Supplemental Digital Appendix 2

Summaries of 72 Included Studies Categorized by Theme According to Primary Focus

A. Studies That Examined Personal Characteristics, Attributes, or Background as Predictors of Primary Care Physician Practice in an Underserved Urban or Rural Area (n = 19)

Study author, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Komaromy et al, 1996[12]	Cross-sectional; 718 physicians	Survey of physician with AMA Physician Masterfile practice zip code linked to U.S. Census data for California communities	Black physicians vs others	Urban community	β coef. -.89 (-1.4 – -0.4),*P* < .001
			Hispanic physicians vs non-Hispanic		β coef. -.9 (-1.2 – -.56), *P* < .001
			Black physicians vs others	Rural community	β coef. -1.35 (-2.7 – -.05), *P* < .001
			Hispanic physicians vs non-Hispanic		β coef. -.57 (-.9 – -.23), *P* < .001
			Black physicians vs others	% black patients	β coef. 42.9 (38-47), *P* < .001
			Foreign medical school graduates		β coef. 1.6 (-0.9-4.2), NS
			Hispanic physicians vs non-Hispanic	% Hispanic patients	β coef. 30.2 (25-36), *P* < .001
			Foreign medical school graduates		β coef. 10.9 (7.4-14), *P* < .001
Cregler et al, 1997[31]	Case series; 414 physicians	CUNY graduates who completed MD degree, practice address available for 79% (327/414), and 160 practiced in New York	Graduates with practice data	Practice in underserved area*	33% (no comparison group)
			White		26%
			African American		73%
			Latino		50%
			Asian		43%
Baer et al, 1998[32]	Cross-sectional; Sample size not reported	Primary care physicians (allopathic and osteopathic) from AMA Physician Masterfile linked to Area Resource File	IMG and USMG	Practice in rural HPSA (ratio of primary care IMGs to all primary care physicians)	18.7% in nonmetropolitan whole county HPSAs were IMGs
					15.2% in nonmetropolitan partial county HPSAs were IMGs
					14.3% in non-HPSA's were IMGs

Study author, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Mick and Lee, 1999[34]	Cross-sectional; 69,065 physicians	Primary care physicians (allopathic and osteopathic) using AMA Masterfile and Area Resource File	IMG and USMG	Practice in county with low socioeconomic status (SES) composite variable	Primary care IMGs nationally were significantly more likely than primary care USMGs to be located in low SES counties, with a difference in proportion of -6.9 percent
			Proportion of physicians in each state's rural counties characterized by need	Practice area with high proportion of nonwhite population	12 states had significant primary care IMG disproportions
				Low physician-to-population ratio (112/100,00)	Significant primary care IMG disproportion of -4.1 percent, and -12.4 percent for specialty care
Mick and Lee, 1999[33]	Cross-sectional; 77 cities in the US	Practicing physicians using AMA Masterfile, linked to US Census zip-code level data	IMG and USMG	Practice in high poverty area (Proportion of physicians in high-poverty areas in US cities)	Large cities: 7 cities had IMG complements significantly exceeding the average 29.6% IMGs in high-poverty areas
					Mid-size cities: 10 cities significantly exceeded the average 21.6% IMGs in high-poverty areas
					Small cities: 6 cities significantly exceeded the 16.7% IMG average
Mick et al, 2000[35]	Cross-sectional; sample size not reported	Allopathic and osteopathic physicians from 1997 AMA Physician Masterfile linked to Area Resource File	IMGs and USMGs (Proportion of IMGs distributed in needy state counties divided by total number of IMGs in all state counties subtracted from analogous proportion of USMGs) (Negative value = IMG disproportion, and positive value = USMG disproportion)	Socioeconomic status (SES)	IMGs nationally more likely than USMGs to practice in counties with low SES (-1.2%, $P < .05$)
				Nonwhite % of population	IMGs nationally more likely than USMGs to practice in counties with high proportion nonwhite population (-3.8%, $P < .05$)
				Rural vs urban location	USMGs nationally more likely than IMGs to practice rural versus urban counties (1.4%, $P < .05$)

Study author, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Rabinowitz et al, 2000[36]	Cross sectional; 2,199 physicians	Allopathic and osteopathic generalist physicians (family practice, general practice, general internal medicine, or general pediatrics), U.S. graduates, random sample, 74% response rate	Member of an underserved/minority group	Practice in underserved area (practice in a federally designated area [HPSA or MUA], practice with 40% or more of medically indigent patients, or 40% or more patients who are poor)	AOR 2.9 (1.9-4.4), *P* < .001
			Growing up in an inner city or rural area		AOR 1.6 (1.3-2.0), *P* < .001
			Service in the NHSC		AOR 2.2 (1.6-3.0), *P* < .001
			Strong interest in underserved practice prior to medical school		AOR 1.7 (1.4-2.1), *P* < .001
			Family income when growing up		AOR 1.0 (0.9-1.2), *P* = .58
Polsky et al, 2002[37]	Retrospective cohort study; 19,940 physicians	IMGs who completed GME in the United States between 1989–1994 and who were in patient care practice 4.5 years later, used AMA Physician Masterfile	Foreign born IMGs from Asian countries	Practice in market areas where ethnic composition of the population matched their own ethnicity	RR 1.36, *P* < .05
			Foreign born IMGs from Hispanic countries		RR 1.39, *P* < .05
			All foreign born IMGs	Proportion of population below the poverty level	RR 2.013, *P* < .05
Fink et al, 2003[38]	Cross-sectional; 524,404 physicians	U.S. primary care physicians, used AMA Physician Masterfile linked to Area Resource File	USMG vs. IMG	Practice in rural underserved HPSA	2.1% vs 2.1% (percent of total primary care)
			US-IMG vs foreign born (FB)-IMG		1.5% vs 2.1%
			Family practice USMG vs. IMG		1.3% vs 0.4%
			Family practice US-IMG vs. FB-IMG		0.8% vs 0.4%
			Internal medicine USMG vs. IMG		0.3% vs 1.0%
			Internal medicine US-IMG vs. FB-IMG		0.4% vs 1.0%
Bach et al, 2004[16]	Cross-sectional; 4,355 physicians	150,391 visits by black and white Medicare beneficiaries 65 years of age or older	Physicians providing care to white patients vs. black patients	Income in areas of practice	Lower incomes in areas with black visits (*P* < .001)

Study author, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Yoon et al, 2004[14]	Cross-sectional; 1,364 physicians	Survey of primary care and specialist physicians practicing in California, 61% response rate	Spanish-speaking primary care physicians vs non-Spanish-speaking primary care physicians	Percent of residents in area who are LEP Spanish-speaking	15.3% vs 9.7%, *P* < .05
			Spanish-speaking specialist physicians vs non-Spanish-speaking specialist physicians	Percent of residents in area who are LEP Spanish-speaking	12.9% vs 9.2%, *P* < .05
Hughes et al, 2005[39]	Cross-sectional; 214 physicians	Cohort study of graduates of the University of California, San Francisco – Fresno Family Practice Residency Program 1970–2000	High school census track used to determine graduation from: 1) rural high school	Practice in rural area	32% vs 11% (*P* < .05) AOR 5.7 (2.0-16.4), (*P* < .05)
			2) high minority setting high school	Practice in area with high minority persons	31% vs 16% (*P* < .05) AOR 6.5 (1.1-37.6), (*P* < .05)
			3) high school in MUA	Practice in MUA	13% vs 18% (*P* > .05) AOR 0.7 (0.2-2.0), *P* > .05
			Graduate in rural training track	Practice in rural area	AOR 2.7 (1.2-6.4), (*P* < .05)
Wade et al, 2007[41]	Cross-sectional; 2,487 physicians	Family medicine graduates of Indiana University School of Medicine (1988–1997)	Non-metro hometown	Practice in rural area	AOR 4.7 (3.27-6.69), *P* < .001 for all specialties
					AOR 4.4 (2.51-7.82), *P* < .01 for family physicians
Mertz et al, 2007[40]	Cross-sectional; 3,862 physicians	Survey of primary care and specialist physicians practicing in California, no longer in training	South Asian IMG vs South Asian US-IMG	Practice in HPSA	AOR 1.6, *P* < .05
				Practice in MUA	AOR 1.1, *P* < .05
				Practice in rural area	AOR 1.6, *P* < .05
Thompson et al, 2009[42]	Cross-sectional; 205,063 physicians	AMA Physician Masterfile for allopathic and osteopathic primary care physicians linked to Rural-Urban Commuting Areas	IMG vs USMG	Rural and urban location using reported ZIP code	IMGs were significantly more likely than USMGs to practice in rural areas in 2 out of the 9 Census Divisions (East South Central and West North Central)

Study author, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Moreno et al, 2011[13]	Cross-sectional; 61,138 physicians	Survey of primary care and specialist physicians practicing in California, no longer in training, 83% response rate	Physician fluency in an Asian language	Practice in areas with high numbers of LEP Asian speakers	AOR 1.77 (1.63-1.92), *P* < .001
			Physician fluency in Spanish	Practice in areas with high numbers of LEP Spanish speakers	AOR 1.77 (1.43- 1.82), *P* < .001
Odom et al, 2012[43]	Cross-sectional; 48,388 physicians	Survey of primary care and specialist physicians practicing in California, no longer in training	African American, Latino, Asian, Pacific Islander and "other" racial and ethnic minority physicians vs white physicians	Practice in MUA	Range for AOR 1.22-2.25, *P* < .05
			African American, Latino, and "other" racial and ethnic minority physicians vs white physicians	Practice in HPSA	Range for AOR 1.40-1.97, *P* < .05
Rabinowitz et al, 2012[44]	Retrospective cohort study with control group; 762 physicians	Graduates of Jefferson Medical College from the classes of 1978-1982 self-reporting growing up rural, planning rural practice, and planning family medicine at matriculation	Having all three predictors of rural practice at matriculation vs having no predictors (695 with complete data)	Rural practice Location	45% (35%-55%) vs 12% (8%-15%) RR 3.9 (2.7-5.7), *P* < .001
Duffrin et al, 2014[45]	Cross-sectional; 2,829 physicians	Survey of practicing primary care physicians in North Carolina (family medicine, general practice, pediatrics, obstetrics/gynecology, and internal medicine), 34% response rate	Raised in hometown population of ≤ 11,000 vs. hometown population of > 11,000	Practice in rural area vs metro area	72% vs. 38.6%, *P* = .007

Abbreviations: HPSA indicates federally designated primary care Health Professional Shortage Area; MUA, Medically Underserved Area; NS, not significant; IMG, international medical graduate; USMG, U.S. medical graduate; GME, graduate medical education; AMA, American Medical Association; CUNY, City University of New York; LEP, low or limited English proficiency; NHSC, National Health Service Corp; AOR, adjusted odds ratio; RR, risk ratio.

[a]95% confidence intervals are provided in parentheses.

B. Studies That Examined Financial Factors as Predictors of Primary Care Physician Practice in Underserved Urban or Rural Areas (n = 13)

Study authors, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Pathman et al, 1994[46]	Retrospective cohort study with control group; 1,675 physicians	Primary care rural physicians, 675 in NHSC program and 1,000 non-NHSC physicians	NHSC physician participants vs. non-NHSC physicians	Practice in rural area and saw more minority patients	61.7% vs. 28.2%, *P* < .001
Cullen et al, 1997[47]	Cross-sectional; 2,903 physicians	NHSC scholarship recipients graduating from U.S. medical schools between 1975–1983 who were originally stationed in nonmetropolitan areas	Original NHSC assignment to rural location	Rural practice location in county of original assignment	20% of NHSC participants (no comparison group)
				Other rural practice	20% of NHSC participants
Xu et al, 1997[15]	Cross sectional; 1,911 physicians	Random sample survey of physicians (family practice, general internal medicine, or general pediatrics), 74% response rate	NHSC completion	Care for medically underserved patient populations	β coef. 7.46, *P* = .0001
Pathman et al, 2000[20]	Cross-sectional; 375 physicians	Survey of practicing family physicians, general internists, and pediatricians who graduated from U.S. medical schools in 1988 and 1992. 70% response rate	Obligated (participation in a support-for-service program) vs non-obligated (not serving a commitment)	Rural practice	33.3% vs 6.5%, *P* < .001 Adjusted odds ratio (AOR) 3.45, *P* < .001
				Average percentage of uninsured and Medicaid patients	53.1% vs 29.4%, *P* < .001 β-coef (adjusted) 0.273 for non-obligated, *P* < .001
Fryer et al,[48] 2002	Retrospective cohort study with control group; 177,558 physicians in practice	Graduates of US medical schools from 1981–1993 engaged in direct patient care in 2000	Exposure to Title VII funding in medical school and residency vs no exposure	Primary care HPSA	1.5% vs 1.1%
				Rural practice	12.7% vs 9.5%
Holmes, G, 2004[49]	Cross-sectional; 60,000 physicians	USMGs from 1997 AMA Physician Masterfile; 3 cohorts, restricted to primary care with traceable zip code	NHSC completion vs. other	Practice in any underserved area	Cohort 1: Probit coef 0.528 Cohort 2: Probit coef 0.697 Cohort 3: probit coef 0.812 (*P* < .01 for all cohorts)

Study authors, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Probst et al, 2003[50]	Cross-sectional 3,608 physicians, 15,201 patients	1998 active practicing South Carolina physicians, excluding trainees (NHSC alumni, N = 135)	NHSC completion vs. other South Carolina physicians	County poverty quartile	13.3% vs 3.7% (for highest quartile)
				County black population quartile	11.8% vs 3.5% (for highest quartile)
				Practice in HPSA	12.6% vs 5.1%
				Practice in FQHC	1.9% vs 0.5%
Brooks et al, 2003[51]	Cross-sectional 1,635 physicians	Survey of U.S. primary care physicians in Florida. 339 rural and 1,236 non-rural physicians, 61% response rate	NHSC completion vs. other	Rural practice	AOR 5.46 (4.20 to 7.10), *P* < .01
			Rural upbringing		Rural physicians were more likely to be raised in rural areas than suburban/urban colleagues (26% vs 13.4%; *P* = .01)
			Foreign-born		Foreign born AOR 1.85 (1.58 to 2.15), *P* < .05
Pathman et al, 2004[52]	Cross sectional 434 physicians	69 state support-for-service physician programs operating in 1996; programs provided financial support in exchange for service in underserved area. Matched group of 723 non-obligated physicians	Obligated vs non-obligated	Retention in service practice	Hazard ratio (HR) for leaving 0.75 (0.53-1.03), *P* = .08
				Care for uninsured and Medicaid patients	48.5% vs. 28.5%, *P* < .001
			Loan repayment vs other programs	Retention in service practice	HR 0.46 [0.30-0.70], *P* < .001
Krist et al, 2005[18]	Cross sectional 9,107 physicians	Family physicians	Exposure to Title VII funding in medical school and residency vs no exposure	Practice in low income communities	11.9% vs 9.9%, *P* ≤.02
				Practice in rural areas	24.5% vs 21.8%, *P* < .02
Lipkin et al, 2008[53]	Cross-sectional; 122 physicians	Graduates of Title VII funded New York Primary Care Internal Medicine Residency Program	Completion of program	Practice with underserved	90% work with the underserved (no comparison group)

Study authors, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Rittenhouse et al, 2008[54]	Cross-sectional; 412,012 physicians	Physicians in 2004 AMA Physician Masterfile merged with record of institution Title VII grant receipt, Medicare claims data and NHSC participant database	Primary care physician attendance of Title VII funded training program with academic grant	Work in community health center	AOR 1.12 (10.4-1.20), *P* < .01 for primary care physicians
			Primary care attendance of Title VII funded training program with residency grant		AOR 1.23 (1.16-1.31), *P* < .001 for primary care physicians
					AOR 1.41 (1.30-1.52), *P* < .001 for family physicians
			NHSC completion		AOR 6.16 (5.68-6.69). *P* < .01 for primary care physicians
Chou and Lo Sasso, 2009[19]	Cross-sectional; 3,758 physicians	Exiting residents in OB/GYN, surgery, general internal medicine, pediatrics, or family medicine in New York	Primary care physician with educational debt > $0 but < $100,000, vs with debt > $100,000	Practice in HPSA	RR 0.104 vs .017, *P* < .01 for primary care physicians
					Primary care physicians with no debt are 3 times more likely to locate in a HPSA
					Results non-significant for surgeons and OB/GYNs

Abbreviations: NHSC indicates National Health Services Corps; HPSA, federally designated primary care Health Professional Shortage Area; USMG, United States Medical Graduate; AMA, American Medical Association; OB/GYN, obstetrics/gynecology; AOR, adjusted odds ratio; HR, Hazard ratio; RR, risk ratio; FQHC, federally qualified health center.

[a]95% confidence intervals are provided in parentheses.

C. Studies That Examined Medical School Curricula and Programs as Predictors of Primary Care Physician Practice in Underserved Urban Areas (n = 8)

Study authors, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Johnson et al, 1989[55]	Case series; 1,985 physicians	Survey of Howard University College of Medicine (HUCM) graduates spanning 49 classes, 728 respondents, 37% response rate	Graduate of HUCM	Practice in large urban area	60% [no comparison group]
				Practice in the inner city	30%
Campos-Outcalt et al, 1997[56]	Cross sectional; 282 physicians	Survey of all Commitment to Underserved People (CUP) participants and random sample of non-participating classmates 1983-1987	Completion of the CUP program vs randomly selected nonparticipating classmates	Indian Health Service	AOR 7.42 (1.71-32.16), *P* = .001
				Practicing in rural area (communities < 25,000 persons)	32% vs. 10%; *P* = .004 AOR 5.94 (2.04-17.27), *P* = .001
			Family practice specialty		AOR 9.65 (3.52-26.55), *P* < .001
			Family practice specialty	Community health center ever	AOR 3.26 (1.32-8.07), *P* = .01
Gugelchuk et al, 1999[57]	Case series 765 physicians	Alumni of Western University (1982-1995), Osteopathic School	Graduation from Western University	Underserved practice location	20% [no comparison group]
Rabinowitz et al, 1999[58]	Retrospective cohort study; 206 physicians	Physicians who participated in the Jefferson Medical College Physician Shortage Area Program (PSAP) from 1978-1991	Completion of PSAP vs non-PSAP	Practice in HPSA or Health Manpower Shortage Area (HMPSA)	39% vs 9%, RR 3.2
Ko et al, 2007[59]	Cross-sectional; 1,071 physicians	Graduates of the UCLA/Drew program and controls from UCLA School of Medicine (1985-1995)	Completion of UCLA/Drew program vs UCLA students	Practice in area medically disadvantaged area (HPSA/MUA, rural, high minority area, or high poverty area)	OR 2.47 (1.59-3.83), *P* < .001

Study authors, year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
McDougle et al, 2010[60]	Retrospective cohort study with control group; 103 physicians	Graduates who completed the Ohio State University College (OSU) of Medicine postbaccalaureate program (PBP) from 1996-2002 and had been in practice for at least 1 year, with random control of non-PBP OSU graduates, 79% response rate	Completion of OSU PBP vs not in OSU PBP	Practice in HPSA/MUA	29.4% vs 5.1%, $P < .009$
				Practice in area with poor patients	67.6% vs 33.3%, $P < .003$
Lupton et al, 2012[17]	Retrospective cohort study with control group; 303 physicians	University of California postbaccalaureate (UCPB) alumni from 1986-2002 and 586 randomly selected control physicians in the AMA Physician Masterfile	Completion of UCPB program vs not in UCPB	Practice in high-poverty area	16.2% vs 8.7%, $P < .016$
				Practice in high Latino population area	18.3% vs 8.7%, $P < .01$
				Practice in high African American population area	29.8% vs 19.8%, $P < .02$
				Practice in HPSA/MUA	No difference
Roy et al, 2015[61]	Case series; 42 physicians	Survey of graduates of the Urban Underserved Program (UUP), response rate of 71.4% (n = 30), underserved defined as practicing in community health center; HPSA; FQHC; or > 40% of patients on Medicaid or uninsured or poor	Graduate of UUP	Practice in urban underserved area	75% (21/28) (no comparison group)

Abbreviations: NHSC indicates National Health Service Corps; HPSA, federally designated primary care Health Professional Shortage Area; FQHC, Federally Qualified Health Center; MUA, Medically Underserved Area; AOR, adjusted odds ratio; OR, odds ration; RR, risk ratio.

[a]95% confidence intervals are provided in parentheses.

D. Studies That Examined Medical School Curricula and Programs as Predictors of Primary Care Physician Practice in Rural Areas, Published 2008-2015 (n = 12)

Study authors, Year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Glasser et al, 2008[62]	Case series; 103 physicians	Graduates of University of Illinois College Rural Medical Education Program (RMED) program in current practice	Completion of RMED	Rural practice	64.4% (no comparison group)
Halaas et al, 2008[63]	Retrospective cohort study ; 901 physicians	Graduates of the Minnesota Rural Physician Associate Program (RPAP) in current practice	Completion of RPAP and primary care specialty	Rural vs metropolitan practice location	56% vs 44%, *P* = ns for primary care [no comparison group]
					61% vs 39%, *P* ≤ .001 for family medicine 26% vs 76%, *P* < .001 for internal medicine, pediatrics, medicine/pediatrics
			Raised in rural community vs metropolitan		31% vs 18%, *P* ≤ .001
Zink et. al, 2010[64]	Retrospective cohort study with control group; 3,365 physicians	215 graduates of the University of Minnesota-Duluth campus Rural Physician Associate Program (RPAP), 276 RPAP-Twin Cities campus graduates, and 2,874 non-RPAP graduates of both UMN campuses	Completion of RPAP	Rural practice	AOR 4.62 (3.01-7.09), *P* < .001
			Duluth campus		AOR 4.09 (2.81-5.96), *P* < .001
			Raised in rural community vs metropolitan		AOR 2.82 (2.10-3.79), *P* < .001
Rabinowitz et al, 2011[25]	Retrospective cohort study with control group; 1,551 physicians	Graduates from 3 rural programs from inception until 2005	Completed training in one of three rural programs	Rural practice	63% any specialty [range 45% to 76%; no comparison group]
					71% family medicine
					55% general internal medicine and pediatrics
					55% non-primary care specialties

Study authors, Year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Rabinowitz et al, 2011[65]	Retrospective cohort study with control group; 2,394 physicians	97 graduates of the Jefferson Medical College Physician Shortage Area Program (PSAP) and 2,004 JMC peers from the classes of 1992-2002	Completion of PSAP vs not in PSAP	Rural family medicine practice	32.0% vs 3.2% RR 9.9 (6.8-14.4), *P* < .001
Quinn et. al, 2011[66]	Retrospective cohort study with control group; 554 physicians	48 graduates of University of Missouri Rural Track Pipeline Programs (RTPP) and 506 non-RTPP graduates	RTPP participation	Rural location for first practice location	57% of RTPP [no comparison group]
Rabinowitz et al, 2012[67]	Retrospective cohort study with control group; 8,231 physicians	1,757 graduates of 3 medical school rural programs who were practicing in the state in which they trained, and 6,474 IMGs graduating in the same year and practicing in the same states	Graduation from U.S. rural training program vs IMG training	Rural family medicine practice	RR 10.0 (8.7-11.6), *P* < .001
				Any rural primary care specialty	RR 3.8 (3.5-4.2), *P* < .001
Rabinowitz, et al, 2012[68]	Retrospective cohort study with control group; 3,006 physicians	Graduates of Jefferson Medical College from 1978–2002 who reported a planned specialty at matriculation and were assessed for rural practice location in 2007	Planned family medicine specialty at matriculation	Rural practice	29.4% were practicing in rural areas
					1.5-2.1 times as likely to practice rural as other specialties
Crump et al, 2013[69]	Retrospective cohort study with control group; 1,391 physicians	60 graduates of the rural-based Trover Campus (ULTC) and non-ULTC graduates of the University of Louisville School of Medicine	Completion of ULTC vs non-ULTC	Non-metropolitan practice	RR 6.27 (4.26-9.24), *P* < .001
Deutchman, 2013[27]	Cross-sectional; N/A physicians	35 U.S. medical schools with rural tracks or rural tracks in development; reports on 18 programs that tracked students' practice location	Completion of rural track in medical school	Rural practice	Average of 44% of graduates practice in rural area [range: 20% to 73%]
MacDowell et al, 2013[70]	Retrospective cohort study with control group; 2,283 physicians	160 graduates of University of Illinois College Rural Medical Education Program (RMED) and 2,663 non-RMED graduates	Completion of RMED vs non-RMED	Rural practice	56.3% vs 6.9% OR 17.20 (12.18-24.35), *P* < .05
				CMS primary care shortage zip code	OR 12.77 (8.58-18.99), *P* < .05

Study authors, Year[ref]	Design; sample size	Participants and data source	Predictor(s)	Outcome(s)	Results[a]
Wendling et al, 2016[71,b]	Cross-sectional; 179 physicians	179 graduates of the Rural Physician Program (RPP) in Michigan (1978-2006) compared to 2792 graduates of other Michigan clinical campuses	Graduating from RPP vs not in RPP	Practice in HPSA	63% vs 49%, *P* < .001
				Rural practice	45% vs 14%, *P* < .001 AOR 3.09 (2.12-4.50), *P* < .001
			Rural origin		AOR 2.80 (2.09-3.74), *P* < .001
			Primary care specialty		AOR 1.65 (1.31-2.08), *P* < .001
			Gender (male)		AOR 1.39 (1.10-1.75), *P* = .006

Abbreviations: NHSC indicates National Health Service Corps; HPSA, federally designated primary care Health Professional Shortage Area; NA = not available; ns, not significant; AOR, adjusted odds ratio; OR, odds ratio; RR, risk ratio; IMG, international medical graduate; CMS, Centers for Medicare and Medicaid Services.

[a]95% confidence intervals are provided in parentheses.

[b]This study was published online ahead of print in August 2015.

E. Studies That Examined GME Programs as Predictors of Primary Care Physician Practice in Underserved Urban or Rural Areas (n = 20)

Study author, year[ref]	Design; sample size	Participants data source	Predictor(s)	Outcome(s)	Results[a]
Denton et al 1989[72]	Cross-sectional; 689 physicians	Graduates of Texas family medicine residecy programs (1979–1987)	Graduate of a Texas family medicine program	Rural practice	24.2% in city of < 10,000 people [no comparison group] 19.7%% in city of 10,000 to 24,999 people
Baldwin et al, 1995[73]	Cross-sectional; 503 physicians	Survey of graduates from University of Washington Family Medicine Residency Network from 1973–1990	Completion of University of Washington Family Medicine Residency	Rural practice	30% of graduates [no comparison group]
				Rural vs urban private practice	86% vs 64%
				Rural vs urban solo practice	24% vs 9%
West et al, 1996[74]	Case series; 358 physicians	Survey of University of Washington Family Practice Residency Network	Completion of University of Washington Family Medicine Residency	Rural practice	22.3% (n = 80) [no comparison group]
				Urban practice	56.8% (n =203)
				Mixed rural and urban rural	20.9% (n = 75)
Frisch et al, 2003[75]	Case series; 593 physicians	Graduates of 3 Kansas family medicine residency programs, survey had 87% response rate	Completion of family medicine residency program	Rural practice	32% [no comparison group]
Tavernier et al, 2003[76]	Cross-sectional; 775 physicians	Survey of 450 US family medicine residency programs on indicators associated with MUA exposure	Early MUA exposures combined with medical training experiences in underserved settings	Born/raised in MUA	57% vs. 35%, *P* < .0001, OR: 2.4, CI: 1.8-3.4
				Service experience in medical training	75% vs. 62%, *P* = .0005, OR: 1.9, CI: 1.3-2.6
Pacheco et al, 2005[77]	Cross-sectional ; 317 physicians	Graduates 1974–2004 of New Mexico family medicine training programs	Trained in rural residency program vs urban	Rural practice location	65.1% vs 25.8%, *P* < .001 [unadjusted]
			Minority vs non-minority	Rural practice location	35.4 vs 27.6%, *P* = .004 [unadjusted]

Study author, year[ref]	Design; sample size	Participants data source	Predictor(s)	Outcome(s)	Results[a]
Edwards et al, 2006[78]	Case series; 346 physicians	Survery of graduates from East Tennesse State University from 1978–2002	Completion of family residency program	Rural practice:	
				MUA only	28% [no comparison group]
				HPSA only	2.4%
				Both MUA and HPSA	62%
Florence et al, 2007[79]	Cross-sectional; 130 physicians	Graduates of the East Tennessee State University Community Partnerships Program (CPP) and controls from the traditional program who matriculated from 1992–2002	Completion of CPP program vs non CPP participation	Rural practice	46% vs 28%, *P* < .05 [unadjusted]
Morris et al, 2008[80]	Cross-sectional; 838 physicians	Survey of graduates from the Washington, Alaska, Montana, and Idaho (WAMI) Family Medicine Residency Network from 1986-2002	CHC vs non-CHC trained family physicians	Underserved settings	63.9% vs 37.3%, *P* < .001, OR: 2.7 (1.6,4.7)
				Rural Health Clinic	18.1% vs 6.4%, *P* < .001, OR: 2.4 (1.2, 5)
Reese et al, 2008[81]	Cross-sectional; 1,545 physicians	Graduates of 22 Family Medicine residencies that closed between 2000-2006	Completion of respective Family Medicine Program	Rural practice	21%
				Full or partial county primary care HPSA	68%
Cashman et al, 2009[82]	Case series; 347 physicians	Survey of graduates from University of Massachusetts Family Medicine Residency from 1976-1985, 1986-1995, 1996-2005	Completion of University of Massachusetts Family Medicine Residency	Current Practice HPSA:	[no comparison group]
				1976–1985	9.7%, *P* < .01
				1986–1995	15%, *P* < .001
				1996–2005	20%, *P* < .001
Ferguson et al, 2009[83]	Cross-sectional; 262 physicians	Survery of graduates from University of Massachusetts University-based family medicine residency	Residency training site	Current Underserved and rural practice	
				Community Health Center	29.3%, *P* < .001 vs 26.8%, *P* < .017
				Urban center	6.5%, *P* < .001 vs 22.6%, *P* < .017
				Rural center	10.3%, *P* < .001 vs 41.4%, *P* < .017

Study author, year[ref]	Design; sample size	Participants data source	Predictor(s)	Outcome(s)	Results[a]
Chen et al, 2010[84]	Cross-sectional; 175,649 physicians	Clinically active allopathic and osteopathic national physician cohort	Trained in rural residency program vs no rural program	Rural practice	RR = 3.4. *P* < .001
			Trained in rural family medicine residency vs no rural program		60% in rural practice RR 2.8, *P* < .001
Fordyce et al, 2012[85]	Cross-sectional; 201,213 physicians	2005 AMA Physician Masterfile and AOA Masterfile of USMD, DO and IMG primary care physicians (PCPs)	DO, USMD, or IMG training	Rural PCP workforce DO vs Non-DO	20.5% vs 14.9%
				Rural PCP workforce IMG vs Non-IMG	12.4% vs 9.1%
				Rural PCP workforce DO (total)	10.4% (n = 15,644)
				Rural PCP workforce IMG (total)	19.3% (n = 51,502)
Hixon et al, 2012[86]	Case series; 86 physicians	Graduates of University of Hawaii Family Medicine and Community Health graduates from 1993 to 2010	Completion of Hawaii Family Medicine Residency Program	Remain in Hawaii	73% [no comparison group]
				HPSA practice throughout United States	36%
Patterson et al, 2013[26]	Cross-sectional; 123 physicians	18 family medicine residencies with rural training tracks active 2008–2012; 18/25 programs reponded; 33 physicians with follow-up date	Completion of a family medicine residency with rural training track	Rural practice	71.9% [2-3x the proportion of family medicine residency graduates overall] 3 years after graduation: 60.6%
Petrany et al, 2013[87]	Retrospective cohort study with control group; 106 physicians	12 graduates of the Marshall University Family Medicine Residency Rural Track and 94 graduates of the traditional track	Completion of the MUFMR rural track vs traditional track	Rural practice location	83% vs 40%, *P* < .01

Study author, year[ref]	Design; sample size	Participants data source	Predictor(s)	Outcome(s)	Results[a]
Phillips et al, 2013[88]	Cross-sectional; 3,430 physicians	Residents in 828 rural health clinics (RHCs), federally qualified health centers (FQHCs), and critical access hospitals (CAHs) under whom a Medicare Part B claim was filed between 2001–2005, re-measured in 2009	Training in a RHC, FQHC, or CAH vs other types of sites	Practice in safety-net setting (RHC, FQHC, CAH)	52.6% of residents who had trained in a CAH, 38.1% who had trained in an RHC, and 31.2% who had trained in an FQHC between 2001–2005 were currently practicing in a safety net setting in 2009
Ross et al, 2013[89]	Cross-sectional; 62 physicians	Survey of graduates from Cascades East Family Medicine Residency (CEFMR) from 1994-2009	Completion of family medicine programs located in small community hospital	Practice in population < 25,000	60% of graduates [no comparison group]
				Practice in HPSA	63% of graduates
Crane et al, 2014[90]	Cross-sectional; 37 physicians	Survery of graduates of North Carolina Hendersonville Family Medicine Residency Program from 1999–2010	Completion of rural track training program	Rural practice	65% of graduates [no comparison group]
				Practice in full or partial HPSAs	60% of graduates

Abbreviations: GME indicates graduate medical education; HPSA, federally designated primary care Health Professional Shortage Area; MUA, Medically Underserved Area; IMG, international medical graduate; AMA, American Medical Association; AOA, American Osteopathic Association; OR, odds ratio; RR, risk ratio.
[a]95% confidence intervals are provided in parentheses.