Supplemental Digital Appendix 1

Thirty-One Articles Identified Through Electronic Searches and Reference List Review Addressing Individual Characteristics Related to Rural Primary Care Physician Recruitment and Retention (1993-May 2016)

Individual Characteristic	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure; Personal Attributes (personal trait)	Hancock (2009)[21]	Northeastern California and Northwestern Nevada 2006-2007	Qualitative interviews	Rural primary care physicians (n=22)	Two ways to gain rural exposure and familiarity are through rural upbringing and rural recreation. Some rural physicians reported that they chose to work in a rural area so they could help an underserved population. Experiences during upbringing can encourage resiliency.
Rural Exposure	Rabinowitz (2012)[22]	United States (US) 2007	Cross-sectional survey	Graduates (1978-1982) of Jefferson Medical College (JMC; n=762)	Of the 762 graduates, 172 (23%) were in rural practice. Rural background was independently related to rural practice ($p<0.001$).
Rural Exposure; Personal Attributes (gender)	Rabinowitz (2001)[23]	US 1999	Retrospective cohort comparison using Alumni database	Graduates (1978-1993) of JMC practicing primary care, completed the Physician Shortage Area program (PSAP) vs those who did not (PSAP n=220 vs non-PSAP n=3194)	Graduates who grew up in a rural area were significantly more likely to practice in a rural area (OR 4.0 95% CI 2.1-7.6; $p<.001$). Males more likely to be in rural practice (OR=1.8; 95% CI, 1.1-2.7; $p=.01$). Graduates who grew up in a rural area were significantly more likely to remain in a rural area (OR=1.6; 95%CI 1.1-2.5; $p=.03$).

Supplemental Digital Appendix 1. Continued

Individual Characteristic	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Exposure	Woloschuk (2004)[24]	Canada 2003	Cross-sectional database analysis	Graduates of the University of Calgary Medical School Family Medicine (FM) Residency 1996-2000 (n=85)	78 (92%) became family physicians; 14 (18%) practicing in a rural area. 7 (32%) with rural background and 7 (13%) with an urban background (RR=2.55; CI=1.01-6.42) became rural physicians.
Rural Exposure	Woloschuk (2005)[25]	Canada Year not reported	Cross-sectional survey	Graduates (1996-2000) of FM Residency at University of Alberta and University of Calgary (n=240)	Those in rural practice more likely to have lived in a rural community (<10,000 population) prior to their 18th birthday OR=2.14 (CL=1.13-4.03)
Rural Exposure	Szafran (2013)[26]	Canada 2006	Cross-sectional survey	Graduates (2001-2005) of the FM Residency Program at University Alberta or University of Calgary (n=171)	Compared to urban-upbringing, rural-upbring-ing physicians were not more likely to be in rural practice (17.2% vs 30.0%, p>0.05); but were more prepared for practice management (39.5% vs 60%; p=0.02) and healthcare reform issues (39.7% vs 60%; p=0.02), to establish a practice (35.9% vs 55% p=0.03), manage finances/business records (18.9% vs 40%; p=0.006), cope with time demands of rural practice (79.3% vs 95% p=0.02), understand rural culture (70.2% vs 92.5% p=0.004), small-community living (70.2% vs 92.5% p=0.004).

Supplemental Digital Appendix 1. Continued

Individual Characteristic	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Charles (2005)[27]	Australia Year not reported	Cross-sectional survey	Female general practitioners (GPs) who completed a 6-month rural attachment (N=65)	Prior residence in a rural area was related to plans to work in a rural area (p<0.01).
Rural Exposure; Personal Attributes (gender)	Rourke (2005)[28]	Ontario 1999	Cohort study using a cross-sectional survey	FM physicians (n=443; rural n=264 vs urban n=179)	Rural background physicians (<10,000 population) are more likely to practice in a rural area [Rural upbringing in rural=34.9%; rural upbringing in urban =14.6% (OR 3.31 95% CI 1.87-5.86)]. Males are more likely than females to practice rural [72% vs 50% (OR 2.57 95% CI 1.60-4.12)].
Rural Exposure	Chan (2005)[29]	Canada 2002	Cross-sectional survey	Rural FM physicians (n=382)	124 (33%) of rural physicians were raised in rural communities (<10,000 population). Those with rural upbringing were more likely to have some interest in rural medicine at the start of medical school (90% vs 67%; p<0.0001). At the end of postgraduate more rural raised physicians were certain they wanted to go into rural practice (92% vs 71%; p<0.0001).
Rural Exposure	Brooks (2003)[30]	Florida 2001	Cross-sectional survey	Primary care doctors (rural n=272, urban n=385, suburban n=343)	Based on univariate analysis, compared to urban physicians, rural physicians are more likely to be raised in a rural community (26% vs 13%; p=0.01)

Supplemental Digital Appendix 1. Continued

Individual Characteristic	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Exposure; Personal Attributes (gender)	Fryer (1997)[31]	Colorado 1995	Cross-sectional survey	Family physicians and GPs (n=986)	Multivariate analysis: Compared to urban physicians, rural physicians are more likely to be male (84.9% vs 76.3%; OR 1.79 95% CI: 1.14-2.81) and raised in a rural community (40.7% vs 25.6%; OR 1.68 95% CI: 1.12-2.52).
Rural Exposure; Personal Attributes (gender & age)	Wilkinson (2000)[32]	South Australia 1998	Cohort comparison using 2 cross-sectional surveys	Urban and rural GPs (urban n=236 vs rural n=268)	Rural GPs were more likely to have a rural background (37% vs 27%, p=0.02). Compared to urban GPs, rural GPs were younger (47 vs 50, P<0.01) and more likely to be male (81% vs 67%, p=0.001).
Rural Exposure	Easterbrook (1999)[33]	Ontario 1993	Cross-sectional survey	Graduates (1977-1991) of Queen's University FM residency (n=159)	Rural hometown was the only significant predictor of recruitment to rural practice (OR 4.77 95% CI: 1.91-11.90). Rural hometown was the only significant predictor of retention in rural practice (OR 4.92 95% CI: 1.98-12.12).

Supplemental Digital Appendix 1. Continued

Individual Characteristic	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Exposure; Personal Attributes (gender)	Wilkinson (2003)[34]	Nationwide Australia 2000	Case control study using cross-sectional survey data	Rural and urban GPs (n=2414)	GPs who spent their final year in a rural high school were more likely to be a rural GP (OR 3.18, 95% CI 0.99-10.22). Compared to urban GPs, rural GPs were more likely to be male (OR 1.61, 95% CI 1.17-1.73).
Rural Exposure	Duffrin (2014)[35]	North Carolina 2012	Cross-sectional survey	Primary care physicians (n=975)	Hometown with population ≤11,000 was a significant predictor for rural practice (p=0.007).
Rural Exposure	Stenger (2008)[40]	Nationwide US 2004-2005	Cross-sectional survey	Rural primary care physicians (n=160)	24.3% reported rural background was an important attribute to be a good rural physician. Women more likely to report intention to stay in rural practice for next decade (p=.034)
Rural Exposure	Costa (1996)[42]	Nationwide US 1994	Cross-sectional survey	3rd year FM residents (n=1,012)	Residents prefer to practice in a community similar in size to where they grew up (Spearman r=0.44, p<0.01)
Rural Exposure	Hyer (2007)[44]	US 2006	Descriptive study	Active US-born physicians (n=540,000)	Physicians with a rural upbringing are 4 times more likely to practice rural medicine than those with an urban upbringing; this relationship is even more pronounced among family medicine physicians.

Supplemental Digital Appendix 1. Continued

Individual Characteristic	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Potter (1995)[45]	Alaska 1992	Cross-sectional survey	FM physicians (n=150)	Physician background was not predictive of practice location (50% rural background vs 50% urban background)
Rural Exposure	Myhre (2015)[46]	Canada, US, Australia 1970-2014	Scoping review of literature	Factors that predispose urban-origin students to be rural physicians (17 articles)	One reason urban-origin students choose rural practice is because of their premedical school mindset to practice rurally.
Rural Exposure	Manusov (2010)[47]	US Year not reported	Literature review	To develop a framework to discuss rural background (15 articles)	There were 5 “connectors” identified as ways to define rural background: 1) "did you grow up in a rural area?"; 2) a rural county of birth; 3) grew up in a town of less than 10,000 persons; 4) graduation from a high school located in a town less than 10,000 persons; 5) self-declared rural county of residence.
Personal Attributes (personal trait)	Geyman (2000)[20]	US Year not reported	Literature review	Programs and initiatives that prepare and place rural GPs (125 articles)	Medical school applicants with service orientation or previous community service work may be more likely to become a rural physician.
Personal Attributes (personal trait)	Ferguson (2009)[36]	US Year not reported	Cross-sectional survey	FM Residency graduates at University of Massachusetts (n=262)	Interest in underserved was associated with initial practice location (OR=3.87 (1.65-9.05)) and current practice location (OR=2.84 (1.14-7)).

Supplemental Digital Appendix 1. Continued

Individual Characteristic	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes related to Recruitment and Retention**
Personal Attributes (gender)	Jamieson (2013)[37]	British Columbia, Canada 1998-2009	Retrospec-tive cohort comparison using survey data	FM Graduates (1990-2007) at the University of British Colombia (n=649 responses from 480 people)	Men were more likely to choose to go into rural practice (OR 2.397; p=0.004).
Personal Attributes (age)	Horner (1993)[38]	North Carolina 1981-1989	Retrospec-tive cohort comparison using North Carolina database	Rural and urban primary care physicians (n=1,947)	Rural physicians: older (31.7 v 30.1 years old; p<0.001) and more men (80.9% vs. 68.4%; p<0.001).
Personal Attributes (personal trait)	Eley (2009)[39]	Australia 2006	Cross-sectional survey	GPs (rural n=120, urban n=94)	Rural GPs scored higher than urban GPs in Novelty Seeking (t=2.53, p<0.01) and lower in Harm Avoidance (t=1.983, p<0.04)
Personal Attributes (gender)	Weeks (2008)[41]	Nationwide US 1992-2002	Secondary analysis cross-sectional surveys from 1992-2002	Primary care physicians (n=7,098)	Rural family medicine physicians are more likely to be male (86.3% v 81%; p=0.022) than urban physicians.

Supplemental Digital Appendix 1. Continued

Individual Characteristic	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Personal Attributes (gender)	Doescher (2000)[43]	Nationwide US 1996	Descriptive study	Female GPs (n=91,146)	More female family/general practice physicians in rural practice than urban practice (12.4% vs 20.1%).
Personal Attributes (gender)	Spenny (2000)[48]	Northwestern US 1997	Cross-sectional survey	Rural FM physicians (n=63)	Recruitment of female physicians was influenced by availability of part time work and opportunities for personal partners ($p<0.001$). Professional isolation and potential lack of privacy in rural areas discouraged them.
Personal Attributes (gender)	Shannon (2006)[49]	West Virginia 2001	Cross-sectional survey	Rural primary care physicians (n=200)	Compared to men, women worked fewer hours (40hrs vs 50 hrs; $p<0.01$) and call days per week (2 vs 3.5; $p<0.01$).
Personal Attributes (gender)	Phillips (2016)[50]	Nationwide US 2012	Qualitative interviews	Female, rural FM physicians (n=25)	Reduced or flexible work hours, supportive relationships, and clear work-life boundaries help women build successful careers.

Abbreviations: US, United States; JMC, Jefferson Medical College; PSAP, Physician Shortage Area Program; OR, odds ratio; FM, family medicine; RR, risk ratio; Cl, confidence interval; GP, general practitioner.

Supplemental Digital Appendix 2

Fifteen Articles Identified Through Electronic Searches and Reference List Review Addressing Medical School Factors Related to Rural Primary Care Physician Recruitment and Retention (1992-2015)

Medical School Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure; Rural Emphasis	Geyman (2000)[20]	United States (US) Years not reported	Literature review	Programs and initiatives that prepare and place rural generalist physicians (125 articles)	Many medical school admission committees' target students with rural backgrounds or interests. Medical schools with a rural focus often implement decentralized rural curriculums that involve rural, community based clinical experiences. Other factors such as the medical school's type and mission, faculty role models with rural experience, and generalist focus can also play a role in rural physician placement.
Rural Exposure	Woloschuk (2004)[24]	Canada 2003	Cross-sectional database analysis	Graduates of the University of Calgary Medical School who entered family medicine (FM) residencies between 1996-2000 (n=85)	85 students were potential FM doctors in the previous study. 78 (92%) became family physicians; 14 (18%) practicing in a rural area.
Rural Exposure	Rourke (2005)[28]	Ontario 1999	Cohort study using a cross-sectional survey	FM physicians (n=443; rural n=264 vs urban n=179)	Rural physicians were significantly more likely to have had rural training in medical school [Rural training=55.4% vs no rural training=35.2% (OR 2.46, 95% CL 1.53-3.96)].

Supplemental Digital Appendix 2. Continued

Individual Characteristic	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Chan (2005)[29]	Canada 2002	Cross-sectional survey	Rural FM physicians (n=382)	Urban-background physicians were more likely to report rural exposure in medical school and residency were important in practice location (18.8% vs 9.0%; p=0.015).
Rural Exposure	Wilkinson (2000)[32]	South Australia 1998	Cohort comparison using 2 cross-sectional surveys	Urban and rural general practitioners (GPs) (urban n=236 vs rural n=268)	Rural GPs were more likely to have received rural primary (33% vs 19%, p=0.001) and secondary (25% vs 13%, p=0.001) education. Having a rural primary education (OR=2.43, 95% CI, 1.09-5.56) was independently associated with rural practice.
Rural Exposure	Wilkinson (2003)[34]	Nationwide Australia 2000	Case control of cross-sectional survey data	Rural and urban GPs (n=2414)	Compared to urban GPs, rural GPs were more likely to have had rural medical school training (OR 1.61, 95% CI 1.32-1.95).
Rural Exposure	Stenger (2008)[40]	Nationwide US 2004-2005	Cross-sectional survey	Rural primary care physicians (PCP; n=160)	45.7% reported rural exposure in medical school= very important attribute for good rural physician.
Rural Exposure	Myhre (2015)[46]	Canada, US, Australia 1970-2014	Scoping review of literature	Factors that predispose urban-origin students to be rural physicians (17 articles)	One reason urban-origin students choose rural practice was the influence of rural training during medical school.

Supplemental Digital Appendix 2. Continued

Medical School Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Rabinowitz (1999)[51]	US 1996	Retrospective cohort comparison using Alumni database	Graduates (1978-1991) of Jefferson Medical College (JMC) who completed the Physician Shortage Area program (PSAP) and those who did not (PSAP n=206 vs non-PSAP n=2793)	Compared to non-PSAP graduates, PSAP graduates were more likely to practice rural family medicine (67/2701=2% vs 42/200=21%; RR, 8.5). Compared to non-PSAP graduates, more PSAP graduates remained in rural practice for 5-10 years (33/38=87% vs 46/55=84%).
Rural Exposure	Rabinowitz (2005)[52]	US 2002	Retrospective cohort comparison using Alumni database	Graduates (1978-1986) of JMC who completed the PSAP and those who did not (n=92; PSAP n=38 vs non-PSAP n=54)	26 of 38 (68%) PSAP graduates entered and still practiced rural FM in the same rural area in 2002 compared to 25 of 54 (46%) non-PSAP graduates (p=0.03). PSAP graduates remained in rural FM significantly longer (p=0.04)
Rural Exposure	Rabinowitz (2013)[53]	US 2011	Retrospective cohort comparison using Alumni database	Graduates (1978-1986) of JMC who first located as rural family medicine physicians (n=89; PSAP n=37 vs non-PSAP n=52)	26 of 37 (70.3%) PSAP graduates entered and still practiced rural FM in the same rural area in 2011 as compared to 24 of 52 (46.2%) non-PSAP graduates (p=0.02).

Supplemental Digital Appendix 2. Continued

Medical School Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Exposure	Halaas (2008)[54]	US 2007	Cross-sectional database analysis	FM (n=605) and primary care (n=707) graduates of Rural Physician Associate Program in Minnesota	Of the primary care graduates, 396 (56%) chose rural practice. Of the FM graduates, 369 (61%) chose rural practice.
Rural Emphasis	Brooks (2003)[30]	Florida 2001	Cross-sectional survey	PCPs (rural n=272, urban n=385, and suburban n=343)	Medical students who experience more exposure to rural medicine and rural community living were more likely to go into rural practice (22% vs 17%; $p<0.05$ and 18% vs 10%; $p<0.05$, respectively).
Rural Emphasis	Fordyce (2012)[55]	Nationwide US 2005	Cross-sectional database analysis	PCPs [Osteopathic (DO) n=3,213, international medical graduate (IMG) n=5,952]	DO PCPs were more likely than allopathic PCPs to participate in rural places (20.5% vs 14.9%). Compared to US allopathic and IMG PCPs, Dos are most likely to practice in small (29.4% vs 29.9% vs 31.3%) and isolated small rural areas (13.7% vs 12.6% vs 19.5%). In the US, DOs contributed 10.4% of total rural physicians; in North Carolina, only 2.9%. Rural US DO per 100,000 = 5.7; Rural US allopathic PCPs per 100,000=38.6; Rural IMG PCPs per 100,000 = 10.6. Rural DOs are least likely to practice in rural persistent poverty areas compared to US allopathic and IMG PCPs (7.8% vs 9.3% vs 12.4%).

Supplemental Digital Appendix 2. Continued

Medical School Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Emphasis	Rosenblatt (1992)[56]	Nationwide US 1991	Cross-sectional database analysis	Graduates (1976-1985) of American medical schools (medical schools n=121; students n=122,034)	25.6% of students in rural practice were from 12 medical schools. Four medical school characteristics strongly associated with rural practice are: 1) Rural state; 2) Public ownership; 3) Production of family physicians; and 4) Less research emphasis

Abbreviations: US, United States; FM, family medicine; OR, odds ration; GP, general practitioner; Cl, confidence interval; JMC, Jefferson Medical College; PSAP, Physician Shortage Area Program; PCP, primary care physician; DO, osteopathic doctor; IMG, international medical graduate.

Supplemental Digital Appendix 3

Forty-Three Articles Identified Through Electronic Searches and Reference List Review Addressing Residency Factors Related to Rural Primary Care Physician Recruitment and Retention (1998-May 2016)

Residency Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure; Rural Preparation	Woloschuk (2005)[25]	Canada Year not reported	Cross-sectional survey	Graduates (1996-2000) of Family Medicine (FM) Residency at University of Alberta & Calgary (n=240)	Rural culture and rural community leadership= important nonclinical factors for rural practice. Most (72.9%) prepared for rural culture; Fewer (40%) prepared for community leadership. Preparation for community leadership was significantly associated with rural practice (OR 1.92, 95% CI 1.03-3.61).
Rural Exposure	Szafran (2013)[26]	Canada 2006	Cross-sectional survey	Graduates (2001-2005) of FM Residency at University Alberta & University of Calgary (n=171)	Compared to urban-raised students with no rural rotation in residency, urban-raised students with rural exposure in residency were significantly more prepared for 1) Time demands of rural practice (83 vs 53.3; p=0.02); 2) Understanding rural culture (74.3 vs 40; p=0.01); and 3) Small community living (74.3 vs 40; p=0.01)
Rural Exposure	Charles (2005)[27]	Australia Year not reported	Cross-sectional survey	Female general practitioners (GP) who completed a 6-month rural attachment (n=65)	82% of participants felt the rural attachment was a positive experience. 33% were more likely to practice rural medicine because of the rural experience. The rural experience influenced 14% of participants against rural practice.

Supplemental Digital Appendix 3. Continued

Residency Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Rourke (2005)[28]	Ontario 1999	Cohort study using a cross-sectional survey	FM physicians (n=443; rural n=264 vs urban n=179)	Compared to urban physicians, rural physicians were significantly more likely to have ≥8 weeks of rural training in residency (OR 2.17 95% CI 1.28-3.69). >6 months of rural exposure was significantly associated with rural practice (OR 10.70, 95% CI 3.26-35.18).
Rural Exposure	Chan (2005)[29]	Canada 2002	Cross-sectional survey	Rural FM physicians (n=382)	Urban-background physicians were more likely to report rural exposure in medical school and residency were important influences on practice location (18.8% vs 9.0%; p=0.015)
Rural Exposure; Rural Preparation	Brooks (2003)[30]	Florida 2001	Cross-sectional survey	Primary care physicians (rural n=272, urban n=385, and suburban n=343	Physicians who received training in rural areas (OR: 1.69, 95% CI: 1.42-2.02) and obstetrical training (OR: 1.28, 95% CI: 1.1-1.48) in residency were more likely to choose rural medicine.
Rural Exposure	Easterbrook (1999)[33]	Ontario 1993	Cross-sectional survey	Graduates (1977-1991) of Queen's University FM residency (n=159)	Rural exposure during residency was not significantly correlated with choosing rural practice (RR 1.62, 95% CI 0.82-3.16).

Supplemental Digital Appendix 3. Continued

Residency Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Wilkinson (2003)[34]	Nationwide Australia 2000	Case control of cross-sectional survey	Rural and urban GPs (n=2414)	Rural GPs were more likely to have rural training in residency (OR 3.14, 95% CI 2.57-3.83). There is a positive correlation between length of rural training and likelihood of rural practice; GPs with ≥50% of training rural=most likely to be rural GPs (OR 10.52, 95% CI 5.39-20.51).
Rural Exposure	Ferguson (2009)[36]	United States (US) Year not reported	Cross-sectional survey	Graduates of FM Residency at University of Massachusetts (n=262)	Placed rural: Federally Qualified Health Center (FQHC) training site 21/82=25.6%; Urban training site 24/93=25.8%; Rural training site 36/87=41.4%; p=0.035. Retained rural: FQHC training site 22/82=26.8%; Urban training site 21/93=22.6%; Rural training site 36/87=41.4%; p=0.017.
Rural Exposure	Jamieson (2013)[37]	British Columbia Canada 1998-2009	Retrospective cohort comparison using survey data	Graduates (1990-2007) from FM residency at University of British Columbia (n=649 responses; 480 people)	Residents trained in nonmetropolitan sites were more likely to choose rural practice (OR 15.48, 95% CI 7.22-33.19). Those trained in nonmetropolitan sites were more likely to remain in rural practice ≥1 year (95% CI 12.2-108.5)

Supplemental Digital Appendix 3. Continued

Residency Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Exposure; Rural Preparation	Stenger (2008)[40]	Nationwide US 2004-2005	Cross-sectional survey	Rural primary care physicians (n=160)	Important rural physician attributes: 1) Rural exposure in residency (68.8%); 2) Community involvement (61%); and 3) Rural mentor (49.7%). Rural exposure in residency is associated with preparedness to live/practice in a rural area (p<.01). Retention associated with preparedness to live/practice in rural area (p=.02).
Rural Exposure	Myhre (2015)[46]	Canada, US, Australia 1970-2014	Scoping literature review	Factors that predispose urban-origin students to be rural physicians (17 articles)	One reason urban-origin students choose rural practice was the influence of rural training during residency.
Rural Exposure; Rural Preparation	Pathman (1999)[58]	Nationwide US 1991 & 1996-7	2 Cross-sectional surveys	Rural primary care physicians who had moved to nonmetropolitan areas between 1987-1990 (n=456)	Rural residency rotations associated with preparedness for rural practice (p=0.004) & rural living (p=0.03). Rural medicine emphasis prepared residents for rural practice (p=0.007). Preparedness for rural practice and rural living are correlated (CC=0.51; p<0.001). Retention associated with preparedness for rural living (HR .074, p=.0001).

Supplemental Digital Appendix 3. Continued

Residency Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Elliott (2009)[59]	Adelaide, Australia 2007	Qualitative interviews	GP registrars pre- or post-rural placement (n=30)	Many pre-placement expectations were negative; most post-placement experiences were positive. Negative expectations turned positive experiences: supervision, managing emergency/trauma, clinic structure, finding childcare, community integration, and having tasks. Other positive experiences reported: being known to all and support from training providers, division, family and friends, & self. Negative expectations reported as negative experiences: family separation, busy workload, & amount of driving.
Rural Exposure	Smith (2012)[60]	Mississippi 2010	Qualitative text analysis of narrative writings	University of Mississippi Medical Center rural rotation participants (n=36; residents n=13, students n=23)	Four themes: positive reflections, community health (meaningful impact & relationship building), limited healthcare access (lack of physicians & underserved patients), and altered prior perceptions (developed interest in rural practice).
Rural Exposure	Chan (2006)[61]	Canada 2002	Cross-sectional survey	Rural FM physicians (n=348)	Duration of exposure during residency: 58% believed right duration (median=6 months/24 months; 3-10 months); 40.2% believed wrong duration (median 2 months/24 months; 1.5-3 months); The preferred amount of rural exposure during residency= 6 months (4-8)

Supplemental Digital Appendix 3. Continued

Residency Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Exposure; Rural Emphasis	Bowman (1998)[62]	Nationwide US 1994-1996	Cross-sectional survey	FM residency programs (n=353)	Programs with the most rural graduates: more rural & obstetrical training, procedural emphasis, fewer major graduate programs, a rural mission, a program director with rural experience, fewer female and minority residents, and were located in rural area. More residents with longer rural exposure choose rural practice than those with shorter exposure (22+ months rural = 68.5% in rural practice; 4-6 months=51.0%; 3 months= 52.3%; 2 months= 45.6%; 1 month= 36.5%; 0 months=24.4%)
Rural Exposure	Edwards (2006)[63]	US 2003	Cross-sectional database analysis	Graduates (1978-2002) of 3 FM programs (n=346)	48% of family medicine physicians chose rural practice.
Rural Exposure	Ross (2013)[64]	US 2009	Cross-sectional survey	Cascades FM Rural Training Track (RTT) Graduates (n=62)	Placement rural: <25,000 population: 37 (60%); <10,000 population: 28 (45%). Retention rural: <25,000 population: 31(50%); <10,000 population: 23 (37%).

Supplemental Digital Appendix 3. Continued

Residency Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Frisch (2003)[65]	US 1992-2000	5 biennial cross-sectional surveys	Graduates of 3 FM residencies affiliated with Kansas University School of Medicine (n=484)	Placement: 61% non-metro counties (RUCA=4-9); 32% rural (RUCA=7-9). No difference in retention urban vs rural (median 5 yrs) Migration between 1992-2000: 62 (39.7%) moves more urban; 24 (15.4%) moves more rural; 70 (44.9%) lateral moves
Rural Exposure	Pacheco (2005)[66]	US 2004	Cross-sectional database analysis	Graduates of the FM Residency at University of New Mexico (n=317)	Compared to graduates of the urban program, graduates of the RTT were more likely to work in rural New Mexico [23 (25.8%) vs 41 (65.1%); p<0.001]
Rural Exposure	Crane (2014)[67]	North Carolina Year not reported	Descriptive study	Mountain Area Health Education Center FM Residency Hendersonville (n=37)	Placement rural: 65% of 37 RTT graduates
Rural Exposure	Rosenthal (2000)[68]	US 1998	Cross-sectional survey	Graduates of 13 RTT FM residencies (n=64)	76% of RTT graduates work in rural areas (<25,000 population).

Supplemental Digital Appendix 3. Continued

Residency Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Petrany (2013)[69]	West Virginia 2010	Cohort comparison of academic outcomes and practice outcomes	Graduates from FM Residency at Marshall University who began in 1994-2006 (rural n=12, traditional n=94)	Placement rural: rural track: 10/12=83.3%; traditional track: 38/94=40.4% (ADJ OR: 7.54, 95% CI 1.5-37.9)
Rural Exposure	Nash (2008)[70]	US 2007	Cross-sectional database analysis and qualitative focus groups	Graduates from FM RTT Residency at the University of Texas (n=7)	Placement rural: 6 (85.7%). Qualitative: RTT prepared residents well for rural practice (procedural skills, confidence, communication, continuity, and practice management).
Rural Exposure	Patterson (2016)[71]	Nationwide US 2013 & 2015	Cross-sectional survey and database analysis	Graduates of RTT between 2007-2015 (n=204)	Placement rural: 67 (32.8%) 1 year post-graduation. Retention rural: 12 (35.3%) 7 years post-graduation.
Rural Exposure	Malaty (2002)[72]	Nationwide US 1999	Cross-sectional survey	FM RTT residencies (n=22)	In 1996-1998, RTT mean match rate: 61%; all FM residencies mean match rate: 86%

Supplemental Digital Appendix 3. Continued

Residency Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Exposure	Patterson (2016)[73]	Nationwide US 2013	Cross-sectional survey	Rural centric FM residencies (≥8 wks rural exposure) (n=29 programs; n=431 residents)	Placement rural: 136 (31.6%). Retention rural (5 yrs post residency): 48 (53.9%) Graduates from rural located residencies were more likely to go into rural practice than those from urban located (>60% vs 4.7%).
Rural Exposure	Peach (2004)[74]	Victoria, Australia 2002	Retrospective matched (sex) cohort study	Medical interns at selected hospitals between 1989-1997 (non-metropolitan n=32; metropoli-tan n=49)	Placement rural: 14 (44%) non-metropolitan interns; 6 (13%) metropolitan interns (difference 31%, 95% CI 17%-45%; p<0.001)
Rural Exposure	Wilson (2003)[75]	US 2003	Cross-sectional survey	East Tennessee State University FM RTT Graduates (1978-2002; n=352)	Placement rural: 75/182=41%
Rural Exposure	Larkins (2003)[76]	Australia 1999-2003	Time series using annual surveys and psychometric scales	GP registrars (year 1 n=213, year 2 n=226, year 3 n=203, year 4 n=98)	≥50% reported a problem in years 2, 3, & 4. Lower enthusiasm for training was associated with those who reported problems (p<.01). Problems with work conditions, administration, and rural rotation

Supplemental Digital Appendix 3. Continued

Residency Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Exposure	Lu (2008)[77]	Alberta, Canada 2004	Qualitative focus groups	2nd year FM residents from University of Calgary (n=17)	88% planned urban practice. Reasons: social (family responsibilities & lifestyle), work (demand, call burden, little interaction with doctors, satisfaction) & financial
Rural Exposure	Bayley (2011)[78]	New South Wales Year not reported	Qualitative interviews	GP registrars (n=15)	Rural placements=mostly positive experience. Negative aspects: stresses from personal life disruption and more clinical responsibility. Some experienced anxiety and depression.
Rural Exposure	Janke (2013)[79]	Nationwide Canada 2009	Cross-sectional survey	2nd year FM residents (n=141; rural n=29, urban=112)	Motor vehicle events: 76% rural; 60% urban (p=.08). Motor vehicle crashes: 37.9% rural; 17.9% urban (p=.03). Rural residents drove significantly more kilometers (37,103 vs 22,528, p<.001).
Rural Preparation	Hays (2003)[80]	North Queens-land Australia 2001	Follow-up qualitative interviews	Rural GP (10+ years rural) (n=13)	Retention rural: 13/18=72% of original interview group. Stable and successful rural physicians reported stronger community links.

Supplemental Digital Appendix 3. Continued

Residency Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Preparation	Cameron (2012)[81]	Alberta, Canada Year not reported	Qualitative collective case study	Rural retention of FM doctors ≥4 yrs (n=4). Participants: community, spouses, hospital/office staff & physicians (n=43)	1 of 3 domains (and key factors) influence physicians' decisions to remain rural: Community=appreciation, connection, active support, and physical/recreational assets.
Rural Preparation	Auer (2010)[82]	Australia Year not reported	Qualitative interviews	Rural GPs (N=19)	One factor contributing to place attachment/retention/ migration: person (community involvement, length of residence).
Rural Residency Emphasis	Fagan (2013)[83]	Nationwide US 2009	Cross-sectional database analysis	FM residency graduates	Upon graduation, 56% of FM residents practice within 100 miles of residency.
Rural Residency Emphasis	Chen (2010)[84]	Nationwide US 2005	Cross-sectional database analysis	Active allopathic and osteopathic physicians who graduated from medical school between 1988-1997 (n=175,649)	Placement rural: 6,282 (22.6%) family physicians. 60% family physicians from rural-located residencies; they were significantly more likely to practice rural medicine than graduates from urban-located residencies (RR=2.8, P<0.001).

Supplemental Digital Appendix 3. Continued

Residency Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Emphasis	Curet (2000)[85]	New Mexico Year not reported	Cross-sectional survey	Primary care physicians (n=534)	General surgeon accessibility: 88% for population 2,000-10,000; 61% for population <2,000. Trauma knowledge and clinical skills significantly more important for rural than urban physicians ($p<0.05$).
Rural Emphasis	Young (1999)[86]	US Year not reported	Cross-sectional survey	Graduates (1959-1995) of the FM residency at John Peter Smith Hospital Texas working in rural areas (n=102)	65 (64%) practiced obstetrics; more so more recently. 94 (92%) manage critically ill patients. More recently, significant increases in office procedures (colonoscopy and esophagogastroduodenoscopy, $p<0.05$). Most provided pediatric hospital care [96 (94%)] and closed fracture management [89 (87%)].
Rural Emphasis	Weigel (2015)[87]	Iowa 2009	Secondary analysis of commercial health insurance claims data	Primary care physicians (n=3,126,971 claims from 2,649 physicians)	Nonmetropolitan physicians provided more medical care than metropolitan doctors: office-based evaluation and management services, hospital based observation care, emergency department care and nursing facility care ($p<0.0001$). Nonmetropolitan FM doctors provided more hospital based inpatient, observation, normal newborn, nursing facility, and emergency department care, surgery related services, drugs and injections ($p<0.0001$).

Supplemental Digital Appendix 3. Continued

Residency Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Emphasis	Goertzen (2006)[88]	Ontario 2000-2001	Cohort comparison 3 surveys	FM residents - 5 programs (rural n=144, urban n=391)	Upon graduation, compared to urban residents, rural residents rated their procedural experience (p<.001) and competence (p=.004) significantly higher.

Abbreviations: FM, family medicine; OR, odds ration; Cl, confidence interval; GP, general practitioner; US, United States; FQHC, Federally Qualified Health Center; HR, hazard ratio; RTT, Rural Training Track; RUCA, Rural-Urban Commuting Area Codes; ADJ OR, adjusted odds ratio.

Supplemental Digital Appendix 4

Thirteen Articles Identified Through Electronic Searches and Reference List Review Addressing Placement Factors Related to Rural Primary Care Physician Recruitment and Retention (1991-2005)

Placement Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Partner and Spouse Preferences	Chan (2005)[29]	Canada 2002	Cross-sectional survey	Rural family medicine (FM) physicians (n=382)	Having a spouse or partner interested in rural lifestyle was an important factor for 4% of physicians when choosing rural practice.
Partner and Spouse Preferences	Wilkinson (2000)[32]	South Australia 1998	Cohort comparison using 2 cross-sectional surveys	Urban and rural general practitioners (GPs) (urban n=236 vs rural n=268)	Rural GPs were more likely to have a partner with a rural background (49% vs 24%, p=0.001).
Partner and Spouse Preferences	Costa (1996)[42]	Nationwide United States (US) 1994	Cross-sectional survey	3rd year FM physician residents (n=1,012)	Important factors in 1st practice location choice: Significant other's wishes (85.2%), medical community friendly to family physicians (76.3%), recreation/culture (60.7%), proximity to family/friends (60.1%), and significant other's employment (59.2%). Family issues were most important for 1st practice location selection.

Supplemental Digital Appendix 4. Continued

Placement Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Partner and Spouse Preferences	Spenny (2000)[48]	North-western US 1997	Cross-sectional survey	Rural FM physicians (n=63)	For female physicians, opportunities for a personal partner are more likely to help recruit ($p<0.001$)
Partner and Spouse Preferences	Lu (2008)[77]	Alberta, Canada 2004	Qualitative focus groups	2nd year FM residents from University of Calgary (n=17)	88% planned urban practice. Reasons: social (family responsibilities and lifestyle), work (demand, burden of call, little interaction with other doctors, satisfaction) and financial
Partner and Spouse Preferences	Rosenthal (1992)[93]	US 1989	Cross-sectional survey	Graduates (1970-1989) of the New York State FM Residency (n=711)	Spouse opinion (86%), hospital consultants (73%), hospital services (71%), colleague interaction (70%), and after-hours coverage (70%) were most important factors for practice location.
Partner and Spouse Preferences	Riley (1991)[94]	Washington, Oregon, Indiana, North Dakota Year not reported	Cross-sectional survey	FM residents and graduates from 12 residencies (n=433)	A spouse or partner reluctant to move and an unreceptive community were sources of dissatisfaction with site visits to rural communities.

Supplemental Digital Appendix 4. Continued

Placement Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Financial Incentives	Geyman (2000)[20]	US Years not reported	Literature review	Programs and initiatives that prepare and place rural GP (125 articles)	National Health Service Corp (NHSC) is helpful in placing rural physicians, but less helpful in retention. Other federal and state funding has helped create specific programs, scholarships, loans, and loan repayments which help recruit physicians to rural areas.
Financial Incentives	Rabinowitz (2001)[23]	US 1999	Retrospective cohort comparison using alumni database	Graduates (1978-1993) of Jefferson Medical College who are practicing primary care (n=3414)	Graduates who received a NHSC scholarship (OR=2.6; 95%CI 1.3-5.1; p=.006) were significantly more likely to be in rural practice.
Financial Incentives	Brooks (2003)[30]	Florida 2001	Cross-sectional survey	Primary care physicians (rural n=272, urban n=385, and suburban n=343)	NHSC participants were more likely to go into rural practice (OR: 5.46 95% CI: 4.20-7.1).
Financial Incentives	Ferguson (2009)[36]	US Year not reported	Cross-sectional survey	Graduates of FM Residency at University of Massachusetts (n=262)	Graduates with a NHSC commitment were more likely to have underserved initial [OR=2.96 (1.23-7.14)] but not current practice location [OR=1.67 (0.67-4.02)].

Supplemental Digital Appendix 4. Continued

Placement Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Financial Incentives	Pathman (2000)[95]	Nationwide US 1991	Cross-sectional survey	Primary care physicians who graduated from medical school between 1988-1992 (n=468)	Compared to physicians without financial commitments, physicians with financial commitments were more likely to work in rural areas (33% vs 7%; P<0.001) and provide care for uninsured and Medicaid covered patients (53% vs 29%; p<0.001).
Financial Incentives	Pathman (1994)[96]	Nationwide US 1990	Prospective cohort study using cross-sectional survey	Rural primary care physicians who graduated from medical school between 1970-1980 (n=202; NHSC n=97 vs non-NHSC n=105)	Non-NHSC physicians were more likely to remain in their index practice (44% vs 13%; p<0.001) and in nonmetropolitan areas (52% vs 25%; p<0.001) than their NHSC physicians.

Abbreviations: FM, family medicine; GP, general practitioner; US, United States; NHSC, National Health Service Corp; OR, odds ratio; CI, confidence interval.

Supplemental Digital Appendix 5

Twenty-Six Articles Identified Through Electronic Searches and Reference List Review Addressing Retention Factors Related to Rural Primary Care Physician Recruitment and Retention (1992-2015)

Retention Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Length of Rural Practice; Rural Medical Practice	Horner (1993)[38]	North Carolina 1981-1989	Retrospective cohort comparison (North Carolina physician database)	Rural and urban primary care physicians (PCP) (n=1,947)	In 1980s, rural retention = 4.6±0.12 yrs vs. urban = 4.4±0.10 yrs; retention drop off 50% within 3 yrs. In 1989 approximately half of all primary care physicians still in initial practice location: rural 48.1% vs. urban 48.5% (not significant). Rural practices more likely solo or partnerships.
Length of Rural Practice	Pathman (1999)[58]	Nationwide United States (US) 1991 & 1996-7	2 Cross-sectional surveys	Rural PCPs new to nonmetropolitan areas in 1987-1990 (n=456)	Median retention at index practice for all physicians = 6 years (95% CI 4.71-7.29).
Length of Rural Practice	Pathman (1994)[96]	Nationwide US 1990	Prospective cohort study using cross-sectional survey	Rural PCPs - graduated medical school 1970-1980 (n=202)	As of 1990, 78 (39%) physicians were still practicing in nonmetropolitan areas; 59 (29%) remained at index practice.

Supplemental Digital Appendix 5. Continued

Retention Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Medical Practice; Quality of Rural Life	Hancock (2009)[21]	Northeastern California & Northwestern Nevada 2006-07	Qualitative interviews	Rural PCPs (n=22)	Four main pathways to rural success: 1. Familiarity; 2. Place integration; 3. Community participation and service; and 4. Self-actualization. Two main driving forces to leave: 1. External influences; and 2. "Intolerable circumstances."
Rural Medical Practice	Fryer (1997)[31]	Colorado 1995	Cross-sectional survey	Family physicians and general practitioners (GPs) (n=986)	Rural physicians worked 8.4 more hours/week. More rural physicians served Medicaid patients (96% vs 75%).
Rural Medical Practice	Duffrin (2014)[35]	North Carolina 2012	Cross-sectional survey	PCPs (n=975)	Solo practice, critical access hospital, community or Federally Qualified Health Centers (FQHC) were strongly associated with rural practice ($p<0.001$)
Rural Medical Practice	Stenger (2008)[40]	Nationwide US 2004-2005	Cross-sectional survey	Rural PCPs (n=160)	67.3% satisfied overall with rural practice; Not feeling overworked ($p=0.043$) or professionally isolated ($p=0.004$) and ease of employing other physicians ($p=0.014$) were associated with higher satisfaction. Reasons for staying: strong sense of connection to patients and place, overall satisfaction with practice and "great place to live." Reasons for leaving: retirement, dissatisfaction with low pay and high workload.

Supplemental Digital Appendix 5. Continued

Retention Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Medical Practice	Weeks (2008)[41]	Nationwide US 1992-2002	Secondary analysis of a cross-sectional surveys from 1992-2002	PCPs (n=7,098)	Compared to urban doctors, rural physicians completed more patient visits and worked more hours; rural family medicine (FM) doctors did 14% & 7% more, respectively ($p<0.01$). Rural FM doctors were more likely to own practice (67.7% vs 50.3%; $p<0.001$) and see more Medicaid patients ($p<.001$)
Rural Medical Practice	Myhre (2015)[46]	Canada, US, Australia 1970-2014	Scoping literature review	Factors that predispose urban-origin students to be rural physicians (17 articles)	Some of the reasons urban-origin students chose rural practice were scope of practice and personal satisfaction.
Rural Medical Practice	Hays (2003)[80]	North Queensland Australia 2001	Qualitative interviews	Rural GP (10+ years rural) (n=13)	Stable and successful rural physicians reported stronger community links, professional support, ability to get adequate time off, and protection from the more negative aspects of rural professional life.

Supplemental Digital Appendix 5. Continued

Retention Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Medical Practice; Quality of Rural Life	Auer (2010)[82]	Australia Year not reported	Qualitative interviews	Rural GPs (N=19)	Providers chose rural practice because they wanted to leave the city or to be a "procedural doctor." Quality of rural work life, limited continued medical education (CME), and professional development limits retention. Doctors need sense of "place attachment" for longer retention; can "adjust" (short term trade-offs) or “adapt" (attempt to change self and environment to fulfill ambitions). Factors contributing to place attachment: Environment (landscape, leisure opportunities), social (spouse engagement, children), structure (work, satisfaction), and person (community involvement, length of residence).
Rural Medical Practice	Young (1999)[86]	US Year not reported	Cross-sectional survey	Graduates (1959-1995) of the FM program at John Peter Smith Hospital-Texas working in rural areas (n=102)	65 (64%) practiced obstetrics; more so more recently. 94 (92%) manage critically ill patients. More recently, significant increases in office procedures (colonoscopy and esophagogastro-duodenoscopy, $p<0.05$). Most provided pediatric hospital care [96 (94%)] and closed fracture management [89 (87%)].

Supplemental Digital Appendix 5. Continued

Retention Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Medical Practice	Weigel (2015)[87]	Iowa 2009	Secondary analysis of commercial health insurance claims data	PCPs (n=3,126,971 claims from 2,649 physicians)	Nonmetropolitan physicians provided more medical care than metropolitan doctors: office-based evaluation and management services, hospital based observation care, emergency department care and nursing facility care ($p<0.0001$). Nonmetropolitan FM doctors provided more hospital based inpatient, observation, normal newborn, nursing facility, and emergency department care, surgery related services, drugs and injections ($p<0.0001$).
Rural Medical Practice	Rosenthal (1992)[93]	US 1989	Cross-sectional survey	Graduates (1970-1989) of the New York State FM Residency (n=711)	Rural physicians (<25,000 population) more likely to be ($p<0.05$) in private groups (41% vs 26%), practice obstetrics (35% vs 21%), pediatrics (97% vs 91%), perform minor office surgery (97% vs 87%), be first assist at surgery (35% vs 13%), provide fracture care (53% vs 37%), and ICU care (35% vs 21%); Also see more patients per week (113 vs 100), work more hours (53 vs 49), be on call more often (68% vs 46%), and accept Medicaid (89% vs 62%). Less likely to be salaried (26% vs 36%) and to have paid their own start-up costs (80% vs 71%).

Supplemental Digital Appendix 5. Continued

Retention Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Medical Practice	Pathman (2004)[98]	Nationwide US 1991 & 1996-7	Cohort comparison using cross-sectional survey data	Rural PCPs who had moved to nonmetropolitan areas between 1987-1990 (n=505;rural health professional shortage areas (HPSA) n=308 vs rural non-HPSA n=197)	Rural-HPSA physicians worked: in smaller towns (mean population 4,926 vs 11,985), in counties with fewer PCP (15.1 pcp/100,000 population vs 29.1 pcp/100,000 population), with lower mean per capita incomes ($12,436 vs $14,172); for nonprofits (17.5% vs 6.3%) or in solo practice (42.4% vs 25.4%), 3+ nights/week on-call more often (64.2% vs 45.6%; p=0.001). Non-HPSA vs. HPSA had similar retention, HR= 1.28 (95% CI 0.89-1.58). Characteristics of rural HPSA physicians correlated to retention: parenting minor children (HR)=0.63; p=0.05); in state where grew up or trained (HR=0.69; p=0.05); owned practice (HR=0.45; p=0.001); and ≤2 nights/week call (HR=1.75; p=0.008). Working in a county adjacent to a metropolitan area was correlated w/ leaving sooner (HR 1.48; p=0.04)
Rural Medical Practice	Chaytors (2001)[99]	Alberta, Canada 1996	Cross-sectional survey	Graduates (1985-1995) of FM residency programs (n=442)	Of 28 procedures, 75% of rural FM doctors performed 13 vs 75% of urban FM doctors performed 5. Significantly more rural FM doctors practiced obstetrics (p<0.01).

Supplemental Digital Appendix 5. Continued

Retention Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Medical Practice; Quality of Rural Life	Gardiner (2005)[100]	South Australia 2001	Cross-sectional survey	Rural GPs (n=187)	>80% in rural practice ≥5 years. Most frequently attended CME regarding patient care, but most frequently identified skills needed to improve rural practice related to personal issues (stress & time management). 96 (52.7%) reported seriously considering leaving rural practice (last 2 years). Significantly worse levels of work-related distress, morale, and quality of work life. Higher levels of support reduced distress (r=0.21; 95% CI, 0.06-0.34), improved work-related morale (r=-0.32; 95% CI, 0.18-0.44) and quality of work life (r=0.25; 95% CI, 0.11-0.38; all p<0.01). Main stressors: lack of support services, workload, work-life imbalance, doctor shortage, children's education, lack of practice management skills, and difficulty coping.
Rural Medical Practice	Eley (2007)[101]	Queensland, Australia 2004	Qualitative interviews	Rural GPs (10+yrs; n=13)	Concerns regarding level of professional support in rural areas (358/900=40% of quotes); specifically system support (state or federal)
Rural Medical Practice	Mainous (1994)[102]	US 1987	Secondary analysis of a cross-sectional survey	Rural PCPs (n=373)	25% indicated somewhat or very likely to leave practice ≤ 2 years; most common reason was too many work hours (21%). 49% dissatisfied with their workload. Those dissatisfied were most likely to leave the practice ≤ 2 years (p<0.005).

Supplemental Digital Appendix 5. Continued

Retention Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Rural Medical Practice	Jones (2004)[103]	Nationwide Australia 2002	Cross-sectional survey	Rural GPs (n=894)	Better remuneration per Medicare consultation was ranked as the number 1 recruitment and retention intervention. Improved after-hours and on-call arrangements were 2nd.
Rural Medical Practice; Quality of Rural Life	Cutchin (1994)[104]	Kentucky Year not reported	Cross-sectional survey	PCPs (n=132)	Items most important for retention based on mean scores (1=very important; 5=not important): availability of relief coverage (1.3), quality of public schools (1.6), compatibility with others in the medical community (1.7), availability of quality housing (1.8), readily available consultation with specialist via telephone (1.9). Primary themes identified in order of importance for retention 1) sociocultural integration 2) medical care context 3) economic stability 4) geographic situation.
Rural Medical Practice	Pathman (1996)[105]	Nationwide US 1991	Cross-sectional survey	Rural PCPs who had moved to nonmetropolitan areas between 1987-1990 (n=620).	Rural physicians were most satisfied with patient relationships, clinical autonomy, helping the underserved, and life in small communities; Least satisfied with access to urban amenities and amount of time spent away from practice. Retention was independently associated with physician satisfaction in their communities, opportunities to achieve professional goals, and earnings.

Supplemental Digital Appendix 5. Continued

Retention Factors	**First Author Year**	**Location Year Studied**	**Methods**	**Target Population Number Studied**	**Outcomes Related to Recruitment and Retention**
Rural Medical Practice	Gardiner (2006)[106]	South Australia 2001 & 2003	Before-after Dr. Doc intervention survey	Rural GPs (n=221) (87 participants who completed pre- and post-surveys	After the involvement in Dr. DOC, GPs improved support networks: comfort discussing personal issues with other physicians (56.4% vs 46.2%; p<0.05) and personal/professional issues with other people (66.7% vs 56.8%; p<0.05). Fewer reported physical and mental health suffered as a result of being a rural GP (P<0.05). Rural retreats (75%) and the emergency support line (66.7%) were helpful components.
Quality of Rural Life	Cameron (2012)[81]	Alberta, Canada Year not reported	Qualitative collective case study	Rural areas that retained FM doctors ≥ 4 years (n=4). Participants: community, spouses, hospital or office staff, and physicians (n=43)	Three domains (and key factors) influence physicians' decisions to remain rural: 1) Professional=physician supply, dynamics, scope of practice and practice set-up; 2) Personal= goodness of fit, individual choice, and spouse/family support; 3) Community=appreciation, connection, active support, and physical/recreational assets. Key factors in each domain are interrelated and have a dynamic relationship with retention.

Supplemental Digital Appendix 5. Continued

Retention Factors	First Author Year	Location Year Studied	Methods	Target Population Number Studied	Outcomes Related to Recruitment and Retention
Quality of Rural Life	Cutchin (1997a)[107]	Kentucky Year not reported	Qualitative interviews	Rural PCPs (n=14) and key informants in rural communities (n=21)	Place integration is important to retention of rural physicians. Three domains are important in the integration process: 1) Physician self; 2) Medical community; 3) Community at large
Quality of Rural Life	Cutchin (1997b)[108]	Kentucky Year not reported	Qualitative interviews	Rural PCPs (n=14) and key medical informants (n=10)	Retention is a dynamic process of "place integration." Self, medical community and community at large all play important roles in the process. The process is characterized by three primary principles--security, freedom, and identity.

Abbreviations: US, United States; Cl, confidence interval; GP, general practitioner; FQHC, Federally Qualified Health Center; FM, family medicine; PCP, primary care physician; HPSA, Health Professional Shortage Area; HR, hazard ratio; CME, continued medical education.