Supply and Demand: Association Between Non-English Language-Speaking First Year Resident Physicians and Areas of Need in the USA

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BACKGROUND: Over 25 million US inhabitants are limited English proficient (LEP). It is unknown whether physicians fluent in non-English languages are training in geographic areas with the highest proportion of LEP people. Diversity of language ability in the physician workforce is an important complement to language assistance services for providing quality care to LEP patients.

OBJECTIVE: To determine whether non-English language-speaking resident physicians matched in the geographic areas where language skills are needed.

DESIGN: Cross-sectional study.

PARTICIPANTS: Postgraduate medical training applicants to the Association of American Medical College's Electronic Residency Application Service in 2013–2014 ($n = 50,766$). We included data from the Graduate Medical Education Track database, mapped against American Community Survey data.

INTERVENTIONS: N/A.

MAIN MEASURES: We assessed the geographic alignment of non-English language-speaking resident physicians relative to the distribution of the LEP-speaking population.

KEY RESULTS: While 37% of resident physicians spoke at least one non-English language, in most cases the languages they spoke were not those in greatest need by the US LEP population. LEP speakers' potential exposure to non-English language-speaking residents varied. For Spanish, the language with the lowest national resident physician to Spanish LEP patient ratio, the ratio was most favorable in New York at 23.7/100,000 LEP population versus 5.1 in Los Angeles. For Tagalog, the group with the highest geographic mismatch, the ratio was 70.4 in New York but 0 in San Diego, San Jose, and Seattle. Among the top five LEP languages in the USA, Chinese-speaking resident physicians were the most geographically matched.

CONCLUSIONS: We found considerable misalignment of the geographic distribution of non-English language-

speaking resident physicians relative to the distribution of the LEP-speaking population. Residency programs in areas of high need could consider better matching the non-English language needs of their community with the language abilities of the resident physicians they are recruiting.

KEY WORDS: language barriers; physician workforce; physician-patient communication; health disparities; graduate medical education.

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BACKGROUND

Over 25 million people in the USA are limited English proficient (LEP),¹ representing an increase of 80% from 1990 to 2010.² LEP patients have difficulty reading, writing, and understanding English, which leads to difficulty functioning in the English language-dominant healthcare system.³ Due to language barriers, LEP patients tend to have more negative experiences in the medical system.^{4–7} LEP patients have fewer encounters with clinicians⁸ and are less satisfied with their care than English-speaking patients.⁶ LEP patients are more likely to have costly diagnostic tests,⁵ be misdiagnosed,⁹ and have poor or incomplete treatment plans.⁵ For LEP patients, truly bilingual providers can improve care¹⁰ by increasing LEP patients' understanding of their care,¹¹ being more responsive to their concerns,¹² and improving their participation in and recall of health conversations.¹³

Resident physicians are often the front line of both inpatient and outpatient care for underserved patients, many of whom are LEP.¹⁴ We previously showed that at the national level, the language diversity of the resident physician workforce does not match the languages spoken by the US LEP population. Among new MDs who entered residency in 2013, there is a relative underrepresentation of resident physicians with language fluency in 4/5 of the most commonly spoken non-English languages in the USA: Spanish, Vietnamese, Korean, and Tagalog.¹⁵ That is, among the national pool of resident physicians, the proportion who speaks Spanish, Vietnamese, Korean, and Tagalog is lower than the proportion of the

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resident physicians who reported at least advanced proficiency in any non-English language. It is unknown whether resident physicians fluent in non-English languages are training in the geographic areas with the highest concentrations of LEP patients. This has postresidency training implications as well. Almost half (47.2%) of physicians practice in the state where they completed their residency. California and Texas are states with both high rates of retention after residency completion (62.7% and 59.7% respectively)¹⁶ and a high proportion of LEP patients (44.4% and 41.9%, respectively).¹⁷ Thus, it is important to study language proficiency among resident physicians in order to get a sense of the future physician workforce in a given geographic area.

The objective of this study was to assess the geographic areas in which resident physicians fluent in non-English languages are serving in US residency programs compared to the geographic areas where these language skills are most needed.

DATA AND METHODS

This study focuses on geographic location and language aptitude for all (both USA and foreign educated) 2013 and 2014 first year resident physicians in the 50 states of the USA and in Washington, DC ($n = 50,766$). Data on language aptitude is taken from the AAMC Electronic Residency Application Service (ERAS) database. ERAS is an online application service which transmits applications and other supporting documents to residency programs. The applicants are asked to self-report their language skills with an adapted Interagency Language Roundtable (ILR) scale with five response options and detailed descriptors: “native/functionally native,” “advanced,” “good,” “fair,” and “basic.” The AAMC began using the ILR scale in 2013 to standardize the way applicants self-reported their language skills. The ILR scale was developed in the 1950s and has become a standardized self-reporting scale for speaking, listening, writing, and translating skills. Since its inception, the scale has been revised and validated and has been used extensively in academia, government, and non-governmental organizations.¹⁸ It is increasingly being used as a self-reporting tool for clinicians.^{19–22} Data on geographic location of the residency program is taken from the Graduate Medical Education Track (GMETTrack) database. These resident physicians applied for postgraduate training by registering once with ERAS in a given year and having their application sent to the residency programs to which they wished to apply. The application includes socio-demographic questions, such as racial/ethnic identity and languages spoken. Applicants were asked to self-report language proficiency in all languages spoken, including English.

This study assigned the residency program location to Core Based Statistical Area (CBSA) IDs using the physical addresses of residency programs obtained from GMETTrack. The program locations were assigned to 238 metropolitan CBSAs (of which there were 381 with populations of 50,000

or more) and 25 were assigned to micropolitan CBSAs (of which there were 536 with populations between 10,000 and 49,999). This study focused on the 238 metropolitan areas with residency programs. Then, using the 2009–2013 American Community Survey (ACS) data, we attached population data for LEP-speaking persons to these metropolitan areas. This study focused on the five most common languages spoken by LEP people in the USA—Spanish, Chinese (Mandarin, Cantonese, and others combined), Vietnamese, Korean, and Tagalog. The US Census Bureau categorizes individuals as LEP if they report speaking English less than “very well.”

Estimating LEP Speakers’ Potential Exposure to Non-English Language–Speaking Resident Physicians

We first calculated for the national level and for each metropolitan area with a residency program the number of first year resident physicians who reported speaking a non-English language with at least “advanced” proficiency for every 100,000 LEP speakers of that language. Because our analytical focus was on first year resident physicians and we had 2 years of data for incoming resident physicians (2013 and 2014), we divided the ratios by 2. The ratio enables us to compare relative representation of resident physicians to LEP speakers by language and by geographic unit.

We conducted analyses in STATA 12 (College Station, TX).

RESULTS

The 238 metropolitan areas with residency programs account for 77% of the US population aged 5 or older and 90% of the population residing in metropolitan areas (Supplemental Appendix Table 1). In the metropolitan areas with residency programs, there were 11.3 first year resident physicians for every 100,000 people. We found that 36.5% (18,373 of 50,303) of resident physicians in 2013 and 2014 spoke at least one non-English language with at least advanced proficiency. On the other hand, 10% of the population (22,472,727 of 224,012,869) was LEP. Of these resident physicians, 39% spoke one of the top five languages used in the USA with the most common being Spanish (24%).

Therefore, there was a higher ratio of non-English language–proficient resident physicians per 100,000 LEP population at the national level (36.9, Table 1) compared with the overall population (11.3, Supplemental Appendix Table 1). There was a preponderance of languages spoken by resident physicians including Hindi and Urdu that were not the five most common non-English languages spoken in the USA.¹⁵ LEP speakers’ exposure to non-English language–speaking resident physicians differed drastically by language. Nationally, the resident physician to LEP ratio was least favorable for Spanish at 13.6. Among the Asian languages, ratios were also lower for Tagalog at 20.2 and 22.7 for Vietnamese while

Table 1 LEP Population and Resident Physicians with Advanced Fluency in a Non-English Language by CBSA

Metropolitan area	Population LEP in CBSA	No. of resident physicians with at least "advanced" fluency (%)	Ratio: resident physicians per 100,000 ^a
Total limited English proficient (LEP)			
New York-Newark-Jersey City, NY-NJ-PA	3,148,722	4006 (55.7)	63.6
Los Angeles-Long Beach-Anaheim, CA	3,021,722	670 (39.2)	11.1
Miami-Fort Lauderdale-West Palm Beach, FL	1,246,298	321 (57.0)	12.9
Chicago-Naperville-Elgin, IL-IN-WI	1,077,695	1009 (41.9)	46.8
Houston-The Woodlands-Sugar Land, TX	947,943	465 (38.7)	24.6
Dallas-Fort Worth-Arlington, TX	805,047	206 (28.9)	12.8
San Francisco-Oakland-Hayward, CA	736,524	261 (33.0)	17.7
Riverside-San Bernardino-Ontario, CA	640,984	194 (48.7)	15.2
Washington-Arlington-Alexandria, DC-VA-MD-WV	541,111	364 (41.3)	33.7
San Diego-Carlsbad, CA	476,405	128 (39.1)	13.5
Spanish LEP			
Los Angeles-Long Beach-Anaheim, CA	2,033,088	207 (12.1)	5.1
New York-Newark-Jersey City, NY-NJ-PA	1,675,204	792 (11.0)	23.7
Miami-Fort Lauderdale-West Palm Beach, FL	1,004,653	204 (36.2)	10.2
Houston-The Woodlands-Sugar Land, TX	769,535	154 (12.8)	10.0
Chicago-Naperville-Elgin, IL-IN-WI	679,023	245 (10.2)	18.1
Dallas-Fort Worth-Arlington, TX	645,031	67 (9.4)	5.2
Riverside-San Bernardino-Ontario, CA	533,544	54 (13.6)	5.1
San Diego-Carlsbad, CA Metro Area	319,880	44 (13.5)	6.9
San Francisco-Oakland-Hayward, CA	310,669	110 (13.9)	17.7
Phoenix-Mesa-Scottsdale, AZ	307,781	35 (7.7)	5.7
Chinese LEP			
New York-Newark-Jersey City, NY-NJ-PA	364,299	370 (5.1)	50.8
Los Angeles-Long Beach-Anaheim, CA	239,576	126 (7.4)	26.3
San Francisco-Oakland-Hayward, CA	203,434	37 (4.7)	9.1
San Jose-Sunnyvale-Santa Clara, CA	61,687	34 (10.9)	27.6
Boston-Cambridge-Newton, MA-NH	51,325	85 (5.2)	82.8
Chicago-Naperville-Elgin, IL-IN-WI	44,600	83 (3.4)	93.1
Seattle-Tacoma-Bellevue, WA	36,399	18 (2.5)	24.8
Washington-Arlington-Alexandria, DC-VA-MD-WV	35,954	25 (2.8)	34.8
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	33,585	66 (3.4)	98.3
Houston-The Woodlands-Sugar Land, TX	32,227	47 (3.9)	72.9
Vietnamese LEP			
Los Angeles-Long Beach-Anaheim, CA	147,472	43 (2.5)	14.6
San Jose-Sunnyvale-Santa Clara, CA	69,212	5 (1.6)	3.6
Houston-The Woodlands-Sugar Land, TX	55,203	20 (1.7)	18.1
Dallas-Fort Worth-Arlington, TX	39,230	14 (2.0)	17.9
Washington-Arlington-Alexandria, DC-VA-MD-WV	29,164	7 (0.8)	12.0
Seattle-Tacoma-Bellevue, WA	28,629	5 (0.7)	8.8
San Francisco-Oakland-Hayward, CA	26,667	13 (1.6)	24.4
San Diego-Carlsbad, CA Metro Area	26,076	5 (1.5)	9.6
Atlanta-Sandy Springs-Roswell, GA	21,665	3 (0.8)	6.9
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	19,385	9 (0.5)	23.2
Korean LEP			
Los Angeles-Long Beach-Anaheim, CA	156,343	33 (1.9)	10.6
New York-Newark-Jersey City, NY-NJ-PA	93,503	94 (1.3)	50.3
Washington-Arlington-Alexandria, DC-VA-MD-WV	33,611	10 (1.1)	14.9
Chicago-Naperville-Elgin, IL-IN-WI	23,998	26 (1.1)	54.2
Seattle-Tacoma-Bellevue, WA	23,035	8 (1.1)	17.4
Atlanta-Sandy Springs-Roswell, GA	21,996	3 (.8)	6.8

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Table 1. (continued)

San Francisco-Oakland-Hayward, CA	16,910	6 (.8)	17.8
Dallas-Fort Worth-Arlington, TX	14,821	9 (1.3)	30.4
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	14,394	20 (1.0)	69.5
San Jose-Sunnyvale-Santa Clara, CA	12,494	4 (1.3)	16.0
Tagalog LEP			
Los Angeles-Long Beach-Anaheim, CA	86,691	11 (0.6)	6.4
San Francisco-Oakland-Hayward, CA	53,027	3 (0.4)	2.9
New York-Newark-Jersey City, NY-NJ-PA	39,069	55 (0.8)	70.4
San Diego-Carlsbad, CA	35,580	0 (0.0)	0.0
Urban Honolulu, HI	23,282	1 (0.6)	2.2
Chicago-Naperville-Elgin, IL-IN-WI	21,731	17 (0.7)	39.1
San Jose-Sunnyvale-Santa Clara, CA	19,949	0 (0.0)	0.0
Las Vegas-Henderson-Paradise, NV	18,628	3 (2.0)	8.1
Riverside-San Bernardino-Ontario, CA	16,986	6 (1.5)	17.7
Seattle-Tacoma-Bellevue, WA	13,851	0 (0.0)	0.0

Data are drawn from the 2009–2013 American Community Survey 5-Year Estimates. American FactFinder: US Census Bureau; U.S. Census Bureau 2011 and the Association of American Medical College Electronic Residency Application Service and GMETrack databases

*Ratio was divided by 2 to represent 1 year of first year resident physicians

higher for Korean at 38.5 and 52.9 for Chinese (Supplemental Appendix Table2).

Table 1 shows the resident physician to LEP ratios for the 10 CBSAs with the most LEP speakers for all LEP non-English language speakers. In addition to Spanish having the least favorable ratio, there were considerable regional variations. For example, the resident physician to Spanish LEP ratio was highest in New York at 23.7 but only 5.1 in Los Angeles. The misalignment was even greater for Asian languages. For Chinese (1686 resident physicians), the resident physician to Chinese LEP ratio was 98.3 in Philadelphia and 50.8 in New York but just 9.1 in San Francisco. The differences were most drastic for Tagalog (207 resident physicians), in which the resident to LEP ratio was 70.4 in New York and 39.1 in Chicago, but just 2.9 in San Francisco, and zero in San Diego, San Jose, and Seattle. These results suggest that the resident physician population proficient in particular non-English languages is not evenly distributed across metropolitan areas.

DISCUSSION

This study demonstrates that within the USA, in 2013 and 2014, the geographic distribution of first year resident physicians that spoke non-English languages did not align with the geographic distribution of the general LEP population. We found that while a third of first year resident physicians reported fluency in non-English languages, in most cases, the languages they were fluent in were not those in greatest need by the US LEP population. We further demonstrated that the geographic distribution of the first year resident physicians who do speak the languages of greatest needs did not align with the distribution of the LEP population. That is, the resident physicians reporting linguistic proficiencies did not always train in the localities in which these abilities can be deployed for the greatest numbers who could benefit. Areas with larger numbers of medical centers (e.g., the Northeast) had higher ratios of language-concordant resident physicians

to LEP population when compared with metropolitan areas with smaller numbers of teaching hospitals (e.g., the Southern border). Similarly, there appears to be an inverse relationship with the level of language diversity in an area and ratio of resident physicians to LEP population. For example, in Chicago, where LEP patients were primarily Spanish and Polish speaking, there was a higher ratio of resident physicians to LEP patient population compared to areas like Southern California, where there is a greater diversity of languages spoken, including Korean, Tagalog, Armenian, and Persian.¹

Studies have shown that language concordance between patients and bilingual physicians results in improved healthcare quality and outcomes. Language concordance between patients and physicians leads to better patient satisfaction with care,^{23, 24} medication adherence,^{25, 26} patient understanding of diagnoses and treatment,²⁷ patient functioning for LEP patients with diabetes,²⁸ patient centeredness,¹² and more health education.^{24, 29} Having a language-concordant physician leads to fewer emergency department visits, less likelihood of missing medications, and lower cost.^{25, 30, 31} While language-concordant physicians can improve healthcare outcomes, they are only one intervention that can be utilized to improve LEP patient care. Trained medical interpreters are crucial components to improving healthcare outcomes for LEP patients,^{32, 33} yet research suggests that they are underused by physicians, even when readily available.^{21, 27, 34–37} While it is important to foster clinician's non-English language skills, it is equally as imperative to train new physicians on how to use language services.

There are federal regulations which require healthcare organizations to provide language services to LEP patients which includes the Title VI of the Civil Rights Act and was later reinforced by Executive Order 13166, which required that all recipients of federal funds provide “meaningful access” to services needed by people with LEP. The Culturally and Linguistically Appropriate Services standards (CLAS standards) in Health Care, issued by the Department of Health and Human Services’ Office of Minority Health, include four that outline

what it means to provide adequate language services to LEP patients as proscribed in Title VI.³⁸ These four CLAS standards are requirements for all recipients of Federal funds. Medical students should be taught early in their education on these mandates and how to properly utilize language services. Research has shown that only a small percentage of medical students feel prepared to work with LEP populations and knowledge around interpreter use is a crucial component of their preparedness.^{39, 40} Currently, not all residency programs provide training on caring for LEP patients nor do they have adequate tools to evaluate their resident physicians' abilities to provide care to this population.⁴¹ Providing comprehensive language services, educating future physicians on using professional interpreters, and increasing the number of resident physicians fluent in the languages commonly spoken by LEP patients at a particular residency program are important ways of complying with the CLAS standards and have the potential to reduce the geographic mismatch observed in this study.

Although the population of LEP is growing in the USA, the racial, ethnic, and linguistic diversity of the physician workforce is not changing as quickly, leading to predicted shortages in meeting the needs of LEP patients.⁴² Albeit, it cannot be expected that physicians will choose their place of work solely on their non-English language capabilities. It is up to sites to make their training programs attractive to diverse resident physician candidates. The AAMC's recent report entitled "Optimizing Graduate Medical Education: A Five-Year Road Map for America's Medical Schools, Teaching Hospitals and Health Systems" includes aligning residency training positions with societal needs as a priority.⁴³ The federal government has established incentive programs to decrease shortages and improve recruitment and retention of physicians in underserved areas.^{44, 45} Studies have also investigated how to improve the geographic distribution of physicians in rural and underserved areas.^{46, 47} The exact number of physicians that are needed per language in each specialty is currently unknown and beyond the scope of this research. Our study could guide residency programs with high percentages of LEP patients to alter the way they recruit non-English language-speaking resident physicians. As programs look to recruit resident physicians with diverse language skills, future studies are needed to determine the association between patient-resident physician language concordance and healthcare outcomes for LEP patients.

Our study has limitations. First, our findings focus on language concordance between first year resident physicians and LEP patients. Care in these systems likely includes (a) faculty who may, themselves, have language fluency and who are supervising care, (b) professional interpreter services, and (c) resident physician education about effectively communicating with LEP patients. Second, the non-English language skills of resident physicians further along in their training who matched in prior years are not reflected in our analysis. We are assuming that the proportions of non-English language-proficient resident physicians do not vary widely from year

to year. Additionally, many resident physicians tend to stay and practice in the state of their residency training, so studying these first cohorts of resident physicians for which we have language proficiency data will likely reflect the language diversity in the future workforce of those areas.⁴⁸ Third, the resident physicians' language proficiencies are based on self-report. However, we focused on resident physicians who reported at least advanced proficiency on the adapted ILR scale, which has been shown to be accurate compared to a validated oral proficiency interview in a previous study.²² Fourth, this study looks at aggregate numbers of non-English language-proficient resident physicians in a particular geographic area, and even if more language-concordant physicians were available, this does not guarantee that an LEP patient would end up being treated by one. Similarly, it would have been interesting to report where Latino Spanish-speakers were in training, but due to having only aggregate data, we were unable to link race/ethnicity of individual applicants with their language data. Furthermore, medical interactions occur at the clinic and hospital level. Our data is not granular enough to evaluate these interactions. Fifth, given the nature of our data, we had no measure of care-seeking behavior and, thus, cannot measure whether there is a demand being unmet due to the observed geographic misalignment of LEP people and non-English-speaking resident physicians. Finally, our study grouped resident physicians going into any specialty together for this analysis. There may be important differences in the need for fluent primary care physicians vs. specialist physicians.

CONCLUSIONS

Diversity of language ability in the physician workforce is an important complement to language assistance services for providing quality care to patients with LEP. Residency programs should be aware of the needs of their LEP communities and continuously monitor the languages in their geographic area to identify these needs. Residency programs in areas of high need should consider the extent to which recruiting resident physicians with non-English language fluencies would improve the service to their communities. Future research should focus on the relationship between geographic mismatch of non-English language-fluent resident physicians and quality of care and outcomes for LEP patients.

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