

Article title: Characteristics of Medical Deserts and Approaches to Mitigate Their Health Workforce Issues: A Scoping Review of Empirical Studies in Western Countries

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Supplementary file 4. Key Characteristics of the Included Studies

Key characteristics of the included studies (n = 240)

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Abbiati ⁸⁴	2020	Switzerland	Quantitative, cross-sectional	Survey	Students (Medical students)	1,749	Underserved areas	Definition & contributing factors
Abid ¹⁴⁰	2020	New Zealand	Quantitative, longitudinal	Questionnaire	Students (Medical students)	1,367	Rural areas	Definition & approaches
Alexander ⁷⁰	1998	Australia	Quantitative,	Questionnaire	Physicians (GPs)	104	Rural areas	Contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
			cross-sectional					
Allan ⁸¹	2007	Australia	Qualitative	Interviews	Allied HWF (Pharmacists & social workers)	11	Rural areas	Contributing factors
Ariste ⁹⁴	2019	Canada	Quantitative, cross-sectional	Existing database	Combination of HWF (Physicians & nurses)	na	Rural areas	Definition & characteristics
Australian Medical Workforce Advisory Committee (AMWAC) ¹⁸²	2005	Australia	Quantitative, cross-sectional	Survey	Physicians (Medical graduates)	7,899	Rural areas	Definition & contributing factors
Bailey ²⁰³	2015	Australia	Quantitative, longitudinal	Existing database	Physicians (GPs)	1,154	Rural areas	Definition & contributing factors
Bamford ¹³⁰	1999	Australia	Quantitative, cross-sectional	Existing database	Physicians (GPs)	na	Rural areas	Definition & characteristics
Bath ¹⁰⁵	2015	Canada	Quantitative, cross-sectional	Existing database	Allied HWF (Physiotherapists)	643	Rural areas	Definition & characteristics
Beauchamp ¹⁸³	2013	Canada	Quantitative, cross-sectional	Questionnaire	Physicians (both family and specialty physicians)	264	Rural areas	Definition & contributing factors
Bennet ⁸²	2013	Australia	Mixed methods	Questionnaire, interviews & focus groups	Students (Nursing students)	31	Rural & remote areas	Approaches
Bent ⁸³	1999	Australia	Qualitative	Interviews	Allied HWF (Occupational therapists, physiotherapists, speech pathologists)	17	Remote areas	Contributing factors
Berk ⁸⁵	1983	United States	Quantitative, cross-sectional	Survey	Physicians (not defined)	na	Underserved areas	Definition & characteristics
Bigbee ¹⁵¹	2013	United States	Quantitative, longitudinal	Survey	Students (Nursing students)	1,283	Rural areas	Definition & contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Booza ¹⁶	2010	United States	Quantitative, longitudinal	Existing database	Students (Medical students)	28	Rural areas	Contributing factors & approaches
Boscardin ¹⁴⁷	2014	United States	Quantitative, cross-sectional	Questionnaire	Students (Medical students)	7,631	Underserved areas	Definition, contributing factors & approaches
Bowman ⁸⁶	2008	United States	Quantitative, cross-sectional	Existing database	Combination of HWF (Physicians (internal medicine, pediatric and family practice) & nurses)	na	Rural areas	Definition & approaches
Bradley ⁸⁷	2018	United States	Mixed methods	Questionnaire	Combination of HWF (Physicians (all types) & nurses)	138	Underserved areas	Definition & approaches
Brockwell ²¹⁵	2009	Australia	Quantitative, cross-sectional	Questionnaire	Allied HWF (Occupational therapists)	15	Rural areas	Definition, contributing factors & approaches
Burnett ¹¹⁶	1995	United States	Quantitative, cross-sectional	Questionnaire	Physicians (Family practice, GP, obstetrics and gynecology, internal medicine, pediatrics)	5,208	Underserved areas	Definition, characteristics & approaches
Bushy ¹²⁴	2005	Canada & United States	Mixed methods	Questionnaire	Students (Nursing students)	44	Rural areas	Definition, characteristics contributing factors
Butler ¹²⁵	1999	Australia	Qualitative	Questionnaire	Allied HWF (Physiotherapists)	103	Rural areas	Definition, characteristics & approaches
Butler ¹⁵²	2010	Australia	Quantitative, cross-sectional	Existing database	Combination of HWF (Medical workforce in general)	na	Remote areas	Definition, characteristics
Cameron ¹⁷²	2010	Canada	Qualitative	Interviews	Physicians (not defined)	41	Rural & remote areas	Definition, characteristics & contributing factors
Carter ¹²⁶	1987	Canada	Quantitative, cross-sectional	Questionnaire	Physicians (not defined)	562	Rural areas	Definition, characteristics & contributing factors
Ceronsky ¹³⁸	2013	United States	Quantitative, cross-sectional	Questionnaire	Combination of HWF (Rural community teams)	na	Rural areas	Definition, characteristics & approaches

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Chan ¹²⁷	1987	Canada	Quantitative, cross-sectional	Questionnaire	Physicians (General Practitioners)	651	Rural areas	Definition, characteristics & contributing factors
Chen ¹²⁸	2013	United States	Quantitative, cross-sectional	Existing database	Physicians (not defined)	759	Rural areas	Definition & characteristics
Chisholm ¹⁶⁷	2011	Australia	Quantitative, cross-sectional	Survey	Combination of HWF (Dietitian, occupational therapists, physiotherapists, podiatrists, psychologists, social worker, speech pathologists)	901	Rural areas	Definition, characteristics & contributing factors
Clark ²⁰⁶	2013	Australia	Quantitative, longitudinal	Questionnaire	Students (Medical students)	448	Rural areas	Definition & approaches
Courtney ²⁴⁰	2005	United States	Quantitative, cross-sectional	Existing database	Nurses	na	Underserved areas	Definition & characteristics
Cramer ¹²⁹	2006	United States	Quantitative, cross-sectional	Existing database	Nurses	na	Rural areas	Definition & characteristics
Crump ¹⁷	2016	United States	Quantitative, cross-sectional	Existing database	Students (Medical students)	1,120	Rural areas	Approaches
Daniels ¹⁸	2007	United States	Quantitative, cross-sectional	Survey	Students (Health science)	1,396	Rural areas	Contributing factors
Denz-Penhey ¹⁹	2005	Australia	Qualitative	Interviews & questionnaire (Open questions)	Students (Medical students)	na	Rural areas	Approaches
Doogan ¹³¹	2018	United States	Quantitative, cross-sectional	Existing database	Combination of HWF (not defined)	na	Rural areas	Definition & characteristics
Drovandi ¹⁹⁷	2020	Australia	Quantitative, cross-sectional	Existing database	Students (Pharmacy students)	973	Rural areas	Definition & approaches
Duma ¹⁴⁸	2011	Romania	Qualitative	Existing database	Combination of HWF (not defined)	na	Rural areas	Definition & contributing factors
Easterbrook ⁹⁵	1999	Canada	Quantitative, cross-sectional	Questionnaire	Physicians (Family medicine)	230	Rural areas	Definition, characteristics & contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Eley ²⁰	2006	Australia	Quantitative, cross-sectional	Survey	Students (Medical students)	25	Rural areas	Approaches
Eley ²⁰⁹	2009	Australia	Quantitative, longitudinal	Survey	Students (Medical students)	180	Rural & remote areas	Approaches
Eley ²¹	2009	Australia	Quantitative, cross-sectional	Survey	Students (Medical students)	476	Rural areas	Definition & approaches
Eley ¹⁷⁵	2012	Australia	Mixed methods, longitudinal	Questionnaire & interviews	Students (Medical students)	115	Rural areas	Definition & contributing factors
Elliott-Schmidt ²²	1995	United States	Quantitative, cross-sectional	Survey	Allied HWF (Occupational therapists)	30	Rural areas	Contributing factors
Emery ²¹⁶	2009	Australia	Quantitative, longitudinal	Existing database	Students (Medical students)	na	Rural areas	Definition & approaches
Feng ²⁴¹	2018	United States	Quantitative, cross-sectional	Existing database	Physicians (Dermatologists)	na	Rural areas	Definition & characteristics
Feng ⁸⁸	2017	United States	Quantitative, cross-sectional	Existing database	Allied HWF (Dentists)	na	Geographical areas	Definition & characteristics
Florence ⁹⁶	2007	United States	Quantitative, cross-sectional	Questionnaire	Students (Health science)	122	Rural areas	Definition, characteristics & approaches
Frisch ⁹⁷	2003	United States	Quantitative, longitudinal	Survey	Physicians (GPs)	514	Rural areas	Definition, characteristics & contributing factors
Fryer ²⁴²	1983	United States	Quantitative, cross-sectional	Existing database	Allied HWF (Dentists)	na	Rural areas	Definition & characteristics
Fryer ⁸⁹	1999	United States	Quantitative, cross-sectional	Existing database	Physicians (GPs)	na	Rural areas	Definition & characteristics
Garcia ¹⁴⁹	2018	United States	Quantitative, cross-sectional	Questionnaire	Students (Medical students)	40,846	Underserved areas	Definition & contributing factors
Gemelas ²⁴³	2020	United States	Quantitative, cross-sectional	Existing database	Physicians (GPs)	25,104	Rural areas	Definition
Gillham ²³	2013	Australia	Qualitative	Interviews	Students (Allied HWF)	8	Rural areas	Contributing factors
Gilliland ¹³²	2019	Canada	Quantitative, cross-sectional	Existing database	Physicians (GPs)	na	Underserved areas	Definition & characteristics
Godwin ²⁴⁴	2017	Australia	Quantitative,	Survey	Allied HWF	631	Rural areas	Definition &

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
			cross-sectional		(Dentists)			characteristics
Goetz ²⁴⁵	2013	Germany	Quantitative, cross-sectional	Survey	Physicians (GPs)	1,027	Rural areas	Contributing factors
Gray ²⁵	2009	Australia	Quasi-experimental	Questionnaire	Physicians (Geriatricians)	na	Rural areas	Approaches
Griffin ¹³⁹	2016	Australia	Quantitative, cross-sectional	Interviews	Students (Medical students)	351	Underserved areas	Definition, characteristics & contributing factors
Gupta ²⁰⁵	2019	Australia	Quantitative, longitudinal	Survey	Students (Medical students)	468	Rural areas	Definition & approaches
Hajat ²²⁴	2003	United States	Quantitative, cross-sectional	Survey	Institute/practice (Local public health agencies)	1,100	Rural areas	Definition, characteristics & approaches
Hancock ⁹⁸	2009	United States	Qualitative	Interviews & questionnaires	Physicians (GPs)	na	Rural areas	Definition & contributing factors
Hanson ⁹⁹	1990	United States	Quantitative, cross-sectional	Questionnaire	Nurses	167	Rural areas	Definition, characteristics, contributing factors & approaches
Hansroth ²⁴⁶	2021	United States	Quantitative, cross-sectional	Survey	Physicians (emergency department)	29	Rural areas	Definition & characteristics
Hays ¹⁶²	1997	Australia	Qualitative	Interviews	Physicians (GPs)	59	Rural areas	Definition & contributing factors
Hays ²⁷	2003	Australia	Qualitative	Interviews	Physicians (GPs)	23	Rural areas	Contributing factors
Heath ²⁸	2009	United States	Observational, longitudinal	Questionnaire	Physicians (Paediatricians)	na	Rural areas	Approaches
Henderson ¹⁰⁰	2004	United States	Mixed methods	Questionnaire	Nurses	124	Rural areas	Definition, characteristics & contributing factors
Henning-Smith ¹⁰¹	2016	United States	Quantitative, cross-sectional	Existing database	Combination of HWF (Child care workers)	na	Rural areas	Definition
Herd ¹⁸⁵	2016	Australia	Quantitative, cross-sectional	Existing database	Students (Medical students)	na	Rural areas	Definition, characteristics & contributing factors
Hills ¹⁶⁰	2011	Australia	Quantitative, cross-sectional	Survey	Physicians	9,900	Rural areas	Definition, characteristics, contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Hoffmann ¹⁶⁵	2015	Austria	Quantitative, cross-sectional	Questionnaire	Physicians (GPs)	173	Rural areas	Definition, characteristics & contributing factors
Hogenbirk ¹⁸⁶	2015	Canada	Quantitative, longitudinal	Questionnaire	Students (Medical students)	na	Rural areas	Definition & contributing factors
Hogue ¹⁰²	2019	United States	Quantitative, cross-sectional	Survey	Physicians (GPs)	99	Rural areas	Definition, characteristics & contributing factors
Horner ¹⁵³	1993	United States	Quantitative, cross-sectional	Existing database	Physicians (GPs)	1,947	Rural areas	Definition, characteristics & contributing factors
Huicho ²³⁸	2010	Switzerland	Quantitative, cross-sectional	Existing database	Combination of HWF (not defined)	na	Underserved areas	Definition & characteristics
Humphreys ¹⁵⁴	1998	Australia	Quantitative, cross-sectional	Survey	Combination of HWF (not defined)	na	Rural areas	Definition & characteristics
Humphreys ¹⁶³	2002	Australia	Quantitative, cross-sectional	Questionnaire	Physicians (GPs)	1,344	Rural & remote areas	Definition & contributing factors
Humphreys ¹⁷¹	2003	Australia	Quantitative, cross-sectional	Questionnaire	Physicians (GPs)	1,498	Rural & remote areas	Definition & contributing factors
Humphreys ²²⁸	2012	Australia	Quantitative, cross-sectional	Existing database	Physicians (GPs)	3,636	Rural areas	Definition, characteristics & approaches
Irby ²³⁰	2012	United States	Quantitative, longitudinal	Existing database	Physicians (Paediatricians)	na	Rural areas	Definition, characteristics & approaches
Isaac ²⁹	2014	Australia	Quantitative, longitudinal	Questionnaire	Students (Medical students)	165	Rural areas	Contributing factors & approaches
Iversen ²⁴⁷	2002	United Kingdom	Qualitative	Interviews	Combination of HWF (GPs, practice nurses, practice managers and administrative staff)	53	Rural areas	Definition, characteristics & contributing factors
Jamar ²¹⁷	2014	Australia	Mixed methods	Survey	Students (Medical students)	74	Rural areas	Definition, characteristics & approaches
Janes ¹⁶⁶	2004	New Zealand	Mixed methods	Questionnaire	Physicians (GPs)	559	Rural areas	Definition & contributing factors
Jo ¹³³	2020	United Kingdom	Quantitative, cross-sectional	Existing database	Allied HWF (Dentists)	1,695	Rural areas	Definition & characteristics
Johnston ²⁴⁸	2020	Canada	Quantitative, cross-sectional	Existing database	Institute/practice	na	Rural areas	Definition

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Jones ²²⁵	2004	Australia	Quantitative, cross-sectional	Questionnaire	Physicians (GPs)	1,050	Rural areas	Definition, characteristics & approaches
Jones ³⁰	2009	Australia & New Zealand	Quantitative, longitudinal	Survey	Students (Medical students)	6,292	Rural areas	Contributing factors
Jones ¹⁰³	2014	Australia	Quantitative, cross-sectional	Questionnaire	Students (Medical students)	3,268	Rural areas	Definition, characteristics & contributing factors
Joyce ²⁴⁹	2005	Australia	Quantitative, cross-sectional	Existing database	Physicians (GPs)	na	Remote areas	Definition & characteristics
Kamien ³¹	1998	Australia	Quantitative, cross-sectional	Interviews	Physicians	101	Rural areas	Contributing factors
Kane ²¹³	2013	United States	Quantitative, longitudinal	Existing database	Students (Medical students)	296	Rural areas	Definition & approaches
Kaye ⁹⁰	2006	United States	Quantitative, cross-sectional	Existing database	Allied HWF	na	Underserved areas	Definition & characteristics
Keane ¹⁷⁴	2011	Australia	Qualitative	Survey	Allied HWF	1,879	Rural & remote areas	Definition
Kelley ³²	2004	Canada	Qualitative	Survey	Combination of HWF	296	Rural areas	Approaches
Kent ¹⁰⁴	2018	New Zealand	Quantitative, cross-sectional	Survey	Students (Medical students)	2,243	Rural areas	Definition, characteristics & contributing factors
King ¹⁷⁷	2016	Australia	Quantitative, cross-sectional	Survey	Students (Medical students)	454	Rural areas	Definition & contributing factors
Kippenbrock ²⁵⁰	2013	United States	Quantitative	Survey	Nurses	na	Rural areas	Definition & characteristics
Kondalsamy-Chennakesavan ¹⁸⁴	2015	Australia	Quantitative, longitudinal	Questionnaire	Students (Medical students)	754	Rural areas	Definition & contributing factors
Kuhn ²²⁹	2017	Germany	Quantitative, cross-sectional	Survey	Combination of HWF	449	Rural areas	Definition, characteristics & approaches
Kuipers ²⁵¹	2015	Australia	Quantitative, cross-sectional	Existing database & semi-structured interviews	Allied HWF	41	Rural areas	Definition & characteristics
Kulig ¹⁵⁵	2008	Canada	Quantitative, cross-sectional	Survey	Nurses	3,412	Rural areas	Definition & characteristics
Kwan ¹⁸⁷	2017	Australia	Quantitative, cross-sectional	Survey	Physicians	729	Rural areas	Definition & contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Landry ³³	2011	Canada	Quantitative, cross-sectional	Questionnaire	Physicians	263	Rural areas	Definition & contributing factors
Larson ²⁵²	2003	United States	Quantitative, cross-sectional	Existing database	Combination of HWF	15,606	Rural areas	Definition & characteristics
Lasala ³⁴	2000	United States	Mixed methods	Questionnaire	Nurses	131	Rural areas	Contributing factors
Laskowska ²⁵³	2015	Poland	Quantitative, cross-sectional	Existing database	Institute/practice	na	Rural areas	Definition & characteristics
Laurence ¹⁶⁴	2010	Australia	Qualitative	Interviews	Physicians (GPs)	na	Rural areas	Definition & contributing factors
Lavanchy ³⁵	2003	United States	Quantitative, cross-sectional	Questionnaire	Physicians	198	Rural areas	Contributing factors
Lavergne ¹³⁴	2016	Canada	Quantitative	Existing database	Institute/practice	89	Rural areas	Definition & characteristics
Lawrence ³⁶	2015	United States	Quasi-experimental	Survey	Institute/practice	96	Underserved areas	Approaches
Lee ¹⁶⁸	2003	Australia	Qualitative	Interviews	Allied HWF (Occupational therapists)	5	Rural areas	Definition & contributing factors
Lee ³⁸	2011	Australia	Mixed methods	Survey	Students (Medical students)	88	Rural areas	Contributing factors & approaches
Lin ³⁹	2006	Australia	Mixed methods, longitudinal	Focus groups & audit	Allied HWF	19	Rural areas	Approaches
Lindeke ⁴⁰	2005	United States	Quantitative, cross-sectional	Survey	Nurses	834	Rural areas	Contributing factors
Longenecker ²²²	2020	United States	Quantitative, cross-sectional	Existing database	Institute/practice	182	Rural areas	Definition & approaches
Lynge ⁹¹	2008	United States	Quantitative, longitudinal	Existing database	Physicians (Surgeons)	na	Rural areas	Definition & characteristics
MacIsaac ⁴¹	2000	Australia	Qualitative	Interviews	Physicians (GPs)	20	Rural areas	Contributing factors
Magnus ⁴²	1993	Norway	Quantitative, cross-sectional	Survey	Students (Medical students)	417	Rural areas	Approaches
Mathews ¹⁰⁶	2008	Canada	Quantitative, cross-sectional	Existing database	Students (Medical students)	na	Rural areas	Definition & contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Mathews ²⁵⁴	2012	Canada	Qualitative	Interviews	Physicians (both family and specialty physicians)	48	Rural areas	Definition, characteristics & contributing factors
Mathews ²⁵⁵	2015	Canada	Quantitative, cross-sectional	Existing database	Students (Medical students)	1,864	Rural areas	Contributing factors
Matthews ⁴³	2015	New Zealand	Qualitative	Survey	Students (Medical students)	45	Rural areas	Definition & approaches
May ²¹⁰	2018	Australia	Quantitative, cross-sectional	Existing database	Students (Medical students)	426	Rural areas	Definition & approaches
McGirr ¹⁵⁶	2019	Australia	Quantitative, cross-sectional	Survey	Students (Medical students)	na	Rural areas	Definition, contributing factors & approaches
McGrail ²⁵⁶	2009	Australia	Quantitative, cross-sectional	Existing database	Combination of HWF	na	Rural areas	Definition
McGrail ¹⁰⁸	2011	Australia	Quantitative, cross-sectional	Existing database	Physicians (GPs & specialists)	5,581	Rural & remote areas	Definition & contributing factors
McGrail ¹⁰⁹	2012	Australia	Quantitative, cross-sectional	Survey	Physicians (GPs)	3,906	Rural areas	Definition & characteristics
McGrail ¹⁸⁰	2015	Australia	Quantitative, cross-sectional	Existing database	Combination of HWF	na	Rural & remote areas	Definition & characteristics
McGrail ²²³	2016	Australia	Quantitative, longitudinal	Existing database	Physicians (GPs)	610	Rural areas	Definition, contributing factors & approaches
McGrail ¹⁵⁷	2017	Australia and United States	Quantitative, cross-sectional	Existing database	Combination of HWF (community amenities)	na	Rural areas	Definition & contributing factors
McGrail ¹⁵⁸	2018	Australia	Quantitative, cross-sectional	Survey	Physicians (GPs)	960	Underserved areas	Definition, characteristics & approaches
Mills ⁴⁴	2002	Australia	Qualitative	Interviews	Allied HWF (Occupational therapists)	10	Rural areas	Contributing factors
Montour ²⁵⁷	2009	Canada	Qualitative	Interviews	Nurses	13	Rural areas	Definition & characteristics
Morris ⁴⁵	2008	United States	Quantitative, cross-sectional	Survey	Physicians (GPs)	838	Rural & underserved areas	Approaches
Natanzon ⁴⁶	2010	Germany	Qualitative	Interviews	Physicians (GPs)	16	Rural areas	Contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Newman ⁴⁷	2008	Australia	Quantitative, cross-sectional	Survey	Nurses	56	Rural areas	Approaches
Nugent ²⁵⁸	2004	Australia	Quantitative, cross-sectional	Existing database & survey	Undergraduates (Nurses)	na	Rural areas	Definition & characteristics
O'Connell ¹⁵⁰	2018	United States	Quantitative, longitudinal	Survey	Students (Medical students)	474	Underserved areas	Definition & contributing factors
O'Connor ¹¹⁰	2006	Australia	Qualitative	Interviews	Physicians (GPs)	10	Rural areas	Definition, characteristics & contributing factors
Orpin ⁴⁹	2005	Australia	Quantitative, cross-sectional	Survey	Students (Medical, nursing & pharmacy students)	235	Rural areas	Approaches
Orzanco ¹¹¹	2011	Canada	Quantitative, longitudinal	Existing database	Students (Medical students)	180	Non-metropolitan areas	Definition, characteristics & contributing factors
O'Sullivan ²⁵⁹	2018	Australia	Quantitative, longitudinal	Existing database	Students (Medical students)	2,412	Rural areas	Definition & contributing factors
O'Toole ⁵¹	2008	Australia	Quantitative, cross-sectional	Survey	Allied HWF (Clinical worker, team leader, manager, educational worker, casework coordinator)	138	Rural areas	Contributing factors
O'Toole ⁵⁰	2010	Australia	Mixed methods	Interviews	Allied HWF (Social worker, dietitian, physiotherapist, speech pathologist, occupational therapist, health promoter, radiologist, podiatrist)	32	Rural areas	Contributing factors
Pathman ¹⁴¹	1992	United States	Quantitative, longitudinal	Survey	Physicians (Primary care)	412	Rural areas	Definition, characteristics, contributing factors & approaches
Pathman ¹⁴²	1999	United States	Quantitative, cross-sectional	Survey	Physicians (Primary care)	456	Rural areas	Definition, contributing factors & approaches
Pathman ¹¹²	2004	United States	Quantitative, cross-sectional	Questionnaire	Physicians (not defined)	45	Underserved areas	Definition & contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Pearce ²⁶⁰	2008	New Zealand	Quantitative, cross-sectional	Existing database	Institute/practice (Community resource access)	na	Rural & remote areas	Definition & characteristics
Pearce ¹³⁵	2006	New Zealand	Quantitative, cross-sectional	Existing database	Institute/practice (Community resource access)	na	Remote areas	Definition & characteristics
Pegram ¹⁴³	2006	Australia	Quantitative, cross-sectional	Existing database	Physicians (GPs)	na	Rural areas	Definition & characteristics
Pepper ⁵²	2010	United States	Quantitative, cross-sectional	Survey	Physicians (Medical doctors & osteopaths)	693	Rural areas	Contributing factors
Perkins ⁵³	2007	Australia	Mixed methods	Interviews	Combination of HWF (Members of mental health teams: managers, team leaders & members, interns)	41	Rural areas	Contributing factors
Playford ⁵⁴	2006	Australia	Quantitative, longitudinal	Survey	Students (Health science)	429	Rural areas	Contributing factors
Playford ⁵⁵	2010	Australia	Quantitative, longitudinal	Interviews	Students (Nursing students)	49	Rural areas	Approaches
Playford ⁵⁶	2012	Australia	Quantitative, longitudinal	Existing database	Students (Medical students)	na	Rural areas	Contributing factors & approaches
Playford ²¹¹	2014	Australia	Quantitative, longitudinal	Existing database	Students (Medical students)	1,017	Rural areas	Definition & approaches
Playford ¹⁹⁹	2016	Australia	Quantitative, longitudinal	Survey	Students (Medical students)	417	Rural areas	Definition, contributing factors & approaches
Playford ¹⁸⁸	2017	Australia	Quantitative, longitudinal	Existing database	Students (Medical students)	508	Rural areas	Definition & contributing factors
Playford ¹³⁶	2019	Australia	Quantitative, longitudinal	Existing database	Students (Medical students)	1,122	Rural areas	Definition, contributing factors & approaches
Puddey ¹⁸¹	2014	Australia	Quantitative, longitudinal	Questionnaire	Students (Medical students)	538	Rural areas	Definition & contributing factors
Puddey ¹¹³	2015	Australia	Quantitative, longitudinal	Questionnaire	Students (Medical students)	729	Rural areas	Definition & contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Rabinowitz ²¹⁸	1988	United States	Quantitative, longitudinal	Existing database	Physicians (GPs)	135	Rural areas	Definition & approaches
Rabinowitz ²¹⁹	1993	United States	Quantitative, longitudinal	Existing database	Students (Medical students)	47	Rural areas	Definition & approaches
Rabinowitz ²²¹	1999	United States	Quantitative, longitudinal	Existing database	Physicians (GPs)	150	Rural areas	Definition & approaches
Rabinowitz ¹⁷³	1999	United States	Quantitative, cross-sectional	Existing database	Physicians (Medical graduates)	1,609	Rural areas	Definition & contributing factors
Rabinowitz ¹⁹¹	2000	United States	Quantitative, cross-sectional	Questionnaire	Physicians (GPs)	1,704	Rural areas	Definition & contributing factors
Rabinowitz ¹⁹⁰	2001	United States	Quantitative, longitudinal	Existing database	Students (Nursing students)	3,414	Rural areas	Definition, contributing factors & approaches
Rabinowitz ⁵⁷	2005	United States	Quantitative, longitudinal	Existing database	Physicians (GPs)	na	Rural areas	Contributing factors & approaches
Rabinowitz ¹⁸⁹	2012	United States	Quantitative, longitudinal	Existing database	Students (Medical students)	762	Rural areas	Definition & contributing factors
Rabinowitz ²²⁰	2013	United States	Quantitative, longitudinal	Existing database	Physicians (Family medicine)	89	Rural areas	Definition & approaches
Ramos ⁵⁸	2014	United States	Quantitative, cross-sectional	Survey	Nurses	360	Rural areas	Approaches
Ray ²²⁷	2014	Australia	Mixed methods	Survey	Combination of HWF (Primary care)	174	Rural areas	Definition, characteristics & approaches
Reymond ⁶⁰	2005	Australia	Mixed methods	Questionnaire	Combination of HWF (Primary care)	na	Rural areas	Approaches
Ricketts ¹⁴	1996	United states	Quantitative, cross-sectional	Existing database	Physicians (Obstetrician-gynaecologists)	na	Rural areas	Contributing factors
Rohova ¹⁴⁴	2017	Bulgaria	Quantitative	Existing database	Combination of HWF (all types of physicians, GPs, dentists, nursing professionals, nurses)	na	Underserved areas	Definition & characteristics
Rolfe ¹⁶¹	1995	Australia	Quantitative, cross-sectional	Questionnaire	Physicians Medical graduates of all types	331	Rural areas	Definition & contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Roots ¹¹⁴	2014	Canada	Qualitative	Interviews	Allied HWF (Occupational therapists, physical therapists)	19	Rural areas	Definition, characteristics & approaches
Rosenblatt ²⁰⁰	1992	United States	Quantitative, longitudinal	Existing database	Physicians (Medical graduates of all types)	15,375	Rural areas	Definition & contributing factors
Rourke ⁶¹	2003	Canada	Quantitative, cross-sectional	Questionnaire	Physicians (Family medicine & residents)	507	Rural areas	Approaches
Rourke ¹¹⁵	2018	Canada	Quantitative, cross-sectional	Existing database	Physicians (family medicine graduates)	na	Rural areas	Definition & approaches
Royston ²³⁴	2012	United states	Quantitative, cross-sectional	Existing database & survey	Students (Osteopathic students)	141	Rural areas	Definition & characteristics
Runge ¹⁹²	2016	Australia	Quantitative, cross-sectional	Existing database	Physicians (all types)	633	Rural areas	Definition, characteristics & contributing factors
Russell ²²⁶	2013	Australia	Quantitative, cross-sectional	Existing database	Physicians (GPs)	2,783	Rural areas	Definition, contributing factors & approaches
Russell ²⁶¹	2013	Australia	Quantitative, cross-sectional	Existing database & survey	Combination of HWF (Primary care)	108	Rural areas	Definition
Sabesan ⁶²	2012	Australia	Quantitative, cross-sectional	Existing database	Physicians (Oncologists)	na	Rural & remote areas	Approaches
Sen Gupta ²⁰¹	2013	Australia	Quantitative, longitudinal	Existing database & survey	Students (Medical students)	292	Rural & remote areas	Definition, contributing factors & approaches
Sen Gupta ¹⁹³	2014	Australia	Quantitative, longitudinal	Existing database & survey	Students (Medical students)	536	Rural & remote areas	Definition, contributing factors & approaches
Senn ²⁶²	2016	Switzerland	Quantitative, cross-sectional	Survey	Combination of HWF (Primary care)	60	Rural areas	Definition & characteristics
Shah ²⁶³	2017	Canada	Quantitative, cross-sectional	Existing database	Combination of HWF (GPs, nurse practitioners)	na	Underserved areas	Definition & characteristics
Shires ²⁰⁴	2015	Australia	Quantitative, longitudinal	Existing database	Students (Medical students)	974	Rural areas	Definition & approaches
Simou ⁹²	2015	Greece	Quantitative, cross-sectional	Existing database	Combination of HWF (Medical personnel, nursing personnel,	na	Rural areas, islands	Definition

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
					other health care personnel (health visitors, midwives, social workers, physiotherapists, laboratory assistants, operators of medical equipment), administrative personnel, technical personnel)			
Smedts ⁶³	2008	Australia	Quantitative, longitudinal	Existing database	Students (Medical students)	683	Rural areas/Declining population	Approaches
Smith ¹⁴⁵	2013	United states	Quantitative, cross-sectional	Existing database	Combination of HWF (Hospital)	na	Rural areas	Definition & characteristics
Smith ¹⁷⁰	2018	Australia	Qualitative	Questionnaire	Students (Medical students)	3,204	Rural areas	Definition & contributing factors
Smith ¹⁹⁴	2021	Australia	Quantitative, cross-sectional	Existing databases	Students (Medical students)	1,315	Rural areas	Definition & contributing factors
Somers ²⁰²	2012	Australia	Quasi-experimental	Survey	Students (Medical students)	58	Rural areas	Definition, characteristics, contributing factors & approaches
Spencer ⁶⁴	2008	Australia	Quantitative, longitudinal	Questionnaire	Students (Medical students)	43	Rural areas	Contributing factors
Stagg ¹⁷⁶	2009	Australia	Quantitative, longitudinal	Survey	Students (Medical students)	46	Rural areas	Definition & contributing factors
Steenbergen ⁶⁵	2004	Australia	Qualitative	Interviews	Allied HWF (Occupational therapists)	9	Rural areas	Approaches
Steinhaeuser ³⁷	2011	Germany	Quantitative, cross-sectional	Survey	Physicians (GPs)	715	Rural areas	Characteristics & contributing factors
Steinhaeuser ¹⁵⁹	2014	Germany	Quantitative, cross-sectional	Survey	Physicians (GPs)	724	Rural areas	Definition & characteristics
Strasser ²⁶⁴	2000	Australia	Quantitative, cross-sectional	Existing database & survey	Physicians (GPs)	na	Rural areas	Definition & characteristics

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Strasser ¹⁹⁵	2010	Australia	Quantitative, longitudinal	Questionnaire	Students (Medical students)	123	Rural areas	Definition & contributing factors
Stratton ⁶⁶	1998	United States	Quantitative, cross-sectional	Existing database	Nurses	164	Rural areas	Contributing factors
Sullivan Havens ⁷⁹	2013	United states	Quantitative, cross-sectional	Survey	Nurses	747	Rural areas	Characteristics
Szafran ¹¹⁸	2001	Canada	Quantitative, cross-sectional	Survey	Physicians (GPs)	702	Rural areas	Definition, characteristics & contributing factors
Thackrah ⁶⁷	2017	Australia	Qualitative	Interviews	Students (Health science)	12	Rural areas	Approaches
Theodorakis ¹⁵	2005	Greece	Quantitative, cross-sectional	Existing database	Physicians (Primary care)	na	Rural areas	Characteristics
Thomas ¹¹⁹	2006	United States	Quantitative, cross-sectional	Existing database	Physicians (Psychiatrists)	na	Rural areas	Definition & characteristics
Tolhurst ⁶⁸	2006	Australia	Qualitative	Focus groups & interviews	Students (Medical students)	130	Rural areas	Contributing factors
Toomey ⁹³	2013	Canada	Qualitative	Interviews	Physicians (Community leaders)	25	Underserved areas	Definition & approaches
Tsiouli ⁴⁸	2016	Greece	Quantitative, cross-sectional	Existing database	Allied HWF (Orthodontists)	na	Rural areas	Characteristics
Ulmer ⁵⁹	2002	Australia	Quantitative, cross-sectional	Questionnaire	Physicians (GPs)	406	Rural areas	Contributing factors
Van Hassel ¹²⁰	2018	Netherlands	Quantitative, cross-sectional	Survey	Physicians (GPs)	596	Rural areas/Declining population	Definition, characteristics & contributing factors
Wade ²⁶⁵	2007	United States	Quantitative, cross-sectional	Existing database	Physicians (GPs)	1,283	Rural areas	Definition, contributing factors
Wainer ¹⁶⁹	2004	Australia	Quantitative, cross-sectional	Survey	Physicians (Female GPs)	302	Rural & remote areas	Definition, contributing factors & approaches
Walker ⁶⁹	2012	Australia	Quantitative, cross-sectional	Questionnaire	Students (Medical students)	125	Rural areas	Contributing factors
Wan ²⁶⁶	2012	United states	Quantitative, cross-sectional	Existing database	Combination of HWF (Primary care)	na	Underserved areas	Definition & characteristics
Ward ⁷¹	2004	Australia	Quantitative, longitudinal	Questionnaire	Students (Medical students)	299	Rural areas	Contributing factors

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Wayne ⁷²	2010	United States	Quantitative, cross-sectional	Survey	Students (Medical students)	244	Underserved areas	Contributing factors
Wendling ²¹²	2016	United States	Quantitative, cross-sectional	Existing database	Physicians (Rural Physician Programs graduates)	2,778	Rural areas	Definition & approaches
White ⁷³	2021	France	Qualitative	Survey	Combination of HWF (HCW of the Hospital)	213	Rural areas	Approaches
Wilkinson ²¹⁴	2003	Australia	Quantitative, cross-sectional	Questionnaire	Physicians (GPs)	2,414	Rural areas	Definition & approaches
Wilkinson ⁸⁰	2008	Australia	Quantitative, cross-sectional	Existing database	Physicians (GPs)	26,359	Rural areas	Characteristics
Williams ⁷⁴	2007	Australia	Quantitative, cross-sectional	Survey	Allied HWF (Physiotherapists)	107	Rural areas	Contributing factors
Williamson ⁷⁵	2003	New Zealand	Quasi-experimental	Questionnaire	Students (Medical students)	167	Rural areas	Contributing factors & approaches
Williamson ⁷⁶	2012	New Zealand	Quantitative, longitudinal	Survey	Students (Medical students)	177	Rural areas	Approaches
Willie-Stephens ²⁶⁷	2014	Australia	Quantitative, cross-sectional	Existing database	Allied HWF (Dentists)	na	Underserved areas	Definition & characteristics
Wilson ⁷⁷	2005	United States	Quantitative, longitudinal	Survey	Nurses	35	Rural areas	Approaches
Woloschuk ¹²¹	2002	Canada	Quasi-experimental	Questionnaire	Students (Medical students)	273	Rural areas	Definition, contributing factors & approaches
Wood ¹²²	1998	United States	Quantitative, longitudinal	Questionnaire	Students (Nursing students)	136	Rural areas	Definition, contributing factors & approaches
Wood ¹²³	2018	United States	Quantitative, longitudinal	Existing database	Institute/practice (Satellite HIV clinics)	4	Rural & underserved urban areas	Definition, characteristics & approaches
Woolley ¹⁹⁶	2014	Australia	Quantitative, longitudinal	Existing database & survey	Students (Medical students)	264	Outer regional & remote areas	Definition, characteristics & contributing factors
Worley ⁷⁸	2008	Australia	Quantitative, cross-sectional	Survey	Students (Medical students)	150	Rural & remote areas	Approaches
Yan ²⁶⁸	2011	Australia	Quantitative, cross-sectional	Survey	Physicians (All types)	15,871	Rural & remote areas	Definition & characteristics

First author (reference)	Year	Country	Design	Data collection method	Type of HWF	Participants, n	Medical desert	Outcome type
Young ²⁰⁸	2011	Australia	Quantitative, longitudinal	Survey	Students (Medical students)	688	Rural & remote areas	Definition & approaches
Zink ²⁰⁷	2010	United States	Quantitative, cross-sectional	Existing database	Students (Medical students)	3,365	Rural areas	Definition, characteristics & approaches
Zhu ¹⁴⁶	2015	United States	Quantitative, cross-sectional	Existing database	Combination of HWF	na	Rural areas	Definition & characteristics

GPs = General Practitioners; HWF = health work force; n = number; na = not available/not applicable

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