



Overseas general practitioners (GPs) and opioid prescriptions in England

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ABSTRACT

The substantial recent rise in opioid prescription rates, along with increasing evidence of misuse and associated morbidity and mortality, raises serious concerns about the appropriateness of these drugs for pain management. This study investigates prescription behaviour differences across opioid drug categories between UK-trained and overseas-trained GPs. Using panel data covering all English practices from 2018 to 2021, we find a strong association between practices with more overseas GPs and opioid prescription patterns. Regional differences emerge, with GPs from North America prescribing more opioids and those from Africa and Asia prescribing less, relative to the UK-trained counterparts. Heterogeneous cultural norms, different training environments, and varying epidemiological patterns might explain these different prescribing behaviours. Comprehensive cross-country assessments of GP competencies could identify areas for targeted training, helping to align the practices of foreign-trained GPs with UK standards while supporting the attraction of global talent.

1. Background

Opioid misuse and dependence have been shown to pose significant risks, with average rates of problematic use in the United States ranging from 21% to 29% and addiction rates from 8% to 12% [1]. The misuse and abuse of opioid agents over the past three decades has cast a long shadow over healthcare systems, particularly in North America, where this public health crisis has been termed ‘the opioid epidemic’ [2]. The estimated total number of opioid analgesic prescriptions in the United States increased by 104% between 2000 and 2010, from 43.8 million to 89.2 million [3]. While the extent of its impact in European nations remains uncertain, concerning trends have emerged. Several European countries have witnessed in recent years an upward trajectory in long-term postoperative opioid use and opioid-related fatalities [4]. One of these EU countries is the UK. Between 2008 and 2018, England saw a 34% rise in opioid prescriptions, culminating in over 231 million prescriptions being issued in primary care, with opioid-related hospitalisations rising by 49% [5,6]. These alarming trends suggest the emergence of a potential opioid crisis in England which, while not yet as severe as in the United States, demands urgent attention. Addressing the multifaceted drivers of opioid misuse and its wide-ranging impacts on

public health and healthcare systems will require a comprehensive and coordinated response.

In this paper, we aim to uncover potential disparities in opioid prescription behaviour between UK-trained and foreign-trained GPs in English general practices. This line of inquiry is motivated by a notable study in the United States, which uncovered a striking relationship between opioid prescribing and medical school rank [7]. According to the study, even after accounting for factors such as speciality and practice location, physicians who completed their initial training at top-ranked medical schools wrote significantly fewer opioid prescriptions compared to those from lower-ranked schools. These findings suggest that medical education may play a role in shaping prescribing behaviours related to opioids. In this context, the UK represents an interesting case as its health service heavily relies on foreign clinical staff, with the share of foreign-trained doctors currently as high as 31%. Due to the shortage of physicians from British medical schools [8], over the past decades, the UK NHS recruited a large number of physicians trained in European and non-European countries. Despite the efforts to integrate foreign-trained doctors into the UK system, they often face cultural and professional challenges when adapting to the UK’s healthcare environment. Studies have shown that physicians’ prescribing behaviours are

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influenced by the medical norms and practices of their training countries, as well as the epidemiological and demographic contexts of those regions [9,10]. Immigrant GPs, especially those trained in countries with different approaches to pain management, may be more or less likely to prescribe opioids, depending on their prior experiences and training environments. In some countries, the prescription of opioids may be more liberal or more tightly regulated than in the UK, which has its own set of guidelines and practices for opioid prescriptions. As immigrant GPs continue to practice in the UK, their prescribing patterns may reflect the clinical training and medical culture of their countries of origin. This can result in discrepancies in opioid prescribing relative to UK standards, potentially affecting patient care, compromising safety, and exacerbating health inequalities. Given the pivotal role of GPs in the UK healthcare system, understanding potential differences in opioid prescription patterns among GPs could inform efforts to promote more judicious prescribing practices.

Despite the importance of this issue, the existing literature on the topic is rather limited. While descriptive evidence suggests that foreign-trained GPs tend to work longer hours and serve a larger number of patients, particularly in deprived areas [11–13], little is known about differences in their prescribing behaviours. A previous study [14] revealed that foreign-trained physicians exhibit distinct prescribing patterns compared to their UK-trained counterparts when it comes to antibiotics, statins, and mental health medications. Our research aims to fill existing gaps in the literature by providing evidence-based insights into opioid prescription patterns among GPs trained in different areas of the world.

To explore the relationship between GPs and the likelihood of opioid prescriptions, we integrate various data sources for England with detailed information about practitioners operating in different GP practices, patients characteristics, and drug prescriptions. Our final dataset is a panel in which the unit of observation is the GP practice, which we follow quarterly from 2018 to 2021. Using this dataset, we estimate a set of fixed-effect panel regression models, with the average percentage of opioid items prescribed as the dependent variable, relative to the total prescriptions within each GP practice. Interestingly, we find significant differences in terms of opioid prescribing behaviour depending on the specific region where GPs received their medical training. In particular, practices with a higher share of GPs trained in South Asia, Africa, and Australia/Pacific exhibit lower percentages of opioid prescriptions, compared to GP practices with higher shares of UK-trained GPs. Conversely, we observe a significantly higher prescribing tendency in practices where GPs are prevalently trained in North America and the Middle East. These findings indicate that the significant variation in the prescriptions of opioids is correlated with the GP's specific region of overseas training.

Our study seeking to identify disparities in prescription behaviour is meant to inform policies to ensure consistent prescribing practices across GPs, regardless of their training background. Identifying and addressing disparities in prescription behaviour is essential for ensuring equitable access to appropriate pain management and reducing the risks associated with opioid misuse and dependence. By shedding light on the factors contributing to prescription disparities, we aim to inform targeted interventions and policies aimed at promoting safer and more effective prescribing practices across GPs in England.

The rest of the paper is organised as follows. Section 2 describes the data and the methodology used for the estimation. Sections 3 and 4 report and discuss the findings. Section 5 concludes the paper offering policy recommendations.

2. Methods

2.1. Data

This study draws on multiple data sources to build the final dataset. The primary source is the National Health Applications and

Infrastructure Services (NHAIS)/‘Exeter’ GP payment system. This electronic system, used by GPs in England, contains mostly doctor-level information, including their age, gender, practice location, full-time equivalent (FTE) status, GP type (partner, trainee, salaried, or retainer), and country of qualification. Fig. 1 illustrates the distribution of GPs trained outside the UK across different Clinical Commissioning Groups (CCGs) in 2019. In particular, we observe that before the onset of the Covid-19 pandemic, more than one in five GPs in England were trained abroad. This pattern remains consistent throughout the duration covered by our study (2018–2021).

Notably, out of the 209 CCGs, 14 had more than half of their GPs trained abroad. For instance, in areas like Barking and Dagenham in London, two-thirds of the GPs were internationally trained. These regions experienced significant immigration, with a 205% rise in non-UK-born residents between 2001 and 2011. While the dataset includes data on the total number of patients in each practice, categorised by gender and age, it lacks information on patients' ethnicity.

By associating GP practices with patients' locations within each LSOA, we are able to compute the index of multiple deprivation (IMD) at the GP practice level. The index is constructed from 37 indicators across seven domains to represent various aspects of deprivation, taking into account labour market, health and crime statistics. This data is available on a quarterly basis.

We also utilize data on disease prevalence at the GP practice level from the Quality and Outcomes Framework (QOF) database. Specifically, we use information on the proportion of patients with conditions such as cardiovascular and respiratory diseases, cancer, chronic kidney disease, mental health disorders, musculoskeletal issues, fertility problems, and lifestyle-related factors. While QOF data are collected monthly, official statistics are published annually, covering the financial year from April to March. Finally, we use monthly data on drug prescriptions at the practice level from the English Prescribing Dataset (EPD). This dataset allows us to get information on the number of items prescribed, with a particular focus on general opioid analgesics categorized under BNF code 040702 for each GP practice. Our final dataset is

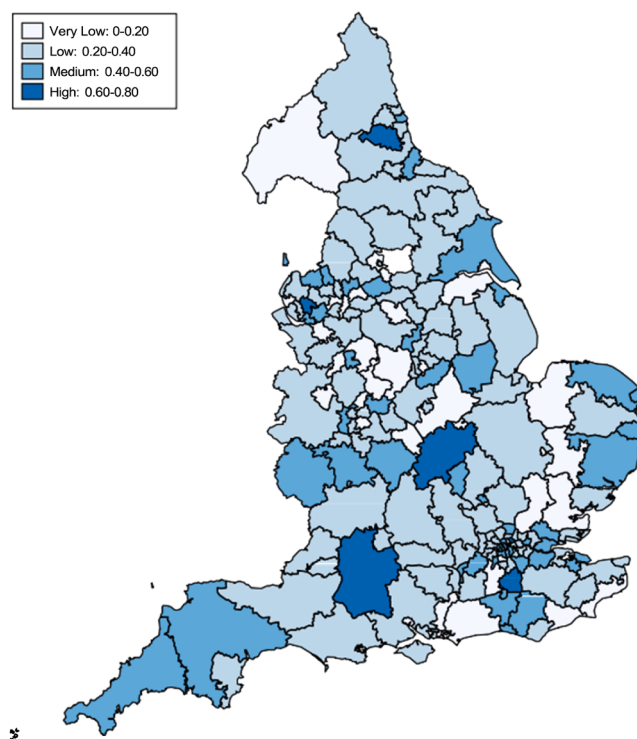


Fig. 1. Share of GPs trained abroad by CCGs in England..
Notes: Data are from 2019.

a panel of 6,659 GP practices in England, which we observe on a quarterly basis from 2018 to 2021. Descriptive statistics are reported in Table 1. About 2% of all prescriptions are for general opioid analgesics. This percentage tends to remain stable across the period of analysis, as shown in Fig. 2. Regarding the country of education, approximately 32% of GPs got their medical degree abroad: 14.3% have a degree from South Asia, 4.4% from Africa and about 5% from the European Union. The average share of FTE GPs per patient (defined as Practice Workload) is just above 5%. Nearly 48% of the GPs included in the sample are under the age of 45, with an equal gender distribution overall. Additionally, we report statistics regarding the degree of urbanisation of the practices, which averages 82%. The IMD index of deprivation gets an average value of 22 but ranges from 3 to 69 across practices (the higher the index, the higher the level of deprivation). Concerning the patient population, around 8% consists of patients aged 65 and above, equally distributed by gender.

2.2. Empirical analysis

To assess the effect of GPs training background on opioid prescription behaviour, we exploit the different concentrations of foreign-born GPs across practices in England from 2018 to 2021. We regress the percentage of opioid prescriptions (on total practice prescriptions) on the share of overseas GPs in each practice.

We estimate a model where the primary focus is on understanding how the proportion of opioid prescriptions within a GP practice varies over time. The dependent variable in our analysis is the percentage of opioid prescriptions relative to total prescriptions in a given GP practice at a specific time. The key variable of interest is the proportion of GPs in a practice who received their training abroad. This variable helps us investigate whether there are differences in prescribing behaviour between GPs trained in the UK and those trained elsewhere. To ensure robustness, we include additional variables that capture characteristics of the GP practice. These include the age and gender of the GPs, the size of the practice, and the demographic composition of the patient population (age and gender). These factors are important because they may influence healthcare needs and prescription patterns. For instance, certain age groups or genders might have higher exposure to specific health conditions. We also account for broader health and socioeconomic factors. These include the prevalence of diseases within the practice's patient population and an index of deprivation, which reflects the general health and socioeconomic conditions in the area. Accounting

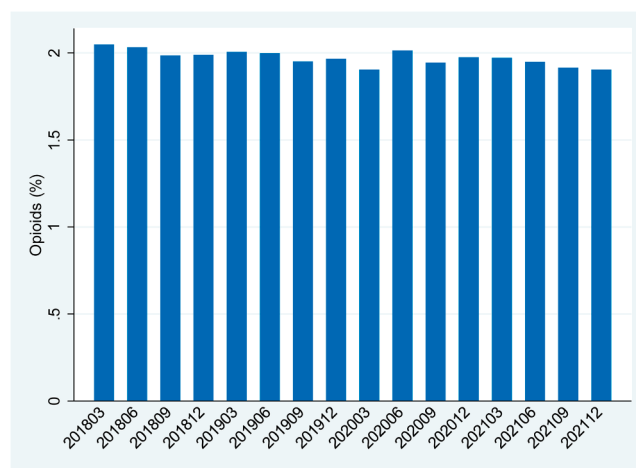


Fig. 2. Average % of opioids prescriptions by year-quarters (2018-2021).

for deprivation is crucial, as individuals in poorer areas tend to experience worse health outcomes on average.

To address unobserved differences that might affect prescription behaviors, we include fixed effects for each GP practice. These control for characteristics that remain constant within a practice over time, such as its location or long-term patient demographics. Additionally, we incorporate time-fixed effects (e.g., year-quarter effects) to control for factors that change over time but affect all practices equally, such as policy changes or seasonal variations. To better understand whether there is a different prescription behaviour across GPs trained in different regions of the world, we decompose the GP shares according to the broad geographical area where they received their degrees.

3. Results

Table 2 shows the main results. While we do not find a significant correlation between the overall share of overseas GPs and the percentage of opioid prescriptions, a different scenario emerges when considering the specific region of their training. When examining the geographic area where GPs received their medical degrees, we observe a lower percentage of opioid prescriptions in practices with a higher share of GPs who studied in South Asia, Africa, Australia and the Pacific

Table 1
Descriptive statistics.

	Mean	Std. Dev.	Min	Max	GP Practices	Observations
Opioids Prescriptions (% total prescriptions)	1.972	.788	0	11.392	6659	92341
GPs Country of education						
Immigrant	.324	.299	0	1	6659	92341
EU	.051	.114	0	1	6659	92341
UK	.676	.299	0	1	6659	92341
Africa	.044	.115	0	1	6659	92341
Asia Other	.004	.034	0	1	6659	92341
Asia South	.143	.233	0	1	6659	92341
Australia/Pacific	.002	.022	0	1	6659	92341
Central & South America	.005	.031	0	.5	6659	92341
North America	0	.006	0	.5	6659	92341
Middle East	.01	.051	0	1	6659	92341
GPs characteristics						
GPs under 45 (FTE)	.487	.262	0	1	6659	92341
GPs female (FTE)	.496	.236	0	1	6659	92341
Practice Workload	.057	.028	.004	1.619	6659	92341
Urban Index	.819	.329	0	1	6659	92329
IMD deprivation	22.892	11.413	3.282	69.231	6659	92329
Patient characteristics (% total patients)						
Patients over 65	.081	.033	0	.263	6659	92341
Patients female	.499	.024	.139	.735	6659	92341

Notes: Practice Workload is calculated as the total number of FTE GPs on patients list size ([15]).

region. Conversely, we find a significant over-prescribing behaviour among GPs trained in North America and Middle East. In particular, GPs trained in Africa prescribed approximately 5% fewer opioids, those trained in South Asia around 2% fewer, and those trained in Australia and the Pacific region nearly 4% less than their counterparts trained in the UK. On the other side, GPs trained in North America and the Middle East prescribed approximately 30% and 10% more opioids, respectively, compared to UK-trained GPs. Our results also show that in practices with a higher share of FTE GPs per patient, the percentage of opioid prescriptions tends to be lower compared to practices with lower FTE ratios. Finally, in practices located in urban areas, we observe higher percentages of opioid prescriptions compared to practices located in rural areas, see Table 2.

3.1. Robustness checks and heterogeneity analysis

To test the robustness of our findings, we re-estimate the analysis excluding the period most affected by the COVID-19 pandemic, which may have influenced opioid prescribing patterns. Specifically, we omit data from March 2020 to April 2021, corresponding to the peak of COVID-19-related disruptions in the UK. The results of this robustness check are presented in Table 3. As shown in the table, the results are confirmed, suggesting that exposure to the COVID-19 pandemic did not affect the association between opioid prescriptions and the region of training of GPs. Interestingly, we find that GPs trained in North America and the Middle East prescribed approximately 38% and 12% more opioids, respectively, compared to their UK-trained counterparts. These estimates are slightly higher than those in the main specification. This overall stability in prescribing patterns might be attributed to different factors, such as a combination of proactive policies and clinical guidelines, the effective adoption of tele-health without increased reliance on opioids, a strong focus on continuity of care for existing opioid users, or changes in patient consultation behaviour, among others.

In addition to the previous analysis, we also conduct heterogeneity analysis to explore whether the effect of the share of overseas GPs differs between deprived and non-deprived areas. Prior literature suggests that patients from disadvantaged communities experience a higher rate of opioid prescriptions compared to those living in more affluent areas [16]. To test whether higher shares of foreign-trained GPs exacerbate existing disparities, we classify practices into two subgroups based on the IMD quartiles of the local area. We define “deprived practices” as

Table 2
Opioids prescriptions.

	Model (1)	Model (2)
GP: immigrant	0.007 (0.007)	
GP: Europe		0.019 (0.015)
GP: Africa		−0.052*** (0.015)
GP: Asia		−0.048 (0.042)
GP: Asia South		−0.025*** (0.010)
GP: Australia/Pacific		−0.398*** (0.074)
GP: North America		0.308* (0.164)
GP: South-Central America		0.002 (0.044)
GP: Middle East		0.101*** (0.031)
Observations	91485	91485

Notes: The table shows the association between the share of GPs by country of origin and other practice characteristics, and opioids prescriptions (on total practice prescriptions). Model 1 includes an indicator for the overall share of GPs trained abroad, while Model (2) includes the region of training of GPs. The method of estimation is OLS. Robust standard errors are clustered at the practice level. Controls include disease prevalence, geographical area, the share of Full-Time Equivalent (FTE) GPs per patient, the share of female GPs, the share of GPs below 45, a dummy for urban areas, and the index of deprivation. All regression models include practice-level and year-quarter fixed effects. Significance levels:

* p -value < 0.1
 ** p -value < 0.05
 *** p -value < 0.01.

Table 3
Opioids prescriptions. Results excluding COVID-19 period.

	(1)	(2)
GP: immigrant	0.011 (0.008)	
GP: Europe		0.032* (0.018)
GP: Africa		−0.057*** (0.018)
GP: Asia		−0.078 (0.049)
GP: Asia South		−0.026*** (0.012)
GP: Australia/Pacific		−0.470*** (0.088)
GP: North America		0.381** (0.186)
GP: South-Central America		0.001 (0.053)
GP: Middle East		0.123*** (0.036)
Observations	68784	68784

Notes: The table shows the association between the share of GPs by country of origin and other practice characteristics, and opioids prescriptions (on total practice prescriptions). The method of estimation is OLS. Robust standard errors are clustered at the practice level. Controls include disease prevalence, geographical area, the share of Full-Time Equivalent (FTE) GPs per patient, the share of female GPs, the share of GPs below 45, a dummy for urban areas, and the index of deprivation. All regression models include practice-level and year-quarter fixed effects. Significance levels:

* p -value < 0.1
 ** p -value < 0.05
 *** p -value < 0.01.

those in the two most deprived IMD quartiles, and “non-deprived practices” in the two least deprived quartiles. We then re-estimate our baseline models by allowing the GPs training country coefficient to vary between these two subgroups.

Our findings (Table 4) indicate that in highly deprived areas, an

Table 4
Opioids prescriptions by deprivation area.

	High Deprivation	High Deprivation	Low Deprivation	Low Deprivation
GP: immigrant	0.025** (0.010)		−0.009 (0.009)	
GP: Europe		0.019 (0.021)		0.005 (0.021)
GP: Africa		−0.013 (0.020)		−0.111*** (0.022)
GP: Asia		−0.089 (0.063)		−0.045 (0.055)
GP: Asia South		−0.052*** (0.013)		0.016 (0.015)
GP: Australia/Pacific		−0.553*** (0.110)		−0.159 (0.101)
GP: North America		0.462** (0.231)		−0.084 (0.238)
GP: South-Central America		−0.088 (0.065)		0.096 (0.061)
GP: Middle East		−0.022 (0.047)		0.208*** (0.040)
Observations	45685	45685	45800	45800

Notes: The table shows the association between the share of GPs by country of origin and other practice characteristics, and opioids prescriptions (on total practice prescriptions). The method of estimation is OLS. Robust standard errors are clustered at the practice level. Controls include disease prevalence, geographical area, the share of Full-Time Equivalent (FTE) GPs per patient, the share of female GPs, the share of GPs below 45, and a dummy for urban areas. All regression models include practice-level and year-quarter fixed effects. Significance levels:

* p < 0.1
 ** p -value < 0.05
 *** p -value < 0.01.

increased share of foreign-trained GPs correlates significantly with a higher proportion of opioid prescriptions. We find some differences when categorising foreign-trained GPs by their region of origin: GPs from North America tend to prescribe more opioids in high-deprived areas compared to UK-trained GPs, whereas those from South Asia and the Australia-Pacific region tend to prescribe less compared to locally trained counterparts. We did not find significant differences in prescribing behaviour in low-deprivation areas, except for a higher prescription rate among GPs trained in Middle Eastern countries and a lower prescription rate among GPs trained in Africa, compared to UK-trained GPs. In addition, we conducted two further heterogeneity analyses by splitting the overall sample based on the age and gender of the GPs. For the sake of space, the results are presented in the online appendix.

4. Discussion

This study investigated differences in the opioid prescription behaviour across GPs trained in the UK versus abroad, practising in English GPs. While we did not find a significant relationship between the overall share of overseas GPs and opioid prescribing rates, notable differences emerged when considering the specific region where GPs received their medical training. Practices with a higher share of GPs trained in South Asia, Africa, and Australia/Pacific exhibit lower percentages of opioid prescriptions, compared to practices with more GPs trained in the UK. Conversely, we observe a significantly higher prescribing tendency among GPs trained in North America and the Middle East, compared to locally trained GPs. These findings indicate that the significant variation in the prescription of opioids might be associated with the GP's specific region of overseas training, rather than their domestic or foreign training status alone. In particular, GPs from Africa prescribed approximately 5% fewer opioids compared to UK-trained GPs, those from South Asia around 2% fewer, and GPs from Australia/Pacific nearly 4% fewer. On the other hand, opioid prescribing was about 30% higher among North American-trained GPs and 10% higher for those trained in the Middle East, compared to UK-trained GPs.

Our heterogeneity analysis reveals some additional nuances in the results. In highly deprived areas, a greater share of foreign-trained GPs is significantly correlated with more opioid prescriptions, especially among GPs originating from North America. However, in low-deprivation areas, we did not find significant differences except for lower prescriptions among African-trained GPs, compared to UK-trained GPs. When examining the GP's age, the over-prescribing behaviour (compared to UK-trained GPs) of overseas-trained GPs is mainly present in practices with higher shares of younger GPs (under 45). Interestingly, practices with fewer female GPs tend to prescribe more opioids compared to those with more female GPs.

The finding of more prescriptions of opioids by certain subgroups of overseas GPs compared to locally trained GPs is of particular relevance given the large and increasing demand for foreign-trained GPs in the UK and the well-documented public health crisis stemming from the unwarranted misuse of opioid medications. Excessive opioid prescriptions can lead to addiction, overdoses, and several additional negative consequences for patients.

The observed differences in opioid prescribing behaviour among GPs with different training backgrounds may arise from a combination of factors, including differing cultural expectations, medical training environments, healthcare system priorities, or the distinct epidemiological landscapes in their countries of origin. For instance, GPs trained overseas might have been exposed to alternative approaches to pain management or face differing levels of opioid use in their home countries, which can influence their prescribing behaviour in the UK.

5. Conclusions

Our findings have significant policy implications, highlighting the

need to develop a comprehensive and robust approach for comparing and bridging the gaps in GP training across different countries. By identifying and addressing specific competencies that foreign-trained GPs may require to better align with UK clinical standards, such efforts would not only help integrate overseas-trained doctors more effectively into the NHS but also ensure that they contribute to the delivery of high-quality and consistent care. These initiatives are vital for strengthening the NHS workforce, particularly in light of current GP shortages, while also promoting the responsible and judicious use of medications, including opioids, across the entire GP workforce in England. Furthermore, this approach could serve to enhance patient safety, reduce the risk of overprescribing, and help manage the public health challenge posed by opioid misuse.

While the findings are highly relevant, the study is subject to some intrinsic limitations. First, we employ a fixed-effect regression model to estimate the impact of GPs' training backgrounds on opioid prescription behaviour. However, potential endogeneity issues remain unaddressed in our analysis. In particular, GPs are unlikely to be randomly assigned to practices; instead, they may self-select into specific locations. Certain practices, for example, may be more inclined to hire overseas-trained GPs due to the area's socioeconomic characteristics or patient demographics.

Second, while we account for certain patient characteristics, such as morbidity and economic deprivation at the practice level, unobserved factors may still influence prescribing patterns. As a result, our estimates of prescribing differences between UK-trained and overseas-trained GPs may be biased. Addressing this issue through a valid instrumental variable approach would provide causal inference, and should be explored in future research. Moreover, due to data limitations, we classify GPs' training backgrounds into broad regional categories, which assumes uniformity in medical training and prescribing patterns within these large areas. However, this approach overlooks important differences across countries and even within subnational regions. Variations in medical education, healthcare systems, and prescribing norms may lead to significant differences in opioid prescribing that our classification does not capture. Future research could refine this approach by examining country-level variations rather than relying on aggregated regional classifications.

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CRediT authorship contribution statement

Joan E. Madia: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Conceptualization. **Catia Nicodemo:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Cristina E. Orso:** Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Cristina Tealdi:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Conceptualization.

Declarations of competing interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.healthpol.2025.105362](https://doi.org/10.1016/j.healthpol.2025.105362).

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