

Impact of Global Health Experiences During Residency on Graduate Practice Location: A Multisite Cohort Study

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Abstract

Background The impact of global health experiences on practice location is not clear.

Objective We studied whether participants in global health tracks (GHTs) and global health electives (GHEs) were more likely to practice in underserved areas.

Methods Our study used the 2010 American Medical Association Masterfile to evaluate the practice location of 999 graduates (1980–2009) from 5 family medicine programs. The variable of interest was participation in a GHT or GHE. Outcome measures were percentage of graduates practicing in (1) health professional shortage areas, (2) medically underserved areas or populations, (3) rural areas, (4) areas of dense poverty, and (5) any rural or underserved area. We also examined whether

availability of a GHT or GHE in the program affected nonparticipants' practice location.

Results Sixty-four percent (112 of 174) of participants practiced in areas of dense poverty compared with 56% (463 of 825) of nonparticipants ($P = .04$). Those graduating after GHT implementation were more likely to practice in a rural or underserved area compared with those graduating before implementation. After controlling for potential confounders, GHT participants were not more likely to work in an underserved area.

Conclusions Graduates of programs with global health experiences were more likely to practice in an underserved or rural area. Making these experiences available may affect participants and nonparticipants.

Introduction

Maldistribution of physicians is a feature of the US health care system,¹ and the Council on Graduate Medical Education has urged the expansion of programs to address this disparity.² The consequences of maldistribution could be magnified as a result of increased numbers of patients with health care coverage after implementation of the Affordable Care Act.³ In Massachusetts, even after state-mandated health insurance, poor patients experienced difficulty accessing care.⁴

Calls for graduate medical education reform have demanded that institutions focus on population health and become accountable to their communities.^{5–7}

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Several characteristics are associated with practice in underserved communities. Research has shown that growing up in a rural county and attending a public medical school are associated with practice in health provider shortage areas (HPSAs).⁸ Other studies have suggested that minority physicians may be more likely to care for low-income patients.⁹

Global health training has also been associated with interest in caring for underserved populations, leading to calls for expanding global health curricula.^{10–12} However, many of these studies reported on the experience of single programs, relied on surveys, and did not confirm whether graduates actually worked in underserved locations.^{11,13} To address these gaps, researchers have called for more objective data.¹⁴ Building on our prior work,¹⁵ we assessed whether participation in a global health track (GHT) or global health elective (GHE) was associated with working in an underserved area and whether the impact of these experiences extended to nonparticipants as well.

Methods

Participants

Our multisite, retrospective analysis included 5 residency programs that participated in the SAGE (Assessing the Social Accountability of Global Health Experiences) project funded by the Society of Teachers of Family

TABLE 1 NUMBER OF GRADUATES BY RESIDENCY AND BY PARTICIPATION IN GLOBAL HEALTH TRACKS OR ELECTIVES

Exposure	No. of Graduates (% of Total per School)
Residency 1	
Global health elective	29 (28)
No global health elective	75 (72)
Residency 1 Total	104
Residency 2	
Global health elective	6 (8)
No global health elective	71 (92)
Residency 2 Total	77
Residency 3	
Global health track	14 (4)
Global health elective	18 (5)
No global health track or elective	332 (91)
Residency 3 Total	364
Residency 4	
Global health track	75 (26)
No global health track	210 (74)
Residency 4 Total	285
Residency 5	
Global health track	32 (19)
No global health track	137 (81)
Residency 5 Total	169
Combined	
Global health elective only	53 (5)
Global health track only	121 (12)
No global health track or elective	825 (83)
Total	999

Medicine Foundation. We used national family medicine meetings and listserv postings to recruit programs with existing GHTs or GHEs that could provide lists of graduates and could determine which graduates participated in these global experiences. Nine programs applied to participate; 5 were able to provide data on graduates.

Our sample consisted of the 999 residents who graduated from the 5 programs from 1980 through 2009. We used the 2010 American Medical Association Masterfile to determine practice locations. We excluded people who did not complete residency and those who graduated

What was known

The impact of global health experiences on resident practice is not known.

What is new

Multisite collected data for family medicine programs with a global health experience.

Limitations

Residents' duration and exposure to global health varied across programs. Interest in serving underserved patients may result from other, unmeasured program attributes.

Bottom line

Independent of whether they participated in global health experiences, graduates of programs with global health experiences were more likely to practice in any type of underserved area.

in 2010 because they were still in residency when the Masterfile data were captured. Two residencies began after 1980 and provided lists starting with their year of inception. Two programs had not yet graduated GHT participants and solely provided data on residents who completed GHEs (TABLE 1). One program submitted data on residents who participated in GHEs but did not offer a GHT. The curricula of these programs share common elements (TABLE 2), although the time spent abroad varied.

Global Health Experiences

The variable of interest was participation in a GHT or GHE. Outcome measures were the percentages of participants and nonparticipants practicing in (1) HPSAs, (2) medically underserved areas or populations (MUA/Ps), (3) rural areas, (4) areas of dense poverty (census tracts with greater than 20% of households earning less than 200% of the federal poverty level), and (5) areas meeting any of these 4 definitions.¹⁶ To obtain these figures, we divided the number of graduates (stratified by GHT or GHE participation) working in these populations by the total number of participants and nonparticipants, respectively. The null hypothesis was that there would be no difference between participants and nonparticipants.

Using Geographic Information Systems (ArcGIS 9.3.1, Esri), we referenced practice locations to designated locations of shortages and underserved populations from the Health Resources and Services Administration (HRSA) Geospatial Data Warehouse. The HRSA designates HPSAs, which meet specific population to primary care physician thresholds,¹⁷ and MUA/Ps.¹⁸ Rural areas were defined as non-Metropolitan Statistical Areas (populations less than 50 000). We obtained poverty information from Census 2000, Summary File 3.²⁰

TABLE 2 DESCRIPTION OF THE GLOBAL HEALTH CURRICULA AT RESIDENCIES 1–5

Residency	First Year of the Global Health Track	Curricular Elements	Duration of International Experiences
Residency 1 ^a	2006	1. Four-year combined family medicine/preventive medicine residency program 2. Integrated master's in public health with a concentration in global health	PGY-2: 4 weeks PGY-3: 4 weeks PGY-4: 12 weeks Global health electives lasted 4 weeks before development of the track
Residency 2 ^a	2007	1. One global health conference 2. Global health readings and online modules 3. Global health lecture series spanning 3 years 4. Completion of a community health activity and global health scholarly activity 5. Quarterly global health journal club	At least 4 weeks over the 3 years Global health electives lasted 4 weeks before development of the track
Residency 3	2004	1. Quarterly global health book club 2. Biannual half-day global health workshops 3. Prebrigade meetings with a discussion of a variety of global health topics	PGY-1: 2 weeks PGY-2: 2 weeks (optional) PGY-3: 2 weeks (optional)
Residency 4	1990	1. Lectures and discussion during global health monthly conferences 2. Courses before international brigades 3. Quarterly book discussions	PGY-1: 9 days PGY-2: 2–3 weeks PGY-3: 4 weeks (optional)
Residency 5	1988	1. Monthly global health meetings 2. One global health conference 3. One-month tropical medicine course	PGY-1: 4 weeks PGY-2: up to 8 weeks

Abbreviation: PGY, postgraduate year.

^a Global health track participants were not included in the track analysis because participants had not graduated by May 2010.

To determine whether the presence of GHTs influenced residents who did not complete these tracks but may have been exposed to GHT curricular elements, we conducted pre- and postimplementation analyses. To capture cohorts exposed to 3 years of the GHTs, we defined the postimplementation period as 2 years after the track started until 2009; the preimplementation period was defined as 1980 until 1 year after the track started (TABLE 2).

To control for confounders, we conducted logistic regression analysis. The dependent variables were practice in HPSAs, MUA/Ps, rural areas, areas of dense poverty, and any rural or underserved designation. The independent variables were age, sex, race, attendance at a private medical school, participation in a GHT or GHE, and residency site. Underrepresented minority physicians include African Americans, Hispanics, and Native Americans. “Unknown” race included those who left this field blank on questionnaires. As race is not available through the American Medical Association Masterfile, we had to combine that data with data from the Association of American Medical Colleges Minority Physician Database. International medical graduates were defined as persons who graduated from medical schools located outside of the United States, Canada, and Puerto Rico.

This analysis was approved by the Institutional Review Board of the American Academy of Family Physicians.

Analysis

We computed χ^2 tests for measures of association using SAS version 9.2 (SAS Institute Inc). A $P < .05$ was considered to indicate statistical significance.

Results

Of the 999 graduates from 5 family medicine residency programs, 53 (5%) participated in GHEs and 121 (12%) participated in GHTs (TABLE 1). Eighty-three percent ($n = 825$) of the sample did not participate in GHEs or GHTs.

When combining all of the residency programs, 68% (118 of 174) of graduates participating in either GHEs or GHTs—compared to 60% (497 of 824) of nonparticipants—practiced in any area of underservice ($P = .06$; FIGURE 1). This difference was driven by the finding that 64% (112 of 174) of GHE and GHT participants compared with 56% (463 of 824) of nonparticipants practiced in areas of dense poverty ($P = .04$). Although the percentage of GHE and GHT participants practicing in HPSAs and MUA/Ps was higher than that for nonparticipants, these differences were not statistically significant.

When comparing those who participated in GHTs with those who participated in neither GHTs nor GHEs, none of the differences were statistically significant. This finding was the same for GHE participants compared with those who participated in neither GHTs nor GHEs. For residency

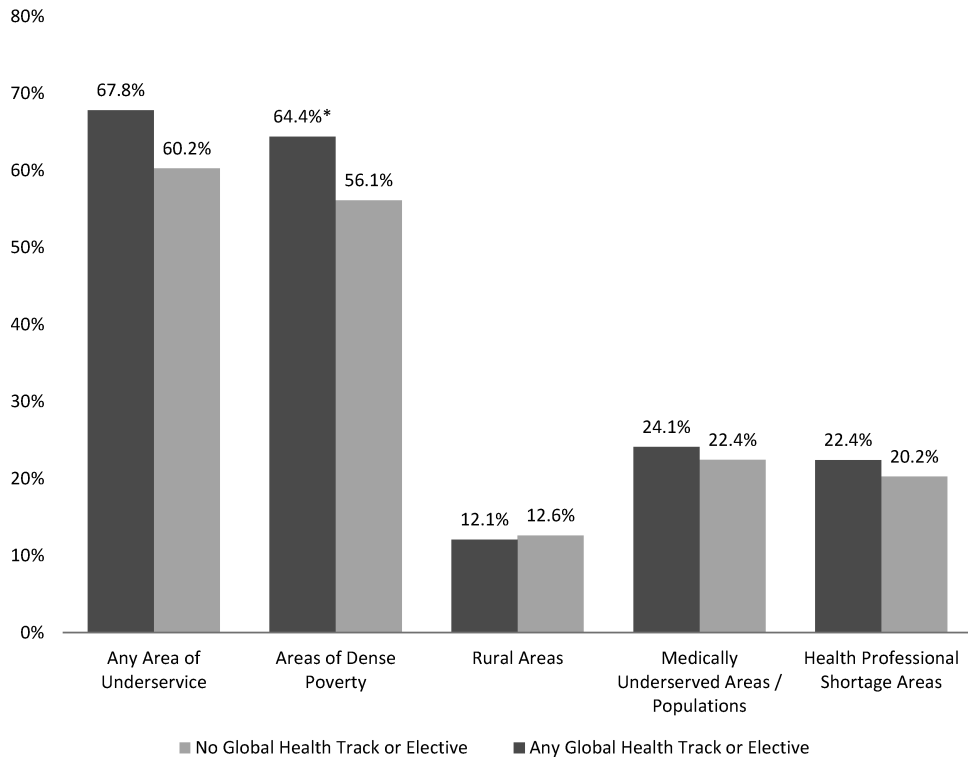


FIGURE 1 | **PERCENTAGE OF RESIDENCY GRADUATES IN UNDERSERVED AREAS, BY PARTICIPATION IN GLOBAL HEALTH TRACKS OR ELECTIVES**

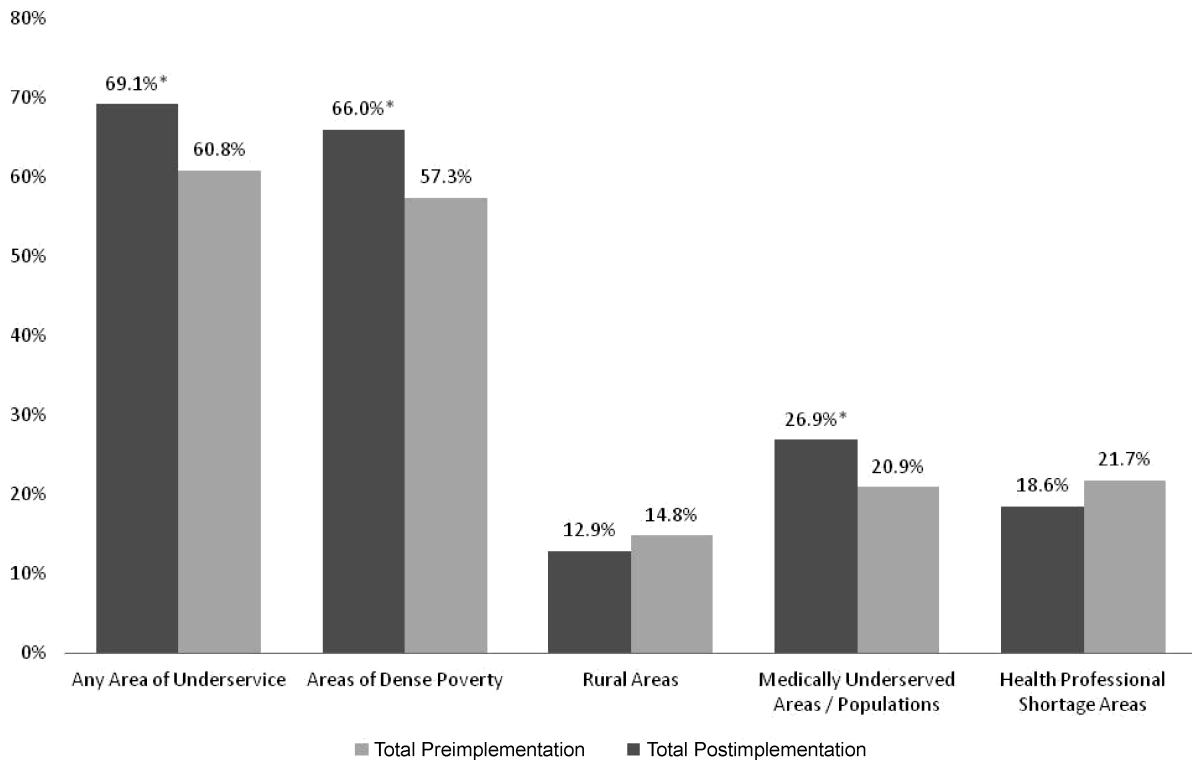


FIGURE 2 | **PERCENTAGE OF PRE- AND POSTIMPLANTATION GRADUATES IN UNDERSERVED AREAS**

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TABLE 3 PREDICTORS OF PRACTICE IN UNDERSERVED POPULATIONS, LOGISTIC REGRESSION RESULTS

Variable	Any Underserved	Health Professional Shortage Area	Medically Underserved Area	Rural Area	Area of Dense Poverty
	Odds Ratio Estimate (95% CI)				
Age	1.03 (1.01–1.05)	1.02 (0.99–1.04)	1.01 (0.99–1.04)	1.01 (0.99–1.04)	1.02 (1.003–1.04)
Sex: Male ^a	0.92 (0.69–1.22)	0.80 (0.58–1.10)	0.83 (0.61–1.14)	0.95 (0.64–1.40)	0.95 (0.72–1.25)
Race: Asian ^b	0.84 (0.49–1.45)	0.82 (0.43–1.57)	0.90 (0.49–1.65)	0.29 (0.09–0.97)	0.93 (0.55–1.57)
Race: Unknown ^b	0.13 (0.09–0.20)	0.31 (0.18–0.54)	0.26 (0.15–0.45)	0.51 (0.28–0.95)	0.17 (0.11–0.26)
Race: Underrepresented minority ^{b,c}	1.25 (0.69–2.26)	0.93 (0.50–1.76)	1.69 (0.96–2.98)	0.51 (0.20–1.33)	1.17 (0.67–2.04)
Public medical school ^d	1.03 (0.73–1.47)	0.74 (0.50–1.09)	1.23 (0.83–1.81)	0.80 (0.50–1.29)	0.90 (0.64–1.26)
International medical graduate ^d	3.27 (1.84–5.82)	1.09 (0.59–2.03)	1.51 (0.82–2.79)	0.80 (0.34–1.89)	2.09 (1.21–3.61)
Global health track population ^e	1.35 (0.83–2.18)	1.41 (0.83–2.42)	1.21 (0.73–2.01)	0.88 (0.46–1.69)	1.37 (0.86–2.20)
Global health elective (but not track) participation ^e	1.52 (0.78–2.95)	1.49 (0.70–3.16)	0.99 (0.46–2.11)	1.56 (0.59–4.09)	1.45 (0.76–2.76)
Residency 1 ^f	1.16 (0.65–2.07)	0.56 (0.25–1.27)	1.04 (0.51–2.11)	0.58 (0.22–1.52)	1.04 (0.59–1.84)
Residency 2 ^f	1.30 (0.67–2.49)	4.68 (2.28–9.60)	2.88 (1.39–5.96)	0.47 (0.12–1.75)	0.91 (0.48–1.74)
Residency 3 ^f	1.34 (0.92–1.05)	1.37 (0.88–2.13)	1.25 (0.81–1.94)	0.96 (0.57–1.63)	1.35 (0.93–1.95)
Residency 5 ^f	2.69 (1.70–4.25)	1.24 (0.75–2.06)	2.20 (1.40–3.47)	1.69 (0.98–2.90)	2.63 (1.69–4.08)

^a Compared with women.

^b Compared with non-Hispanic White.

^c Includes African Americans, Hispanics, and Native Americans (American Indians, Alaskan Natives, and Native Hawaiian/Pacific Islanders).

^d Compared with private medical school graduation.

^e Compared with no participation in the global health tracks or global health electives.

^f Compared with residency 4.

3, 81% (26 of 32) of GHE or GHT participants practiced in any area of underservice compared with 59% (196 of 332) of nonparticipants ($P = .014$). This difference was driven by a discrepancy in the percentage of participants practicing in areas of dense poverty: 81% (26 of 32) of participants and 56% (186 of 332) of nonparticipants practiced in this population ($P = .006$). All other differences for residency 3 and for the remaining residencies were not statistically significant.

Among participants and nonparticipant residents graduating during the postimplementation period for the 3 residencies with GHTs, 69% (242 of 350) practiced in a rural or underserved area compared with 61% (299 of 492) of those in the preimplementation periods ($P = .01$; FIGURE 2). This was driven by an increase (from 57% to 66%, $P = .01$) in the percentage of graduates practicing in areas of dense poverty and an increase (from 21% to 27%, $P = .04$) in the percentage practicing in MUA/Ps. All other differences were not statistically significant.

After controlling for age, sex, race, medical school type, and residency, residents who participated in GHTs or GHEs were no more likely than nonparticipants to work in

a rural or underserved area (TABLE 3). Graduating from residency 5 was predictive of working in MUA/Ps, areas of dense poverty, and any rural or underserved area, whereas graduating from residency 2 was predictive of working in HPSAs and MUA/Ps. Tests regarding model fit for this analysis were adequate.

Discussion

Our findings are the first outcomes-based data documenting that implementing global health curricula may affect participant and nonparticipant practice locations. Participants in GHEs and GHTs were more likely than nonparticipants to practice in areas of dense poverty, though these differences were not significant after controlling for other predictors. Increasing providers in areas of dense poverty has the potential to make a powerful impact on health.^{16,19}

Our study has several limitations. First, residents' duration and type of exposure to global health training across programs is variable. Second, our data may be limited by the accuracy of record keeping. Participating programs provided lists of graduates who participated in

GHTs and GHEs to the best of their knowledge. Third, the pre- and postimplementation periods are asymmetric (for residencies 3–5). The effect of implementing the GHT may change given a longer postimplementation period. Fourth, our analysis provides data for a single year and thus underestimates the impact of global health training if participants practiced in underserved areas before or after 2010. Fifth, although we can document an association, we cannot prove that participating in GHTs led to work in underserved populations. Sixth, because family medicine physicians are more likely to work in community health centers, our results may not be applicable to non-family medicine programs.⁸ Finally, our methodology fails to capture other important measures of underservice (such as international underserved settings).

Consistent record keeping on graduate locations and resident interest in underserved medicine before matriculation would enhance reliability and understanding of outcomes. Unfortunately, this type of longitudinal information is difficult to track. Residencies with global health programs should record which residents have participated in GHTs and GHEs and which graduates are practicing internationally. Future studies should assess whether residency programs with GHTs are more likely to produce graduates who work in areas of underservice compared with residencies without GHTs.

Conclusion

The GHT and GHE participants were more likely to practice in areas of dense poverty, though this difference was not significant after controlling for other predictors. Postimplementation graduates of programs with global health offerings were more likely to practice in a rural or underserved area, which indicates that implementing tracks may affect both participants and nonparticipants.

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