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Can Primary Care Networks contribute to the national goal of reducing health inequalities? A mixed methods study.

Abstract (222 words)

Background

Significant health inequalities exist in England. Primary care networks (PCNs), comprised of GP practices, were introduced in England in 2019 with funding linked to membership. PCNs are tasked with tackling health inequalities.

Aim

We consider how the design and introduction of PCNs might influence their ability to tackle health inequalities.

Method

Sequential mixed-methods study. Linear regression of annual PCN allocated funding per workload-weighted patient on income deprivation score from 2019-2023. Qualitative interviews and observations of PCNs and PCN staff were undertaken across seven PCN sites in England (July 2020-March 2022).

Results

Across 1,243 networks in 2019-20, a 10% higher level of income deprivation resulted in £0.31 (£0.25, £0.37), 4.50%, less funding per weighted patient. In 2022-23, the same difference in deprivation resulted in £0.16 (£0.11, £0.21), 0.60%, more funding. Qualitative interviews highlighted that although there were requirements for PCNs to tackle health inequalities, the policy design and PCN internal relationships and maturity shaped and sometimes restricted how PCNs approached this locally.

Conclusion

Allocated PCN funding has become more pro-poor over time, suggesting that the need to account for deprivation within funding models is understood by policy makers. We highlight additional approaches which could support PCNs to tackle inequalities: better management support; encouragement and support to redistribute funding internally to support practices serving more deprived populations; and greater specificity in service requirements.

Keywords

- Primary Care Networks
- Policy
- Health inequalities
- Mixed methods

How this fits in

Summarise in no more than 4 short sentences what was previously known on the topic and what the research adds, relevance to clinicians.

Primary Care Networks are an important policy development in English primary care, with an additional contract supporting practices to work collaboratively. Policy makers intend that they will tackle local health inequalities. Our research suggests that there is potential for them to achieve this, but it will require: continued weighting of funding formulas to account for deprivation; redistribution of funds and other resources internally to support the most deprived practices; managerial support, particularly for PCNs with deprived populations; and realistic and achievable targets for PCN action.

Main text

Introduction

Health inequalities is a commonly used but often poorly defined concept referring to differences in experiences and outcomes of health and illness across populations. These differences are driven by multiple factors, including socio-economic and social influences, as well as by inequalities in service provision.¹ Important inequalities include differences in morbidity, mortality, health status, access to care, and quality of care received, and have been clearly documented over many years, most recently in relation to outcomes associated with the Covid-19 pandemic.²⁻⁷

Recent health policy in England has emphasised the role of healthcare services in reducing inequalities. The NHS Long Term Plan set out what is described as a ‘concerted and systematic approach to reducing health inequalities,’ with associated actions.⁸ Primary care has an important role to play, with studies over many years demonstrating an inverse care law by which care is least available to those populations which need it most.⁹ It is therefore important to consider how new policies in this context impact on inequality. In this paper we explore the implementation of Primary Care Networks in England, and consider their potential impact on health inequalities.

Primary Care Networks

English general practice is usually provided by partnerships of primary care physicians (GPs) according to a General Medical Services contract. The contract is held between the National Health Service and independent GP practices, outlining both mandatory and additional services that GP Practices must provide to their patients. Additional work can be commissioned via an add-on voluntary contract known as Directed Enhanced Services (DES). In 2019, this mechanism was used to encourage groups of practices to work together as Primary Care Networks (PCNs). Covering a patient population of approximately 30-50,000, the DES provides PCNs with extra resources in exchange for the delivery of additional services.¹⁰ These included seven new ‘service specifications’, alongside extended hours appointments.

PCNs represent the latest in a long history of policies designed to encourage and incentivise individual GP practices in England to work more closely together. Such policies are underpinned by an assumption that individual GP practices are too small to deliver modern primary care services alone, and previous policy examples include: fundholding and Total Purchasing Pilots; Primary Care Groups and Trusts; practice-based commissioning; and Clinical Commissioning Groups. Each of these initiatives involved funding and incentives to support practices to work collectively, although the exact goals and approaches varied between schemes, with some focused largely on service provision by practices, whilst others also involved the engagement of GPs in wider issues of local service planning and commissioning. As initially established, the focus of PCNs is upon collective provision of services, but those responsible for the policy also see a wider role for them in representing primary care in local and regional decision-making about service provision.

The funding provided to PCNs is multifaceted (Table 1). Some payments are intended to support infrastructure, including a so-called ‘participation payment’ and funding to pay a Clinical Director. The most significant funding (approximately 50% of the total) is associated with the Additional Roles Reimbursement Scheme (ARRS), which reimburses networks for the salaries of a broad range of additional staff, including social prescribing link workers, mental health workers, physiotherapists, pharmacists, and physician associates. Finally, PCNs can earn incentive payments, via the Investment and Impact Fund. Since our study the PCN contract has been altered to include the capacity and access fund, which provides additional funding to PCNs to improve access for their patients.¹¹

It is an explicit aim of the PCN DES that the policy should contribute to the reduction in observed health inequalities. There are three potential mechanisms for achieving this. Firstly, the policy offers funding to groups of practices, which is at least partially weighted to account for deprivation. Secondly, the policy directly requires specific activity relevant to inequalities. This is represented by a service specification requiring PCNs to develop a plan to tackle a locally important inequality. Thirdly, there is a more indirect expectation that the collective activity led by a PCN health inequalities lead may catalyse more general changes in service delivery which could act to reduce inequalities.¹² Whilst policy documents do not explicitly consider how this might be achieved, it is expected that working together will encourage a more supportive environment within general practice. It is possible that this might, for example, lead to the internal redistribution of resources or support to help practices serving more deprived populations.

In this paper, we consider the factors affecting the operation of these mechanisms, to better understand how the policy could be optimised to meet its aims regarding health inequalities. Early analysis of the contract identified potential concerns about the distribution of resources, suggesting that known health inequalities were not fully reflected in the formulae used to determine funding.¹³ Here we extend this analysis, using a mixed-methods approach to explore the policy and its implementation.

Method

This paper presents findings from a longitudinal mixed-methods project running between July 2019 and July 2022. This comprised policymaker and stakeholder interviews,¹⁴ telephone interviews with Clinical Commissioning Groups (CCGs),¹⁵ qualitative case studies of PCNs and quantitative analysis of PCN allocated funding. CCGs were established in 2012 as the statutory NHS bodies responsible for planning local services for their local population. At the time of the initial study, they retained responsibility for supporting the establishment of PCNs, although they have since been abolished. Our initial qualitative data collection raised some queries as to whether the funding provided to PCNs was sufficiently adjusted to take account of deprivation and inequalities. This led to a quantitative analysis of the various funding mechanisms, the results of which fed into further qualitative data collection, exploring the factors affecting PCNs ability to use the funding provided to tackle inequalities.

Quantitative contract analysis

To consider the contract design we focussed on the stated funding formulas used in the 2019-20, 2020-21, 2021-22 and 2022-23 DESs. We estimated the funding this provided and analysed how this varied by deprivation after accounting for need. This represents the PCN contract prior to Winter 2022, when the capacity and access fund was introduced.

Data sources

Primary care network sample and population data

A full list of the 1,255 PCNs and 6,531 GP practices open on 1st January 2022 was gathered from NHS England (NHSE), with their unweighted and adjusted populations.¹⁶ NHSE is the organisation responsible for health care planning and delivery in England, with oversight from the government's Department of Health and Social Care. All but 70 GP practices were already aligned to a network. These practices were identified in NHSE organisational data service, with 7 practices subsequently aligned to a network, with the remaining (n=63) not signed up to the network DES. The unweighted and adjusted populations of the subsequently aligned practices were added to their corresponding network to get the final unweighted and adjusted populations. The unweighted population refers to the PCNs raw population. PCNs will differ in how much care their population needs and the

associated costs, such as due to different amounts of morbidity. These differences are accounted for through weighting (adjusting) the raw population.

The PCN DES uses two adjustments. The CCG allocation formula is used to model differences in need and associated workload between different CCGs.¹⁷ This is based upon the registered population's age-sex profile, health inequalities, new registrations and rurality.¹⁷ This formula is applied to create the PCN adjusted population. The contractor weighted list size differs from this as it is the sum of the constituent practices weighted list sizes, which uses the Carr-Hill formula. This adjusts for the practices age-sex profile, additional needs, list turnover, market forces and rurality.

The adjusted population is only available in January 2022 whilst the contractor population is available in March 2022. To account for differences in the population sizes between these time points, the March 2022 contractor weighting for each network was calculated in March 2022 by dividing the contractor weighted population by the unweighted population was calculated (ranging from 0.63 to 1.39) and applied to the January 2022 unweighted network population, creating the contractor weighted population in January 2022.

Stated Funding Formulas

Unfortunately, due to missing data, it was impossible to use the payments that networks actually received. The allocated funding for each PCN for each contract year was calculated. The stated funding streams and formula for each year (2019-20, 2020-21, 2021-22 and 2022-23) of the PCN DES are detailed in Table 1.^{10,18-20} For the ARRS we calculated the maximum amount of funding a network could be reimbursed, however the amount actually reimbursed depends on network recruitment. The Impact and Investment Fund was excluded from the calculation as it is still unclear the extent it will catalyse activity in networks, which is integral to a pay for performance scheme and difficult to estimate.²¹⁻²³ Similarly, the care home premium was excluded as data on number of care home beds per network is not available. Contract changes mid-year were not included, such as funding for the capacity and access fund.

Average Network Income Deprivation Score

Income deprivation score is a continuous measure of the proportion of the population who receive benefits from the State on the grounds of low income. The larger the value the more deprived the population. This was gathered at practice level by combining the 2019 Office of National Statistics Indices of deprivation data and 2020 lower-level super output area data.²⁴ The PCN's income deprivation score was then calculated as the sum of its constituent practice's deprivation scores, relative to the population size of the practice.

Need adjustment

As the deprivation of a population increases we expect the need and associated costs for care to increase relative to the population size. As such, to avoid reinforcing inequality, it is important that the funding formula at least accounts for this difference. To control for this we performed a needs adjustment using the Carr-Hill formula. There are multiple approaches to control for this, such as the Carr-Hill formula (capitation adjustment), as well as age and sex specific consultation rates and population mortality and morbidity, with no universally agreed approach. Pre-existing English general practice funding is adjusted for need (workload adjustment) by the Carr-Hill formula. As such, we adjusted for need differences using this formula. This means we can analyse whether the stated PCN funding formula has greater adjustment for deprivation relative to the existing adjustment used for general practice funding.

Statistical analysis

Statistical analysis was conducted in R Studio 2022.07.2. Twelve practices (0.96%) had incomplete contractor weighted list sizes, which were excluded from the analysis. Summary statistics were calculated for all variables. Linear regression was used to analyse the relationship between the PCN unweighted, contractor weighted and adjusted populations, funding per contract year and funding per weighted patient by the network's income deprivation score.

Qualitative Primary Care Network case studies

The factors affecting the ability of PCNs to tackle inequalities were explored in qualitative case studies of 7 PCNs. The case studies were selected to capture heterogeneity of PCNs including size, population demographics and geographical location (Table 2).

Ninety-one qualitative interviews and approximately 87 hours of meeting (e.g. PCN leadership team or PCN member meetings) observations were conducted by (LWG, DB (female), JHa and SB (male)). All researchers have extensive qualitative research experience and did not know the participants prior to recruitment.

Sites were recruited based on the telephone interviews with CCGs and contact was made for interviews and observations via email. All sites were recruited through the use of a project information sheet which outlined all the information about the research project, what taking part would entail and the ethical considerations e.g. consent and anonymity. Interview participants were selected using purposive and snowball sampling, information was provided by the main PCN contact or people were identified during meeting observations. No participants who were contacted declined to take part.

All interviews and observations took place via Microsoft Teams or Zoom because of Covid-19 pandemic working restrictions. The majority of participants were either working from their home or were within their GP Practice. No other people were present other than the researcher and the participant. The sample comprised general practitioners, commissioners, ARRS staff and NHS managers.

All interviews followed a topic guide developed on the basis of engagement with relevant policy documentation, academic literature and our knowledge of primary care organisation and policy. All interviews were audio recorded and field notes taken when observing meetings. Interviews lasted one hour on average and observations lasted two hours on average. The research team stopped collecting data when data saturation was reached, i.e. no new themes were being discussed by participants. All field notes were typed up by the researchers and the interviews were transcribed by an independent company. None of the transcriptions were checked by participants.

A framework analysis method was employed.²⁵ All data were coded and analysed by LWG, JHa, DB and SB using NVivo (version 12). The coding framework was developed iteratively by the research team members. A deductive and inductive approach was taken, whereby some themes were developed prior to data collection (based on existing literature) and others were derived from the data. Initial findings were presented to a national PCN network to ensure that they had strong face validity with those involved in implementing the PCN policy. Ethical approval was granted from The University of Manchester Proportionate Ethics Committee (Ref: 2019-6922-11177).

Qualitative and quantitative researchers worked collaboratively, with insights from the quantitative work feeding in to subsequent rounds of qualitative interviewing.

Results

The relationship between funding received and population deprivation

A final sample of 1243 networks was included with a mean PCN registered list size of 48,927 (10% and 90% percentiles: 31,194, 69,988). Summary statistics are detailed in table 3 and 4. Mean network income deprivation score was 0.129 (0.063, 0.213). Mean PCN contractor weighted list size was 48,905 (30,921, 71,333) with mean PCN adjusted population 48,903 (30,427, 71,588). Mean estimated funding to PCN increased each contact year from £327,531 (£253,308, £438,213) in 2019/20 to £1,294,476 (£818,675, £1,878,790) in 2022/23. Similarly funding per weighted patient increased from £6.90 (£6.10, £7.73) to £26.49 (£25.85, £27.07) in the same time-period.

Results of the linear regression are in Tables 6. A 10% (0.1) higher average network income deprivation score resulted in 3,283 (95% CI: 1368, 4741), 5,256 (3,322, 7197) and 7952 (6036, 9868) more patients for unweighted, contractor weighted and adjusted populations respectively. This indicates that networks in more deprived areas are larger, with greater weighting for income deprivation with the adjusted compared to contractor weighted populations.

When analysing how stated funding changes with deprivation relative to healthcare need, a gradual change over the four contract years was identified. A 10% increase in deprivation resulted in £0.31 (£0.37, £0.25) less funding per weighted patient in 2019-20, but in 2022-23 the same increase in deprivation resulted in £0.16 (£0.11, £0.21) more funding per weighted patient. This indicates the stated formula for PCNs provides greater weighting for deprivation than the existing adjustment used in the general practice global sum. Scatterplots of this relationship are shown in Figure 1.

Direct requirements to tackle inequalities

The contract includes a service specification which requires PCNs to formulate a co-produced plan to tackle an important locally-identified inequality. Whilst this was generally welcomed by case study PCNs, it was also seen as potentially daunting. For example, in Site C, the membership expressed concerns that 'the ask' of PCNs was too great.

Health Inequalities Lead: PCNs have been asked to engage with people who are experiencing health inequalities, to co-design with them and implement an intervention... We know that in [Area X] that there are issues with air pollution, obesity, higher alcohol and drug misuse and loneliness in the elderly. We have possible actions of looking at healthy families, engagement with the homeless, promote existing services.[...]. The priority we focus on will be the one that has the most votes.

Practice Manager 1: I agree with the points. These are all obstacles that the PCN is facing. I do wonder how we are supposed to tackle some of them...

[Site C PCN Meeting 250122]

As illustrated here, the PCNs in our study were aware of the inequalities that their patient populations face. However, they also told us that, given the wider societal factors underpinning those issues, including housing, education, employment etc., they were concerned that, as health care providers, they had limited levers with which to tackle the problems that they saw. They were keen to engage with this agenda, but would have welcomed more specific guidance and support.

Indirect impact: collaboration as mechanism to reduce local inequalities

Our study noted significant variation in many aspects of PCN operation. These included variation in size, populations they serve, the development of internal relationships and the types of practices within PCNs.²⁶ Therefore, the extent to which the policy will enable collective working which acts to reduce inequalities is also likely to be variable. Several factors of relevance to this potential mechanism were identified, some related to the characteristics of different PCNs and some arising out of the design of the policy itself.

PCN characteristics

Each PCN had the freedom to develop local arrangements for working together. This proved to be easier for some groups than others. In Site A, there were a number of different operating models of general practice within the PCN membership, with practices working within a number of different

contract models collaborating together. The diverse operating models influenced how individual practices viewed their purpose, how they engaged with their patient population and how they wished to provide services. One practice struggled to engage with the wider PCN due to the circumstances by which the practice had joined the PCN. The relationship did not develop organically; instead the practice joined the PCN under the instruction of the local CCG.

We feel as though we're a bit of an oddity around the place and they [the Clinical Commissioning Group] weren't sure where to put us, so they put us with that team. And then that team turned out to have existing relationships of neighbours and they've got on and run it as best they can since then. That's how it feels. [N590yb-GP Site A]

In addition, the existing practices within the PCN had worked together in the past, which had allowed relationships and ways of working to develop over time. This made it more difficult for the practice joining at a later date: organisational structures, ways of working and leadership had previously been established making it more challenging for new practices to find their place within the PCN. In addition to the varied general practice models, there was also significant variation in practice list sizes across the PCN membership. Differing practice sizes meant that there were different staff numbers across practices, affecting how practices engaged with the PCN agenda. Smaller practices have fewer staff, and are therefore less able to engage with collective activity.

'I, on behalf of the practice, and it's purely because of strategically when the meetings are, the collaborative meetings, the GPs that I work for, because you're single-handed, it's been difficult because it's on a Thursday and we do X clinic.' [N290et_Practice Manager Site E]

Although our analysis shows that the funding for PCNs progressively increased the extent to which deprivation was taken into account, variability across general practices was less easy to accommodate. Smaller practices and those serving more deprived populations told us that they felt at a disadvantage when trying to meet the contractual requirements of the DES.

However, Site D had established an operating model which accounted for the diverse population needs, suggesting that PCNs may be able to address this over time. History and pre-existing arrangements prior to the introduction of PCNs had enabled them to find mechanisms to work together at scale and reduce some of the struggles that smaller practices face. A single organisation mentality shaped decision-making.

...So for everything at the moment that the PCN is involved in, we do it as one organisation because we are one organisation. Whereas when I look at the way that other PCNs function, they are first and foremost a practice. [N750hg-PCN GP Site D]

The 'one organisation' mind-set enabled them to think differently about resource allocation. Internal PCN resources were distributed based on population need rather than practice list size. This enabled resources to address some local health inequalities.

I think it doesn't because we look at what is needed in each area, so we're able to, like I said, have the kind of health coaches in like the inner city [xxx] area, and we're able to use different resources in say [Area Y] or [Area Z] which are more affluent, and they're needing different things. And before the pandemic we'd started doing some kind of community engagement things, so we'd got like a knitting group, and we'd got different things in each practice but, obviously, depending on what was needed. [N280dy-PCN GP Site D]

Although this way of working was discussed positively by Site D PCN members some practices may not want to work at scale in this way, as it reduces independent practice development and requires the adoption of ways of working that work for the majority. The internal dynamics within some PCNs made this difficult, particularly where there were significant disparities in the size of practices:

'This one big practice that's always not as contributing towards it than the other, so being a large practice when they are not contributing, it has a big impact on all of the smaller practices, because at the end of the day you don't want to... It's like a family, isn't it? So if there's one member who slacks, the other has to take the pressure on, and how much you can take is the big question... and because GPs change, the leadership change, the board employees, like the managers, everybody keeps changing, it has to always have its questions on going forward, is this going to work, is this going to work? There's always doubt.' [N570mu_090721_Practice Partner_ Site B3]

Working together collectively and redistributing funding internally requires mature relationships, and fostering this will be an important goal for PCNs as they develop. PCNs that have been established based historical working relationships were at an advantage, relationships had been formed and tested, allowing for PCN governance practices to be embedded more easily.

Policy design factors

The PCN policy acknowledges the importance of primary care working together with other community-based organisations.¹⁴ This is particularly important when it comes to tackling local health inequalities. However, as highlighted through our quantitative analysis, the PCN contract provides funding specifically for general practice, with wider collective activity not incentivised or paid for. In some areas this was problematic. For example, in Site D, there were well established programmes of work that had been developed by the CCG. The primary focus of these was to tackle local inequalities, with a broader focus than just health. However, driven by the incentives in the policy, PCNs within Site D retreated from the local programmes of work to focus on meeting the requirements of the PCN DES. The PCN policy was perceived to be primary care focussed which did not necessarily allow PCNs to address local issues that had been identified.

...we looked at what were the true health inequalities in each of those three places and what were... the [programmes] have got the answers to some of these issues, ..., but it's broader than the health and social care agenda, it's about housing, it's about education, it's about employment, it's about economic recovery, it's all of those things, isn't it. [N670rd-Partnership Lead Site D]

Over time, however, growing maturity as an organisation allowed local stakeholders to recognise that there was a local need for the community programmes to operate alongside PCNs to help address local inequalities. Although PCNs were tasked with tackling inequalities, it was recognised locally that PCNs were unable to address the broader factors that shape health and inequalities and a single approach was inadequate to address local inequalities.

And now that's a bit more established I think as a place where recognising that we need to, we can't take a blanket approach to addressing health inequalities. And that's really, what allowed the [programmes] to relaunch and reboot. [...] So there's that work that we're supporting them on at the moment. [N880h7-CCG Manager Site D]

The PCN policy took a one size fits all approach, expecting all PCNs, no matter their size, location or population they served, to deliver the same contractual requirements. Some aspects of the policy

were found to be harder to implement in more deprived areas. For example, some PCNs covering deprived populations told us that they had struggled to recruit new staff to the ARRS roles.

Yeah, I mean, we have managed to recruit. There's been some areas where it's taken a few adverts to get people in, so, we've been a bit persistent. But I think there are occasional, I think they've found a couple of areas in the more deprived areas have struggled a little bit, so have been out for advert more than once.
[N130iy-CCG Manager Site A]

In some areas they tried to mitigate this by recruiting collectively. This entailed PCNs working together at supra-PCN level to develop job descriptions and go out to recruit together. The pandemic affected PCN development and slowed down the recruitment process into the ARRS roles. In many areas, this led to underspend of the available funding. To ensure that money allocated to PCNs was not lost, PCNs began to be creative about how they could utilise the money. In one Site, there was some 'fudging' of the national contract, to try to meet local demand, focussing on community members more likely to suffer from health inequalities. This is an example of where a potentially restrictive contract was utilised a little differently to address known local need.

Community Provider 1: We are having conversations with the commissioner about the ARRS underspend and where we can do something different. We are looking at a piece of work where we would prioritise the most deprived areas in [XXX], including the BAME communities. We know that there people are more likely to suffer from health inequalities. This would mean that they would get bumped up the waiting list.

Community Provider 2: This would provide more opportunities to engage with the Patient Ambassadors.

PCN Business Manager: It sounds positive. We know that this is a good service. It is a shame that we can't get it closer to [Name of] Street. [PCN A1 PCN Members Meeting 070921]

More generally, respondents reported that, in common with other incentive schemes, the targets associated with PCNs (particularly with regard to the Investment and Impact Fund element of the contract) could be more difficult to meet in deprived areas. Some of the PCN targets were not new to general practice i.e. flu immunisation, however the responsibility to deliver them had changed from an individual practice one to a PCN one. There was recognition that some of these targets had been unobtainable for many years and that changing the entity that was required to deliver the targets would not necessarily make the task any easier.

So we get data as a PCN, don't we, about not achieving on X, Y and Z target, whatever it is which relates to health, but we're never going to achieve that because of the deprivation that we have. But yet we can't find that information...we find it really challenging to find that information. [N840im-PCN Consultant Site A]

PCN staff serving deprived populations spoke of the unfairness that they experienced when trying to meet the targets, highlighting that PCNs and practices serving more affluent areas will find it easier, as their population was more engaged and willing to use local healthcare services. This was visible during the Covid-19 vaccination programme, with more deprived areas experiencing higher levels of vaccine hesitancy.

Discussion

Summary

This paper explores the implementation of PCN policy and the factors affecting their ability to tackle health inequalities. We have identified three mechanisms by which PCNs are expected to potentially address health inequalities, and explored how these are working in practice. The funding formula was initially pro-rich relative to need, however over subsequent iterations of the policy this relationship became more pro-poor and is now more pro-poor than the adjustment used in the general practice global sum. This is encouraging, as it suggests that the need to account for deprivation within funding allocations is understood by national policymakers.

The direct requirement for action to tackle health inequalities has been generally welcomed, but the task is felt by some to be daunting, given the importance of social factors beyond the reach of health services. PCNs have significant potential for collective action and the redistribution of funding between members to address inequalities. However, this depends upon mature and trusting relationships, and the development of a collective mind-set as well as robust internal processes.

PCN characteristics in terms of size, membership, and patient demographics are important enabling or inhibiting factors with regards to addressing health inequalities, with those including multiple small practices and those serving deprived populations at particular disadvantage. There is some evidence that those serving deprived areas find it more difficult to both take advantage of PCN funding and achieve relevant targets, and some flexibility within the policy may be required.

Strengths and limitations

Our mixed methods approach was a particular strength of our study. Initial interviews suggested some concerns about the extent to which funding for PCNs took account of deprivation, leading us to undertake our quantitative analysis which showed that, over time, funding has progressively shifted to take account of measures of deprivation. The emerging findings from the quantitative work were then able to inform our ongoing data collection. This type of integrated mixed methods research can be difficult to carry out, but it provides a rich and detailed understanding of complex and nuanced phenomena. The datasets used in the quantitative methods covered all PCNs, which allowed an analysis of how the funding formula address need by deprivation. The qualitative case studies used a longitudinal approach exposing the on-going local challenges faced by PCNs. This methodology provides a voice to those who are trying to implement national policies within local contexts, illuminating challenges which may not be visible at a national level. The trustworthiness of our qualitative findings rests upon our triangulation of interview data with data from observation of PCN meetings, our engagement with relevant literature prior to recruitment, and our collective analysis of the transcribed interviews. Individual team members interpretations were discussed and revised, with reflexive engagement with the positionality and experiences of each team member. However, the qualitative interviews took place within a specific timeframe and this is a limitation, as the landscape around PCNs has changed over time. Further work is required to understand how PCNs are operating outside of the Covid-19 pandemic, which significantly changed the expectations of the PCN contract. In addition, more research is required to understand how PCNs are working within newly formed Integrated Care Systems (ICS), introduced in the Health and Care Act 2022.²⁷ ICSs are statutory bodies with a responsibility for planning and delivering health and care services to their local population (an average of 1.5 million patients). Since their introduction, CCGs have been abolished and their responsibilities have been subsumed into each ICS.

The Carr-Hill formula is commonly criticised for incompletely accounting for workload differences caused by deprivation,²⁸ meaning the coefficients developed here are likely to be underestimated

relative to the true need of deprived communities. The CCG allocation formula provided greater weighting for income deprivation than Carr-Hill. Given the capacity and access fund uses the CCG allocation formula, we expect PCN funding to have remained pro-poor. A sensitivity analysis including this funding data confirmed this.

Unfortunately, funding uptake by PCNs could not be analysed, as too much of the publicly available data is missing. The amount networks actually receive may vary by deprivation, particularly for the ARRS and Impact and Investment Fund which require engagement by the network, and further analysis could usefully explore this.

Comparison with existing literature

It is well known that practices in more deprived areas have struggled to engage with incentive schemes and it is unsurprising that the same issues arise with PCN incentives.²⁹ Adjusting funding for the additional work associated with working with deprived populations is difficult, but can be important in mitigating the advantages associated with working in more affluent areas.³⁰ More generally, evidence from previous schemes encouraging groups of GPs to work together has highlighted the importance of good management support.³¹ PCN policy at present does not include the deployment of dedicated managers, and this may represent a potential avenue through which to support all PCNs to work more closely together and develop collective approaches to inequalities.

Implications for research and/or practice

Our detailed study has highlighted important issues for PCNs as they seek to tackle health inequalities, and suggests four potential approaches that could be adopted to support them in this task. Firstly, more aspects of the funding model could be weighted, alongside better adjustment of incentive scheme requirements to reflect the additional difficulties faced by PCNs serving deprived populations. Secondly, additional management support, both internally and at supra-PCN level, could be usefully provided, particularly for PCNs situated in deprived areas. Thirdly, support should be provided to encourage PCNs to redistribute funds internally to help support more deprived practices. This is particularly important for PCNs that serve heterogeneous populations. Finally, for PCNs to really tackle local inequalities, what they are asked to do needs to be specific and take into account what general practice can realistically achieve. We know that inequalities are a 'wicked' problem and that healthcare cannot effect change alone. However, PCNs represent a promising vehicle for change, and our study suggests ways in which their potential may be realised.

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Ethical approval

This study was granted ethical approval by The University of Manchester Proportionate Research Ethics Committee (study number: 2019-6922-11622).

Competing interests

None

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