

REVIEW ARTICLE

Recruitment and retention of general practitioners in European medical deserts: a systematic review

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ETHICS APPROVAL

Ethics approval was not required for this study

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ABSTRACT:

Introduction: Despite policies aiming at universal health coverage by ensuring availability and accessibility of general practitioners (GPs), medically underserved areas are still present in Europe. This systematic review aims to summarize and compare literature on interventions and their potential effectiveness of GP recruitment and retention in these underserved areas ('medical deserts') from 2011 onwards.

Methods: PubMed and Embase were used to identify

publications, applying a two-stage selection process. All types of study designs, published in the past 10 years, were included if they discussed a possible intervention for GP recruitment or retention covering an underserved area in an EU-27/EEA/EFTA country (part of the European Union, the European Economic Area or the European Free Trade Association). Exclusion criteria were abstracts or full text not available, conference abstracts, poster presentations, books or overlapping secondary literature.

Identified interventions were classified into four categories: 'education', 'professional and personal support', 'financial incentives' and 'regulation'. Eligible articles were critically appraised by two authors (JB, LF), independently, by using the Joanna Briggs Institute checklist.

Results: Of the 294 publications initially retrieved, 25 publications were included. Of them, 14 (56%) described educational interventions, 13 (52%) professional and personal support, and 11

(40%) financial or regulatory interventions. Overlapping categories were often described (56%). The effectiveness of educational or supportive interventions has mainly been evaluated cross-sectionally, whereby causal inference on future GP availability cannot be implied. Few and mixed results were found for the effectiveness of financial and regulatory interventions, because period co-interventions were not taken into account during the study.

Conclusion: In the past 10 years, educational and supportive interventions to improve GP recruitment and retention have been reported most frequently, but often overlapping strategies are seen. While multiple strategies have potential to be effective, their limited evaluation makes it difficult to provide suggestions for policymakers to adapt their GP recruitment and retention strategies aiming at a best-practice approach in European medical deserts.

Keywords:

Europe, general practitioner, health workforce, medical deserts, medically underserved area, recruitment, retention.

FULL ARTICLE:

Introduction

A majority of European as well as other high-income countries aim to ensure health coverage for all citizens, by optimizing the availability and accessibility of health services in all geographical areas^{1,2}. In many European countries, a key priority is to ensure at least sufficient primary care by general practitioners (GPs), as they are the first local contact point for health service and have a crucial role as gatekeepers for hospital care. This is most efficient for the regional equity in health outcomes as well as the cost-effectiveness of the healthcare system^{3,4}. Yet underserved areas that experience lower levels of primary care and GPs capacity, also known as 'medical deserts', are still present in Europe.

In recent decades, there has been an increase in attention from policymakers and researchers on the recruitment and retention of (family) physicians to solve national and regional shortages. Previous research has focused on multiple contributing determinants of physician recruitment and retention in underserved areas⁵⁻⁷. Factors found positively associated with the preferences of physicians for rural job uptake are, among others, a rural background of medical students or a rural exposure during medical school^{5,6}. Still, the majority of physicians are less willing to work in rural and remote areas. Reasons for this consist of several perceptions of physicians on these areas, such as professional or social isolation, the intensity of the workload, poorer job opportunities for spouses, or income level; all contribute to an overall perception that rural and remote areas are correlated with lower job satisfaction⁷.

To tackle these driving factors, various strategies have been proposed. For example, a comprehensive set of approaches has been developed by the WHO to guide countries in encouraging rural living and employment for health workers⁸. Overviewing the state of the art in research, the majority of studies on recruitment and retention of GPs have focused on rural areas in large countries such as the USA or Australia^{9,10}. However, recent studies on interventions to recruit and retain GPs in underserved areas in smaller scale health systems, such as European countries, are scarce. Hence, an overview and evaluation of these studies is urgently needed – to uncover valuable lessons for European

national policies to counteract future rural GP shortages as well as to ensure universal health coverage in the European region.

Objective and research questions

This study provides an overview of the research on GP recruitment and retention interventions in medically underserved areas within European countries. The goal of this study is to investigate and summarize qualitative and quantitative studies focusing on approaches and their effectiveness to improve GP recruitment and retention in underserved areas. Conducting a review of publications over the past 10 years, the aim is to provide insight into various strategies that have been recently initiated and studied in Europe. This extension of knowledge on recruitment and retention, especially focused on GPs, can inform and support healthcare professionals, policymakers and decision-makers toward a more specific tailored strategy. Therefore, this review is structured by the following research questions:

- What are the most frequently used strategies for recruitment and retention of GPs in European medical deserts?
- To what extent are these interventions for recruitment or retention of GPs in medical deserts effective?

Methods

Search strategy

This review was conducted and reported in accordance with the PRISMA guideline (Supplementary table 1)¹¹. To identify recent and relevant publications, two electronic databases (PubMed and Embase) were searched. For this, combinations of MeSH terms or Emtree terms, respectively, were used – as well as free-text words. The Boolean search string that was used is in Supplementary table 2. To identify any additional materials, national reports and implementation guidelines of European countries were searched. The *Human Resources for Health and Rural and Remote Health* websites were searched for publications. In addition to this, references of eligible articles were explored and added to the list. This search of databases and additional resources was performed on 28 June 2021.

Study selection

After retrieving articles and removing duplicate articles, the author (JB) applied a two-stage process for inclusion. First, titles and abstracts of all references found with the search strategy were screened against inclusion and exclusion criteria (Table 1). Then,

the full text of articles was retrieved and assessed for eligibility against inclusion and exclusion criteria. Questionable articles were resolved through discussion among the authors (JB, LF, AIG, RB). Rayyan was used to facilitate the categorization and inclusion or exclusion of studies. Mendeley was used as a reference program to upload and organize the eligible articles and to read the full texts.

Table 1: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Containing the target population, ie GPs, family/primary care physicians, medical students/interns that expressed their intentions to become one	Abstract or full text was not available
All types of study designs or documents discussing a possible intervention for the recruitment or retention of the target population	Documents were either conference abstracts, poster presentations or books
If possible by design, describing direct (eg geographical equality or inequality, trend, number, or rate of available GPs) or indirect (eg job satisfaction of GPs) outcomes	Secondary literature that had overlap with journal articles included in the current review and therefore did not add any new input
Covering rural, remote, or underserved area(s) of at least one of the EEA/EFTA or EU-27 countries	
Published in the past 10 years (2011 onwards)	
Written in English or Dutch	

EEA, European Economic Area. EFTA, European Free Trade Association. EU, European Union. GP, general practitioner.

Data synthesis and analysis method

All relevant articles were extracted into an Excel spreadsheet, including author details, year of publication, country, study type, setting or study population, recruitment or retention intervention(s), study findings or effectiveness, and category of intervention(s). If a publication did not evaluate, but only described, any effectiveness of their study intervention, the study finding was marked as 'not evaluated'. The identified interventions were categorized by a framework, adapted from the global policy recommendations of the WHO⁸. This framework consists of four categories, including 'education', 'professional and personal support', 'financial incentives' and 'regulation'.

Quality assessment

Joanna Briggs Institute (JBI) checklists for the appropriate study design were used by two authors (JB, LF) independently for the

critical appraisal of eligible studies¹². Articles were included if they achieved a score above 50%. Disagreements were resolved through discussion (JB, LF, AIG, RB).

Results

Figure 1 shows the selection process based on the literature search conducted. In total, the search (June 2021) resulted in 294 publications. After removal of duplicates, and title and abstract screening according to inclusion and exclusion criteria, 67 relevant publications remained. In the second stage, the full-text analysis, a total of 42 publications were excluded. Supplementary table 3 provides a detailed description of the reasons for exclusion. A total of 25 publications were included for the analyses. All met the JBI quality criteria for the appropriate study design, but most were of low methodological quality to assess the effectiveness of the outcome (Supplementary table 4).

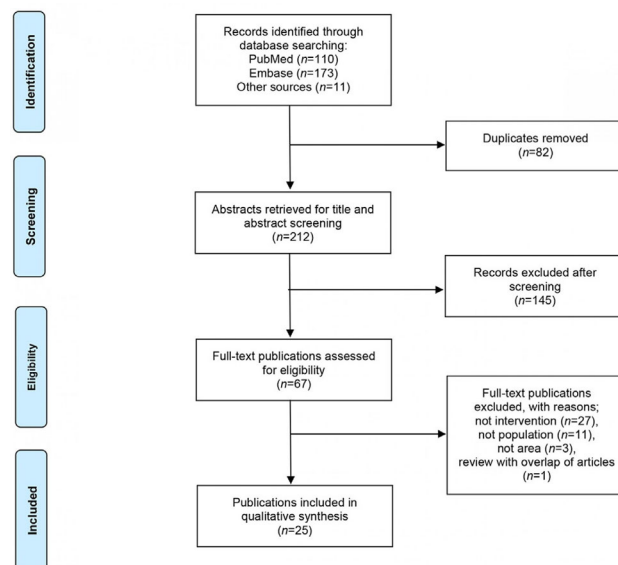


Figure 1: PRISMA flow diagram of the publication selection process.

Study characteristics

Of the 25 included publications, the majority ($n=15$, 60%) reported

on quantitative studies, seven (28%) on qualitative studies and three (12%) were policy reports or reviews (Supplementary table 4). Most of the included publications ($n=23$, 92%) concern West

European countries, mostly the UK ($n=6$, 24%), Germany ($n=6$, 24%) and Norway ($n=4$, 16%). The population under study were medical students, interns or trainees ($n=9$, 36%) and GPs ($n=9$, 36%), of which one study included interviews with both. The remaining eight publications (32%) described municipalities, regions, or European countries more generally. An overview of the critical appraisal of the included publications is in Supplementary table 4.

Category of interventions

The included publications covered mostly interventions for GP recruitment ($n=21$, 84%) and, to a lesser extent, GP retention ($n=15$, 60%). Most publications ($n=14$, 56%) reported on multiple interventions or interventions, with overlap between four categories. A summary of the study findings, including categorization of described interventions, is presented in Table 2.

A majority of included publications ($n=14$, 56%) either described or evaluated educational interventions for recruiting and retaining GPs in medical deserts¹³⁻²⁶. This varies from opening new (rural) medical schools^{13,20} to offering rural programs, rotations or internships to medical students^{14,19,22-24}. The latter is reported in various forms, ranging from 1 day to a 2-year internship^{14,19,22-24}. In addition, the option to let GPs in training conduct research (their doctoral thesis) or spend a 'social year' in a rural area is proposed to familiarize students with working in medical deserts¹⁸. For the retention of GPs, multiple publications describe the provision of training and courses for GP career development^{15,17,21,25,26} – for example rural fellowships or training programs^{15,17,25,26} or small group learning that is locally delivered²¹.

Professional or personal support of GPs is described in 13 publications (52%)^{15-18,20,21,25-31}. There is some overlap with the educational interventions to retain GPs as described above, through supporting further development and maintaining high professional standards^{15,17,21,25,26}. Supportive measures, to counteract isolation are described as advising or mentoring rural GPs (eg with practice setup, location, background help)^{16,18}, improving communication resources (eg internet, telehealth)^{18,27}, task delegation^{28,31} within a general practice, or creating (obligated) networks of health professionals across rural organizations^{26,29}. Furthermore, arrangements are described to reduce workload, including replacement for vacation or out-of-hours medical service (eg GP locum arrangements)^{18,26,30}. In the

area of personal support, offering extra vacation (days)^{16,20} or possibilities for family housing are described^{20,30}.

Financial incentives are identified in 10 of the publications (40%). These are described in multiple forms and can directly or indirectly contribute to the recruitment or retention of rural GPs^{16,20,26,29,30,32-36}. Direct financial incentives consist of an increased or guaranteed salary when GPs accept a job in a medical desert area^{29,30}. In addition, offering a bonus is described: once in exchange for working certain years or several times^{20,29}. This is proposed to trainees for accepting a rural training post^{20,36}, but also to counteract early retirement of GPs in underserved areas^{20,29,36}. Additional direct financial incentives (eg subsidy of transport and research funds) are mentioned to increase rural attractiveness^{20,26}. Indirect financial measures include (co-)funding for hiring additional staff, closing revenue gaps or building new multi-professional group practices in underserved areas^{29,32}. In addition, an alternative or 'fairer' payment system is described, such as adding a separate payment for individual general practices or regions^{26,35}. Furthermore, changes in remuneration schemes, for example per patient or per service provided, are described^{16,26,34}.

Several European countries reported their chosen or updated regulatory interventions ($n=10$, 40%) for the control of GP supply and demand in medical deserts. These interventions largely overlap with the abovementioned financial incentives^{16,20,26,29,30,32-35,37}. Countries intervene by changing certain quotas^{16,20,26,29,32,35}, such as an expansion of medical training places to increase GP supply^{29,32,35} or restrict the number of practice permits in certain regions to ensure a more equal geographical distribution of GPs²⁹. In addition, a reduction in the average number of registered patients per standard general practice is applied^{26,35}, aimed at reducing GP workloads. In France and Norway, governments opted for joint GP services by introducing regulations to stimulate primary care teams (eg co-funding of costs for establishing primary care teams)^{26,32}. In Turkey, a law has been introduced that requires newly appointed GPs to perform a two-year 'public service': to work in a designated area determined by the health authority³⁷. Some aforementioned educational interventions (fellowships) are also tied by regulation to a rural placement, often facilitated by financial incentives^{15,20,25}. Furthermore, Portugal has opted for bilateral agreements that allow GPs from other countries to staff their rural primary care centers²⁰.

Table 2: Summary of findings in reviewed literature

Author (year)	Country	Type of study/report	Setting/study population	Category of intervention	Intervention	Findings/effect on outcome
Aaraas et al (2015) [ref. 13]	Norway	Cross-sectional	1611 Tromsø GPs graduated between 1979 and 2012	Recruit and retain Educational	Tromsø (rural) education of doctors	51% of graduated GPs were still working in rural Northern Norway in 2013
Abelsen and Brandstorp (2019) [ref. 30]	Norway	Qualitative (interviews)	Three rural municipalities of Norway (Meløy, Odde, Ardal)	Recruit Regulation, financial, support	ALIS-Vest project: recruitment program with establishment of salaried educational positions for GPs	In all municipalities, number of GPs was extended by one and number of vacant GP positions was reduced by two or three
Chevillard et al (2019) [ref. 32]	France	Longitudinal (2004–2008 and 2008–2012)	1416 rural living areas: 1232 without PCT and 184 with PCT	Recruit and retain Regulation, financial	Policy to increase PCTs	Increase in GP density for rural areas with PCTs, compared to similar areas without PCTs: average difference-in-differences of 3.5 GPs per 100 000 inhabitants
Crampton et al (2016) [ref. 14]	UK	Qualitative (interviews)	Fourth-year medical students	Recruit Educational	Difficult and Deprived Areas Program: 14 weeks placed in general practice in deprived areas	Indirect outcome (high level of satisfaction about the program)
Demmer et al (2021) [ref. 19]	Germany	Qualitative (interviews)	Medical students, GPs, and regional actors	Recruit Educational	MedP+plus project: medical practical year in a family practice in southern Lower Saxony	Not evaluated
de Oliveira et al (2017) [ref. 20]	Portugal	Systematic review	GPs in Portugal	Recruit and retain Educational, regulatory, financial, support	Multiple strategies: increase in <i>numerus clausus</i> (limited admission of students to a study program based on capacity); opening medical schools and programs; increase of residency places (25%); re-hiring of GPs; reserved vacancies; daily transport subsidy; financial and non-financial incentives to work rural (5-year period); bilateral agreement to recruit physicians from other countries; increased recognition of GPs' careers)	Not evaluated
Dini et al (2012) [ref. 31]	Germany	Cross-sectional (questionnaire)	515 GPs (47%) in Mecklenburg, Western Pomerania	Retain Support	Home visit delegation to a physician assistant	Indirect outcome: rural and individual practices were more likely to delegate (OR 1.63, 95%CI 1.07–2.49 and OR 1.94, 95%CI 1.14–3.28) and spent less time in office (OR 0.97, 95%CI 0.95–0.99) compared to urban and group practices. Delegation resulted in 70% GPs workload reduced, 48% job satisfaction increased
Dowling et al (2019) [ref. 21]	Ireland	Cross-sectional (questionnaire)	1686 (58%) Irish GPs attending CME-SGL in late 2017	Retain Educational, support	Locally delivered SGL for CME	Indirect outcome (with CME-SGL, educational needs were mostly met by 289 (88.9%) and somewhat by 33 (10.1%) rural GPs, equally to urban ($p>0.05$))
Eerste Kamer der Staten-Generaal (2015) [ref. 35]	NL	Report	Netherlands	Recruit and retain Regulatory, financial	Multiple strategies: new funding model for GPs with a separate performance for shrinking regions; increase training places for GPs; reduction in average number of registered persons per standard GP practice)	Not evaluated
Edwards et al (2015) [ref. 22]	UK	Qualitative (questionnaire and interviews)	Two cohorts of medical graduates (six first-year and 11 third-year post-graduation)	Recruit Educational	Swansea Graduate Entry Program): first 2 years of general medicine at Swansea (rural), final 2 years in Cardiff	Indirect outcome: reasons to leave/stay: opportunity to develop new skills, but isolation and lack of opportunities outside of the professional domain
Flum et al (2016) [ref. 23]	Germany	Cross-sectional (questionnaire)	28 GP trainees	Recruit Educational	The Verbundweiterbildungsplus Baden-Württemberg program: a rural day trip	Indirect outcome: future intention to work rurally. No significant ($p>0.05$) change was seen before versus after
Holst et al (2015) [ref. 24]	Germany	Cross-sectional (questionnaire)	15 fourth- and fifth-year medical students	Recruit Educational	The Magdeburg rural practice program: two-weekend rural health course	Indirect outcome: likelihood working in a rural practice before (6.1; SD 1.9) versus after (8.3; SD 1.3) increased
Holte et al (2015) [ref. 33]	Norway	Cross-sectional (questionnaire)	831 (53%) final-year medical students and interns	Recruit Regulation, financial	Hypothetical policy simulations of practice size (1 or 2 v 3–5 GPs), professional development (limited v very good), control of working hours (limited v very good), income (average, >10% or >20%) and location (rural (<5000) v urban (>50 000) inhabitants)	Predicted probabilities for rural versus urban GP; baseline rural practice and change in one of these attributes resulted in <1% choosing a rural over urban job. Improvements of professional development, control of working hours and income predict 18.7% rural job uptake. Improvements in all simulated factors (>10%) predicted a rural job uptake of 31.1%
Jones et al (2018) [ref. 25]	UK	Qualitative (interviews)	Five GPs (newly qualified to 3 years post-training)	Recruit and retain Educational, support	Enfield clinical teaching fellow program: 2-year project of linking GPs with a university (research/teaching)	Three continued afterward, two did not complete the full duration (ended after 11 and 21 months)
Karakolias et al (2017) [ref. 34]	Greece	Cross-sectional (questionnaire)	212 Greek doctors (76%)	Recruit and retain Regulatory, financial	Remuneration scheme	Indirect outcome (rural doctors' views on remuneration; Likert scale 1=disagree, 5=agree): lower remuneration than produced work (mean 4.67); lower remuneration than private-sector colleagues (mean 3.48); motivation to have other (illegal) employment (mean 4.38); not satisfactory to work at border areas (mean 2.05)
Kehlet et al (2015) [ref. 26]	Norway	Qualitative (interviews)	GPs in Norway	Recruit and retain Educational, regulatory, financial, support	The Senja Doctor: joint GP service with additional terms (funding, support)	GP turnover rate between 1998 and 2009; 100 different GPs had 'come and gone'. After implementation (2007), nine GPs got employed. At end of 2013, all GP positions were held, expressed intention to stay
Lee and Cunningham (2019) [ref. 36]	UK	Cross-sectional (questionnaire)	95 (39%) GPSTs	Recruit Financial	Targeted Enhanced Recruitment Scheme initiative: a £20,000 (~A\$35,000) payment for GPST if accepting a rural post	21% of GPSTs with awareness of the scheme were influenced by it in choice of location
MacVicar et al (2016) [ref. 15]	UK	Cross-sectional (questionnaire)	65 (98%) GPs attaining the fellowship between 2002–03 and 2012–13	Recruit and retain Education, support	GP Rural Fellowship: year of training in rural medicine	Current position (2014): 46 graduates (71%) were working in rural areas or accessible small towns, 39 (60%) in substantive general practice roles
Ono et al (2014) [ref. 29]	OECD countries	Report	Germany, Denmark, France, Scotland	Recruit and retain Regulatory, financial, support	Germany: one-time payment for opening general practice in a shortage area; bonus for GPs aged >65 that continue to work in areas underserved or at risk of being so; number of practice permits restricted for physicians in specific regions Denmark: financial support for hiring additional staff; bonus for older GPs who postpone retirement; funding revenue gap, depending on patient list France: annual income guarantee Scotland: obligated networks of rural health professionals across organizations	Not evaluated

Ozegowski et al (2013) [ref. 16]	Europe	Qualitative comparative analysis	270 regions of 21 countries, EU or EEA/EFTA	Recruit and retain Educational, regulatory, financial, support	Multiple strategies: Training (early rural exposure, rural scholarships or loan forgiveness, rural universities, and training facilities) Financial and non-financial incentives (bonus for rural commitment, advisory service, mentoring, family support), Quotas (needs-based, contracts by health insurers, limiting practice licenses) Indirect financial incentives (remuneration schemes)	Equity of GPs' geographical distribution; evidence of training or incentives (financial or otherwise) was insufficient/impact remained unclear. Needs-based quotas alone and in combination with capitation remuneration have a strong positive effect on the equity of GP distribution
O Carroll and O'Reilly (2019) [ref. 17]	Ireland	Cross-sectional (questionnaire)	37 medical graduates (88%) between 2013 and 2017	Recruit Educational, support	North Dublin City General Practitioner Training Program: education of GPs to work in areas of deprivation or with marginalized groups	Indirect outcome: 33 respondents (89%) increased their commitment, 14 (38%) increased their comfort and confidence, 19 (51%) increased their skills and/or knowledge, two (5%) increased their empathy for working with people from areas of deprivation)
Roberts et al (2012) [ref. 27]	UK	Longitudinal (questionnaire and interviews (2008–2009))	10 rural healthcare workers of the program (GP, practice nurses, GP managers, project manager, ward)	Retain Support	The Argyll & Bute Telehealth Project: telehealth service to monitor long-term conditions	Indirect outcome: for COPD patients, comparing periods March–November in 2008–2009 (pre/post-installation), there was a reduction in GP visits (47 to 28)
Unal (2015) [ref. 37]	Turkey	Longitudinal (1965–2000)	16 regions in Turkey	Recruit and retain Regulatory	Implementation of compulsory service law ("The Law Regarding the Obligation of Civil Service for Some Medical Staff") in 1980	Population-to-GP ratio (Gini index) decreased from 0.44 in 1965 to 0.13 in 2000. Before the law, average change in Gini was not significant (0.002, 95%CI -0.007 to 0.003). After the law, a significant decrease in Gini index of -0.015 (SD 0.001) per year
Van den Berg et al (2012) [ref. 28]	Germany	Longitudinal (2006–2008)	Four GPs that participated in the AGnES project	Retain Support	Delegation of GP home visits to AgnES practice assistant	Indirect outcome: 360.1 GP working hours could be saved yearly; after implementation, participating practices (n=4) enrolled an additional 133 patients/quarter year, non-participating (n=2) practices enrolled additional 104 patients/quarter year
Wilhelmi et al (2018) [ref. 18]	Germany	Qualitative (interviews)	33 participants (16 medical students and 17 postgraduate trainees)	Recruit Educational, support	Multiple strategies: establishing a personal connection with rural areas; improving students and young postgraduate trainees' confidence for working as a GP in rural areas; invalidation of prejudices	Not evaluated

CI, confidence interval. CME, continuing medical education. COPD, chronic obstructive pulmonary disease. EEA, European Economic Area. EFTA, European Free Trade Association. EU, European Union. GP, general practitioner. GPST, General Practice Specialty Trainee. OR, odds ratio. PCT, primary care team. SD, standard deviation. SGL, small group learning.

Effectiveness of interventions

In total, 10 publications (40%) evaluated the direct (potential) effectiveness of the described intervention(s) (ie the availability, density or distribution of GPs in the medical desert areas). In addition, certain indirect outcome(s)/factors of the outcome(s) were evaluated in 10 articles (40%). The remaining five publications (20%) did not evaluate their described or implemented intervention.

Although interventions were highly described, only nine publications had actually evaluated their educational intervention. For medical schools, it was found in a study in Northern Norway that more than half of the 1611 previously graduated GPs stayed working in this rural area¹³. In this study, a clear upward trend in physicians was observed since the start, but the design does not allow to conclusions on a causal relationship to be drawn. This also applies to other studies that evaluated different rural curricula by conducting single-time point questionnaires or interviews^{14,22,23}. Indirect outcomes that were described in these studies showed high satisfaction with rural educational programs, or summarized factors that may have contributed to GPs staying or leaving a medical desert area. Despite reporting potential for their educational programs to recruit GPs, no further evaluation was conducted if this indeed resulted in an increase in rural GP availability. Two other studies, describing rural fellowships, did evaluate how many GPs remained afterwards^{15,25}. One included five GPs with fellowships, and reported that more than half (60%) continued to work in the rural areas²⁵. The other study questioned 66 GPs with fellowships, and found that 60% (n=39) had taken up a rural GP job¹⁵. Both studies did not take into account factors such as previous intentions or preferences to work rurally.

Two other published studies examined the drivers and barriers of educational programs during the careers of GPs, but without direct or conclusive results on the extent of contribution to the recruitment and retention of rural GPs^{17,21}. A published study by Dowling et al showed that barriers to attend continued medical

education were reported more frequently by rural GPs than by urban GPs²¹. In another publication, results of a survey among 42 graduates in a rural training program showed that respondents reported an increased commitment (89%) and skills/knowledge (51%), confidence and comfort (37%) to work in deprived areas¹⁷. The used questionnaire did not determine, however, to what extent this program resulted in actual rural job uptake in these regions. Ozegowski et al evaluated the overall effectiveness of the use of GP training interventions in 21 European countries. Their results on the (in)equality of distribution of GPs were inconclusive, due to a small sample of countries that actively used these interventions¹⁶.

Supportive measures to improve GP availability have been evaluated in only three publications. These studies did not show direct increases in the available number nor the reduction of GPs leaving medical desert areas^{27,28,31}. Two of these studies examined the implementation of task delegation from GPs to qualified physician assistants in general practices in Germany^{28,31}. The article by Dini et al showed that rural and individual practices were 1.6–1.9 times more likely to delegate compared to urban and group practices. As a result, the delegating GPs spent significantly less of their time on running their general practice³¹. The other study estimated that the implementation of the task delegation project saved approximately 360 GP working hours per year²⁸. These researchers assumed that this, on the other hand, can be used to increase the number of registered patients per practice. After implementation, a higher average increase of patients was calculated in participating practices compared to non-participating practices (133 v 104 patients per quarter year, respectively). It should be noted, however, that practices in this study could allocate themselves to either the intervention or control group. This means that other influencing factors cannot be ruled out²⁸. A publication on the use of telehealth in a Scottish rural GP practice highlighted that telehealth increased the interactional workability of the employed staff members. By monitoring patients remotely, fewer patients with chronic obstructive pulmonary disease visited

the practice, but workload was not directly reduced through concerns with technical issues, although not quantified²⁷.

Two publications evaluated financial or regulatory measures as recruitment or retention strategy solely^{36,37}. One study on solely financial measures found that a £20,000 (~A\$35,000) bonus to work in a certain rural area actually affected 21% of the trainees who were aware of this bonus³⁶. No further investigation has been conducted into the extent to which these trainees already intended to work in such an area, regardless of payment, or on the effect on long-term stay. In relation to Europe, one publication showed that little to no relationship could be found between GP distribution and using financial bonuses as a singly policy measurement¹⁶. One study focused on a specific regulation measurement – the mandatory GP placement by law as introduced in Turkey in 1980 – and its impact on GP distribution over time³⁷. The study showed that, after implementation, there was a significant average decrease in the Gini index (an indicator for regional maldistribution) in Turkey, which was not observed in the baseline trend before the law. This means that this mandatory law resulted in a rapid improvement of an equal GP distribution over the country, compared to only increasing the number of available GPs over time. More publications reported combinations of financial and regulatory strategies^{16,26,30,32-34}.

Three publications evaluated remuneration schemes^{16,33,34}. One study found in a European context that the reimbursement of GPs using capitation payments (based on the number of registered inhabitants) had a positive effect on equal regional GP distribution. This effect was especially pronounced for countries with high GP density and in combination with a needs-based quota¹⁶. In Greece, a country with high variation in GP density, it was found that rural GPs, among others, agreed that the remuneration was not satisfactory to work at border areas³⁴. This means remuneration influences their choice of location. In another study, simulations of policy measures, according to the preference of Norway medical students, showed that an increase of 10% in income on itself has little influence (0.02%) on the predicted probability of choosing a rural work location. Simultaneous improvement in other important attributes for location preferences (practice size, control of working hours and professional development) predicts a probability of 19% that medical students will choose a rural job over an urban job. On top of that, a 10% increase in income results in a predicted increase of up to 31%. It should be noted that these results are based on hypothetical simulations³³.

A study in France quantified the impact of the 'practice size' over time (2004–2012) on GP retention in rural areas. It was shown that rural primary care teams co-funded by the government have higher GP density of 3.5 GPs per 100 000 inhabitants compared to similar areas without such primary care teams³². In Norway, it was found that the merging of rural GP practices, in combination with other beneficial (financial) incentives, resulted in fewer vacant GP positions and a reduction in turnover rate^{26,30}. These studies show that 'larger' primary care teams slow down the decrease in GP density in rural areas. Other measures during these periods were not taken into account, however, which could lead to an overestimation of the results.

Discussion

This study provides a review of the literature from 2011 onwards describing and evaluating recruitment and retention strategies of

GPs in medical deserts across Europe. We found that the most frequently reported interventions focused on education, and professional or personal support of GPs. To what extent these interventions have actually affected recruitment and retention of GPs in underserved areas is hard to conclude, since the majority of these studies were cross-sectionally designed, and via indirect contributing factors or not evaluated. Still, a number of publications showed that financial and regulatory interventions (financial bonus, a mandatory placement law or capitation remuneration) did have a pronounced effect on a more equal geographical distribution of GPs. However, since other confounding factors or co-interventions were not taken into account in these studies, a 'best practice approach' to recruit and retain GPs in underserved areas remains difficult to extract from our review.

Comparing existing literature

This research makes a contribution to the medical desert health workforce issue by using the framework prevalent in other literature³⁸⁻⁴¹. Our results are in line with previous reviews that showed that educational interventions were most reported⁴⁰⁻⁴². In this respect, this review complements these previous studies. Nevertheless, we found that multiple countries mainly reported a 'rural curriculum' as a solution for health workforce shortages. This could be for multiple reasons. First, the WHO, as well as the European Commission, has made a strong recommendation to implement this intervention^{8,43}. In addition, adding a rural curriculum, especially in comparison to setting up rural medical schools, might be less resource demanding and costs are relatively modest. Although research suggests a strong association between rural exposure and choice of career location, results about the length of this curriculum are still inconclusive⁴⁴⁻⁴⁷. It is suggested that a longer duration (5–6 months) of rural exposure to students may be more economically sustainable^{45,46}. The review of Peckham et al suggests, however, that increased duration can improve student skills or knowledge about general practice work in rural areas, but that this might not inherently translate into a higher recruitment rate⁴⁷. Therefore, other intrinsic factors need to be accounted for as well. For example, in the USA and Australia, the personal interest of students in 'rural medicine' is explicitly screened by their medical school^{48,49}. Evidence from these countries suggests that GPs with a rural background have a higher likelihood, approximately two times higher, of working in a rural practice⁵⁰. The implementation of educational interventions thus involves several factors, which policymakers should take into account for recruitment strategies.

The present review identified multiple personal and professional support interventions that are aimed at improving working conditions. Research has indicated that multiple factors indirectly contribute to job satisfaction in rural areas, including manageable workload, support and the perception of a valued profession^{7,51}. This might contribute to retaining GPs longer, or postpone their retirement. For example, continuous medical learning is of key importance for continuous professional development and job satisfaction, but flexibility is required to overcome barriers to attendance⁵². Research shows that telemedicine could also be a promising strategy for reducing workload and the retention of GPs, especially for rural and underserved communities⁵³. This is in line with what our review shows and suggests that for the next-generation GP a healthy work–life balance is important. Multiple factors may contribute a small part to the reduction of GP

shortage and unequal staff accessibility in underserved areas, and this substantiates the idea that a combination of measures should be used in retention strategies.

Nevertheless, there is still a lack of outcome-based evaluation studies that have investigated if, how and when educational and supportive measures are eventually successful to improve numbers of GPs in underserved areas – as emphasized previously^{41,42}. This makes it difficult for policymakers to learn from implemented recruitment as well as retention interventions. A reason for this scarcity in evaluation studies might be the difficulty designing interventions and measuring causal relationships, since multiple factors (as already mentioned here) have to be taken into account. Also, direct outcomes are difficult to establish (eg difference in duration of employment, turnover rate), but measuring and analysing these are of great value⁵⁴. However, these semi-experimental, longitudinal and outcome-precise studies are more time consuming and often costly to conduct. In addition, currently updated curricula or the use of telehealth might be 'too new' to be evaluated yet. In the meantime, the European Commission recommends their member states to update their training curricula and education to the rapid developments in health care. This might improve employability as well as equip GPs with the right skills for the current and future job market⁴³. Therefore, indirectly evaluated outcomes, which are quicker and easier to measure in a shorter amount of time, are still highly informative to collect and review. Our study did this, and indicates the need for long-term evaluation of these interventions if policymakers want to respond adequately to rural GPs' expectations and retention.

With regard to the role of financial incentives, few and mixed results were found when evaluated. This supports the conclusion of Verma et al, who reviewed US, Canadian and Australian recruitment and retention interventions⁹. They found that financial incentives were mainly effective for trainees with a rural background, particularly when there are flexible career opportunities and a longer period of obligatory service. On the other hand, policy simulations in Australia predicted as well that less than 1% of the working GPs would relocate in response to a hypothetical income increase of 10%⁵⁵. This suggests that such an extrinsic motivation by financial incentive alone is not sufficient for trainees and GPs to move to underserved areas. One determinant we found little of in our review, but has been more addressed in studies outside Europe, is international recruitment⁹. This is often stimulated by higher salaries in neighboring countries. It is indicated that the migration of medical students or GPs to rural areas is mainly triggered by wealthier Western European countries, where a much higher salary than in their country is feasible^{20,56}. Such bilateral or multilateral agreements might be a solution for the GP shortage in one country, but pose a problem to the country of origin. For example, Romania reported that approximately 14 000 GPs left their jobs in their national health system to practice abroad between 2007 and 2013⁵⁶. Although this might be efficient to address the GP shortages in the short term, cost-effectiveness of these measures of GP retention in the long term remains unclear. A study in England looked at the cost-effectiveness of a GP retention scheme⁵⁷. Since GP training costs an average £11,600 (~A\$21,000) per year and lasts approximately 4 years, retaining a GP employed in the health workforce for at least one additional year through a retention scheme (at £4430 (~A\$8000) per year) can contribute to much larger financial savings. Although these results are country- or context-specific, this suggests that focusing

on long-term retention of GPs in the health workforce could be more cost-effective for a national health system than increasing number of trainees.

Furthermore, our review found only a few publications on regulatory recruitment and retention measures, which might be because these are more demanding, economically as well as politically. Of these measures, the use of quotas to increase the number of medical students was most often described by countries. Previous research found that this has only a minor impact on the geographic distribution of GPs^{58,59}. In Portugal, it was observed that, despite an annual growth rate of 0.94 to 3.57 physicians per 1000 inhabitants between 1996 and 2007, this did not lead to a more spatial distribution⁵⁸. This corresponds to our described results in a publication on Turkey, before introduction of a GP mandatory placement law³⁷. This contradicts the theoretical model in economics of supplier-induced demand – a larger supply of physicians resulting in a competitive medical market ensures that the demand for care and therefore the income per physician in these urban areas decreases⁶⁰. This should make it more attractive to relocate to more underserved areas, where the demand for care and therefore also income is higher. One possible explanation for the observed trends by Correia and Veiga, and Ünal et al could be that the health labor market is not really competitive^{37,58}. It could be that physicians themselves can stimulate the demand for care, and working in urban areas remains advantageous. Yet, there is disagreement on the importance and effect of this market failure⁶⁰⁻⁶³. Nevertheless, this substantiates that remuneration based on capitation payment could be effective, which is in line with our results.

We found robust evidence on the effectiveness of financial and regulatory measures, but the generalizability is challenging because there were a relatively small number of studies. One reason for this might be that countries often implement a combination of incentives and that measuring the individual effect of a regulatory measure is not possible. Although particularly the longitudinal studies of Ünal et al and Chevillard et al show valuable results, they could not adjust for co-interventions^{32,37}. Because there is no uniformed European policy yet and often multiple simultaneous measures are implemented, the results of included studies are very country- and context-dependent. Also, medical desert areas within Europe have a relative definition. The desired distance to primary care could be country-specific; for a relatively small country such as the Netherlands, this will be shorter than for a larger country such as Norway. While this review mainly refers to rural areas, this does not automatically equate to underserved or deprived areas, but relatively often rural areas are underserved and a GP shortage is often first noticeable⁴⁸.

The generalizability of our results to medical specializations other than GPs is also challenging. While some European countries offer patients a free and direct choice of medical care provider, others have a mandatory gatekeeping system by GPs to specialized care³. The latter requires a higher GP-to-patient density than that of specialized physicians in order to meet basic primary care needs. These country- and context-specific factors shows that further research is needed into the characteristics that define medical deserts. Caution is needed in relation to the transferability of our review findings, but could potentially give valuable information and mobilize health authorities of European countries for cooperation across borders.

Strengths and limitations

Our study reinforces the WHO framework that is often prevalent in literature on health workforce^{8,38-41}. One strength of this systematic review is that it is focused on a key profession (GPs) in medical deserts, as health workforce shortages are often first noticeable in these areas. Previous reviews described the health workforces in general^{41,42}; reviewing research on GPs only can offer insights into a more specific tailored strategy. In addition, we focus our review on extracting various outcomes of interventions, direct and indirect, and the effectiveness of the different recruitment and retention interventions. This variability provides additional understanding of factors influencing GP recruitment and retention in underserved areas. We also extensively searched grey literature, which has led to additional included publications. However, limitations should be taken into account when interpreting this review. We have used only two databases for our base search strategy.

Although no language restriction was used in the search string, a language bias may have occurred. The search for additional publications was only done in two languages (English and Dutch). Although GP shortages and unequal distribution are a problem across all European countries, our language selection might have unintentionally excluded, in particular, Eastern European studies. In these countries, policy and research outputs might only be written in their own languages and be less published locally and internationally. This suggests that our results might be more

representative for Western Europe.

Our review was limited to publications that described or evaluated an intervention in their method or results section. Interventions could have been evaluated by countries but not published. Interventions mentioned in the introduction or discussion section have not been included, which might have caused a reporting bias, with some categories of recruitment and retention strategies being unrepresented in this review.

Conclusion

This systematic review contributes to the existing knowledge on recruitment and retention strategies of GPs in European medical deserts. While not all European countries were equally represented, these results remain of interest to those experiencing issues with GP distribution and medical deserts given a similar health system. Analyses of the selected publications showed that educational and supportive measures are most frequently reported, while often a multifactorial approach is described or implemented. Mainly due to limitations of the study designs and methodologies, the majority of interventions were not thoroughly evaluated on their effectiveness. Since the number and generalizability of published studies are not optimal, stronger focus on evaluation of the effectiveness of interventions is needed to provide policymakers with insight into the long-term sustainability of recruitment and retention interventions of GPs in medical deserts.

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