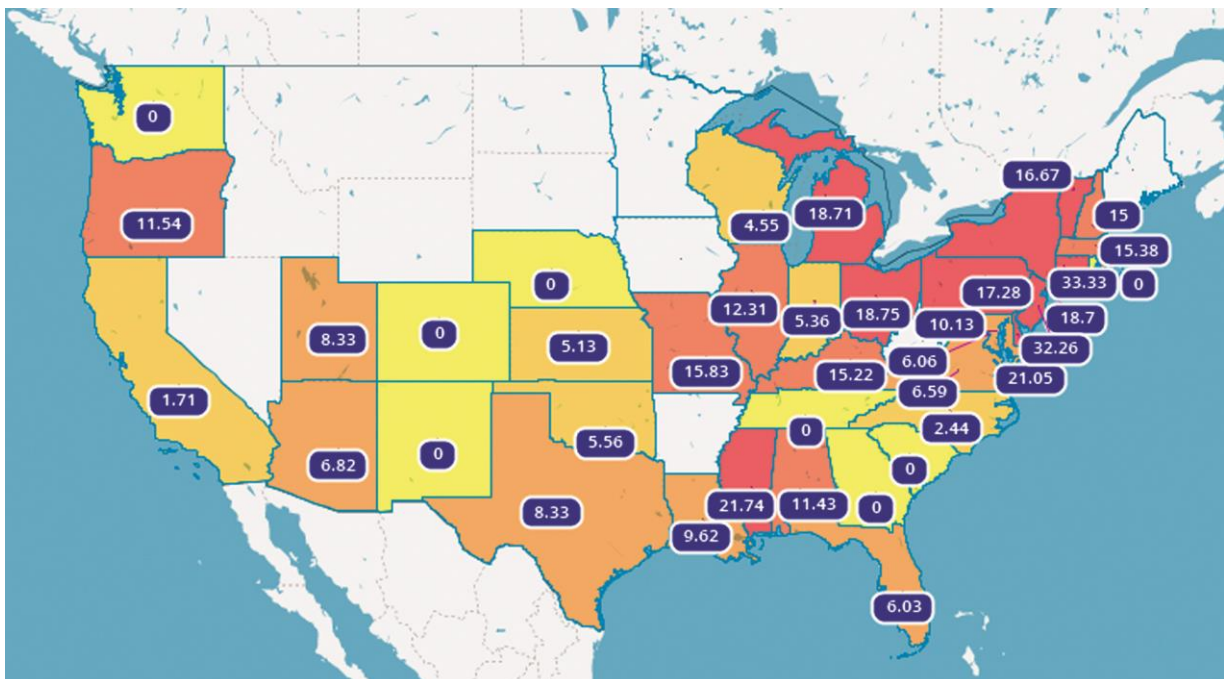Figure 1. The percentage of female residents in radiology



Figure 2. The percentage of international medical graduates in radiology residencies.
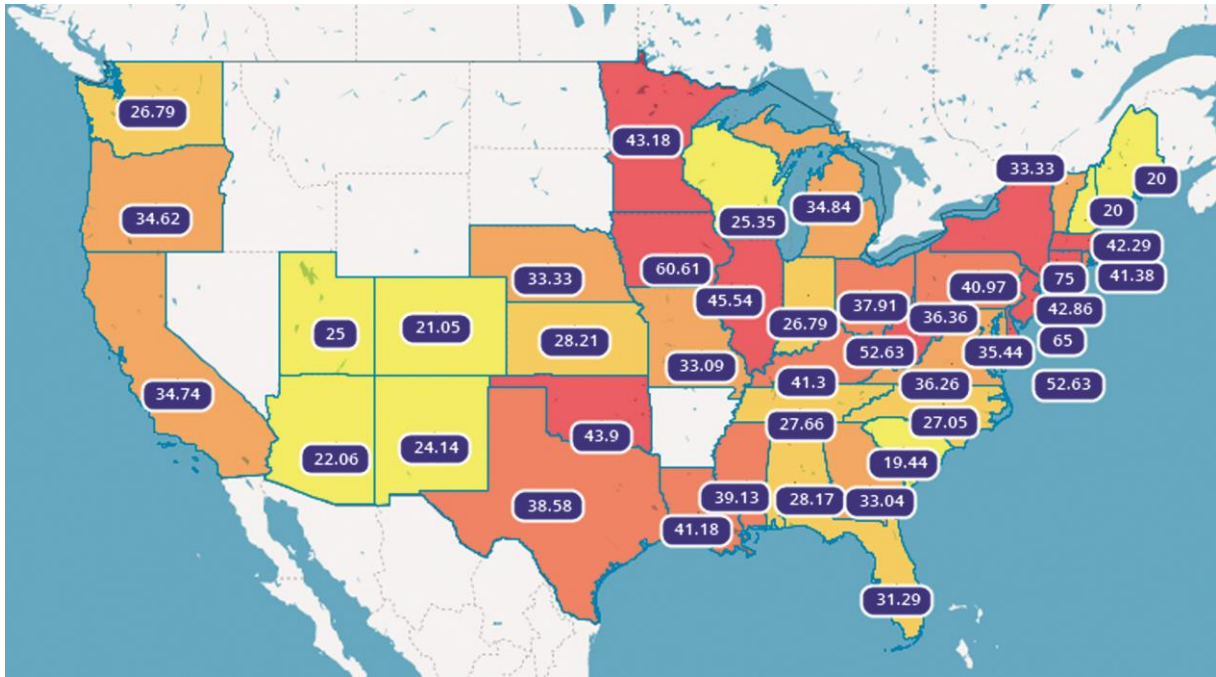
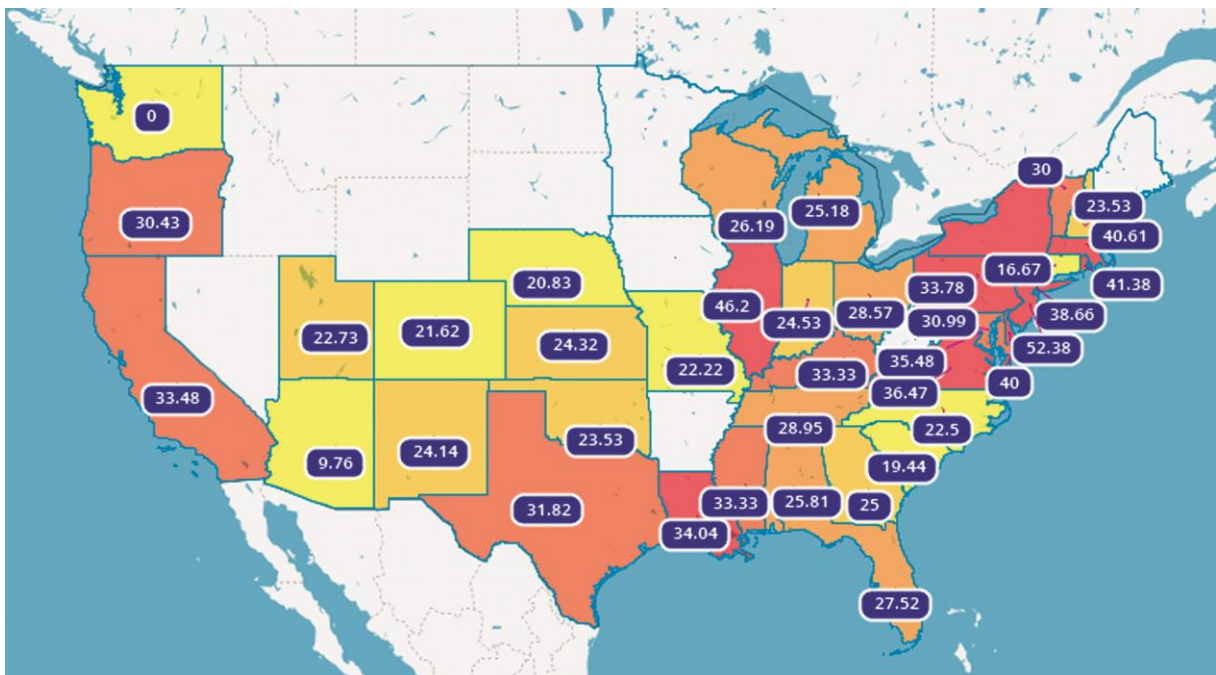Figure 3. The percentage of non-common names in radiology residencies.



Figure 4. The percentage of non-common names among in radiology residencies among US graduates.

In our study, the geographical distribution of non-common names was similar to that of international medical graduates, with higher percentages in the Northeast and Midwest, especially in states with larger urban areas and multiple programs. The frequency of non-common names among US graduates followed a similar distribution, which may signal higher background cultural diversity in these regions.

The secondary outcome of the study was a detailed distribution of female radiology residents. Gender distribution in radiology is a topic that has gained much interest in recent years, since women constitute around 25% of all radiology residents (16)

and there is ongoing research to identify reasons associated with low participation of women in radiology. The 25% figure from 2004 (16), is still the exact figure we obtained for the percentage of female radiology residents in 2018.

As mentioned, Campbell et al (14) studied the gender distribution of residents in programs affiliated with the 50 highest ranking medical schools (plus Cleveland Clinic) in 2017. They reported higher representation of female residents in the Northeast and West, which is similar to our findings from 151 programs. Our study, however, found no association between having a female program director and a higher percentage of female residents.

The choropleth maps presented to demonstrate the distribution of female residents, international medical graduates, and non-common names (figures 1-4), may not be accurate at the state level, especially for states with few radiology residency programs, due to the programs for which data was not available.

Additional limitations of the study include the fact that names may not accurately reflect the cultural background of the individual, and therefore, no conclusions should be drawn at the individual level, but may be useful nonetheless since discrimination does occur towards at least some names independent of other information (5-13). Another limitation is that this study is limited in its findings to radiology residents in the United States, and even the methodology may not be applicable in many other countries where names may not effectively represent cultural background or demonstrate other limitations.

## Conclusions

Our hope is that this study provides a precedent for the use of names to measure cultural diversity, and a framework for further studies to correlate this information with other background demographic variables for better interpretation of the data. If that proves valuable, looking at the data through time and between various specialties may also provide useful information.

In addition, with the underrepresentation of women in radiology, we hope this study provides additional information regarding gender distribution among radiology residents.

*Conflicts of interest*: none

### Ethical considerations
No patients were recruited and no patient information was used.

### Authors' contribution
Ali Rastegarpour was responsible for design of the study, data analysis, and writing the draft article. All authors were involved in data collection and interpretation and had access to the data.

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## References

1. Pomorski M, Krawczyk MJ, Kułakowski K, Kwapień J, Ausloos M. Inferring cultural regions from correlation networks of given baby names. Physica A: Statistical Mechanics and its Applications 2016; 445:169-75.

2. Fryer Jr RG, Levitt SD. The causes and consequences of distinctively black names. The Quarterly Journal of Economics 2004; 119:767-805.

3. Berger J, Bradlow ET, Braunstein A, Zhang Y. From Karen to Katie: Using baby names to understand cultural evolution. Psychological science 2012; 23:1067-73.

4. Hahn MW, Bentley RA. Drift as a mechanism for cultural change: an example from baby names. Proceedings of the Royal Society of London B: Biological Sciences 2003; 270:S120-3.

5. Bertrand M, Mullainathan S. Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. American economic review 2004; 94:991-1013.

6. Esmail A, Everington S. Racial discrimination against doctors from ethnic minorities. BMJ: British Medical Journal 1993; 306:691.

7. Carpusor AG, Loges WE. Rental discrimination and ethnicity in names. Journal of Applied Social Psychology 2006; 36:934-52.

8. Edelman B, Luca M, Svirsky D. Racial discrimination in the sharing economy: Evidence from a field experiment. American Economic Journal: Applied Economics 2017; 9:1-22.

9. Figlio DN. Names, expectations and the black-white test score gap. National Bureau of Economic Research 2005.

10. Lang K, Spitzer AK. Race discrimination: An economic perspective. Journal of Economic Perspectives 2020; 34: 68-89.

11. Kline P, Rose EK, Walters CR. Systemic discrimination among large US employers. The Quarterly Journal of Economics 2022; 137: 1963-2036.

12. Cui R, Li J, Zhang DJ. Reducing discrimination with reviews in the sharing economy: Evidence from field experiments on Airbnb. Management Science 2020; 66:1071-94.

13. Ahmad A. When the name matters: An experimental investigation of ethnic discrimination in the Finnish labor market. Sociological Inquiry 2020; 90:468-96.

14. Campbell JC, Yoon SC, Cater SW, Grimm LJ. Factors influencing the gender breakdown of academic radiology residency programs. Journal of the American College of Radiology 2017; 14:958-62.

15. Social Security database. Popular Baby Names by Decade. Available at: https://www.ssa.gov/oact/babynames/decades/. Accessed 6/9/2018.

16. Baker SR, Barry M, Chaudhry H, Hubbi B. Women as radiologists: are there barriers to entry and advancement?. Journal of the American College of Radiology 2006; 3:131-4.