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Location, location, location: does providing public health services from community pharmacies contribute to tackling health inequalities?

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ABSTRACT

Background Community pharmacies have long been advocated as an accessible source of advice on health improvement in communities. This cross-sectional study explored the association between provision of pharmacy public health services and factors that might influence the extent to which pharmacies contribute to tackling inequalities.

Methods Publically available data were used to explore the association between pharmacy public health service provision and pharmacy characteristics (socioeconomic deprivation, urbanity, opening hours and workload). Regression models were fitted to the number of service consultations. The association between the number of services provided and the mean number of consultations across each service was investigated using regression models.

Results Pharmacies showed a propensity for being situated in areas of higher socioeconomic deprivation. There was no association between socioeconomic deprivation and number of service consultations a pharmacy provided. Clustering of pharmacies in less affluent areas led to over half of all public health service consultations being in the two most deprived quintiles.

Conclusions Providing healthcare services from pharmacies in more deprived areas does not mean the public use them or that pharmacies will prioritize their delivery. The higher prevalence of pharmacies in disadvantaged communities is an important factor in ensuring pharmacy services support reducing inequalities.

Keywords epidemiology, health services, public health

Background

Health inequalities are unfair and avoidable differences in health between individuals and between different groups within society.[1] Typically, individuals living in areas with high levels of socioeconomic deprivation have greater co-morbidity, shorter life expectancy, more complex healthcare needs and are significantly more likely to participate in high health-risk behaviours[2,3] than those living in areas that are more affluent.[4]

Community pharmacies have long been advocated as an accessible source of advice on health improvement in communities, and a broader role for the sector has been the subject of strategies and health service reforms championed by successive UK Governments.[5,6] As recently as 2016, the Royal Society for Public Health and Public Health England called for more effective use of pharmacies in efforts to improve population health and tackle inequalities.[7]

However, where previous studies have examined the association between socioeconomic deprivation and pharmacy service provision, they have suggested new services may not preferentially reach those with lower socioeconomic status[8] and may reach affluent parts of the population earlier.[9]

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The objective of this study was to explore the association between provision of pharmacy public health services and factors that might influence the extent to which pharmacies contribute to tackling inequalities.

Methods

Data were obtained from the NHS Wales Shared Services Partnership from consultation records ($n = 213\,239$) submitted by every pharmacy in Wales for the four public health services (smoking cessation (SC), common ailments (CA), emergency contraception (EC) and seasonal influenza vaccination (SFV)) most commonly provided by pharmacies in Wales.[10] Data related to the 12-month period 1 March 2019 to 29 February 2020. Data obtained included for each pharmacy: postcode; opening hours; prescription volume and number of consultations for each service.

The postcodes of each pharmacy were matched to the corresponding Lower Super Output Area (LSOA) using the Office for National Statistics (ONS) postcode directory.[11] The LSOA data were used to classify the pharmacy location using ONS rural urban classifications[12] and assign them to deprivation quintiles based on the Welsh Index of Multiple Deprivation (WIMD) 2019.[13]

Variables

Explanatory variables included the following pharmacy characteristics: WIMD deprivation quintile, ONS rural urban classification (dichotomized as urban or rural), whether the pharmacy opened extended hours (determined as opening after 7 pm on weekdays, after 2 pm on Saturday, and at any time on Sunday), whether the pharmacy was in independent or multiple ownership and the average monthly prescription volume grouped into quintiles. In the absence of meaningful denominators for pharmacy populations, mean monthly consultation numbers were used for outcome variables.

Statistical analysis

Statistical analyses were conducted using Stata/SE version 16.1 (StataCorp. 2019. Stata Statistical Software: Release 16 College Station, TX: StataCorp LLC). Negative binomial (for the CA and EC) and zero-inflated negative binomial (for SFV and SC services) regression models were fitted to the number of service consultations to account for overdispersed count data and overdispersed count data with excess zeros (these were structural zeroes caused by pharmacies not offering a particular service), respectively. Univariable and multivariable analyses (including all pharmacy characteristics as explanatory variables) were conducted. For zero-inflated models, the inflated part of the model included all variables included in the adjusted models. Multivariable models exploring exposure outcome relationships excluding potential mediators (and thus adjusting solely for potential confounders) were fitted as sensitivity analyses (see Supplementary Tables S1–S3). We pre-specified potential mediators based on expert opinion and knowledge of the literature. We explored each candidate exposure in turn by reflecting on the remaining variables to consider whether they would likely act as potential confounders or mediators.

The association between the number of services provided and the mean number of consultations across each service was investigated by fitting negative binomial or zero-inflated negative binomial regression models to the number of consultations (as above). Pharmacies that did not offer particular services were excluded from the analysis. All findings were reported as incidence risk ratios (IRRs).

Results

Data were available for 716 pharmacies (Table 1). Most pharmacies were located in urban areas (71.6%, 513/716) and showed a propensity towards being situated in areas of higher socioeconomic deprivation with more than half of pharmacies (50.6%, 363/716) in WIMD quintiles 1 and 2. The majority of pharmacies (97.6%, 699/716) offered at least one of the services studied. Half of all pharmacies (358/716) offered all services and over 80% of pharmacies (576/716) offered three or more.

In total 213 239 service consultations took place in the study period. The CA service was the most commonly and frequently provided service, with 695 pharmacies providing 75 139 consultations. The least commonly and least frequently provided services were the SC (446 pharmacies, 62.3%) and EC services (35 871 consultations), respectively.

Socioeconomic deprivation

The highest proportion of consultations (27.3%, 58 255/213 239) took place in pharmacies in the quintile of highest socioeconomic deprivation. However, when individual services were considered, only the CA service had the largest proportion of consultations taking place in this quintile.

In the univariable analyses, there was no evidence of an association between WIMD quintile and the number of consultations provided in either the EC, SFV or SC services. For the CA service, consultation numbers in the quintile of lowest socioeconomic deprivation (quintile 5) were 38% lower than quintile 1 ($P = 0.024$); however, this association was smaller and no longer statistically significant after adjusting for other factors ($P = 0.053$).

Table 1 Characteristics of pharmacies providing selected public health services in Wales

	All pharmacies, n (%)		*Number of public health services offered at pharmacy, n (%)*									
			0		*1*		*2*		*3*		*4*	
Pharmacy type												
Independent	214	(29.9)	12	(5.6)	27	(12.6)	39	(18.2)	59	(27.6)	77	(36.0)
Multiple	502	(70.1)	5	(1.0)	6	(1.2)	51	(10.2)	159	(31.7)	281	(56.0)
Rural urban classification												
Urban	513	(71.6)	9	(1.8)	25	(4.9)	64	(12.5)	152	(29.6)	263	(51.3)
Rural	203	(28.4)	8	(3.9)	8	(3.9)	26	(12.8)	66	(32.5)	95	(47.0)
Deprivation quintile												
1 (highest)	182	(25.4)	3	(1.6)	5	(2.7)	25	(13.7)	53	(29.1)	96	(52.7)
2	181	(25.3)	4	(2.2)	6	(3.3)	14	(7.7)	49	(27.1)	108	(59.7)
3	160	(22.3)	6	(3.8)	9	(5.6)	19	(11.9)	52	(32.5)	74	(46.3)
4	108	(15.1)	2	(1.9)	9	(8.3)	12	(11.1)	34	(31.5)	51	(47.2)
5 (lowest)	85	(11.9)	2	(2.4)	4	(4.7)	20	(23.5)	30	(35.3)	29	(34.1)
Extended hours pharmacy												
Yes	209	(29.2)	1	(0.5)	3	(1.4)	20	(9.6)	62	(29.7)	123	(58.9)
No	507	(70.8)	16	(3.2)	30	(5.9)	70	(13.8)	156	(30.8)	235	(46.4)
Annual prescription volume quintile												
1 (lowest)	143	(20.0)	8	(5.6)	11	(7.7)	25	(17.5)	43	(30.1)	56	(39.2)
2	143	(20.0)	5	(3.5)	8	(5.6)	21	(14.7)	41	(28.7)	68	(47.6)
3	143	(20.0)	2	(1.4)	6	(4.2)	15	(10.5)	47	(32.9)	73	(51.0)
4	143	(20.0)	1	(0.7)	4	(2.8)	18	(12.6)	44	(30.8)	76	(53.1)
5 (highest)	144	(20.0)	1	(0.7)	4	(2.8)	11	(7.7)	43	(30.1)	85	(59.4)
Total	716		17		33		90		218		358	

Rural urban classification

Over three quarters of consultations took place in urban pharmacies (75.6%, 161 271/213 239). On average, urban pharmacies undertook more service consultations than rural ones (314.4 consultations per pharmacy per year versus 256.0 consultations per pharmacy per year). Despite lower consultation numbers overall, rural pharmacies were associated with lower consultation numbers only for the EC service (adjusted IRR = 0.49, 95% confidence interval (CI) 0.39 to 0.62, $P < 0.001$). We found no evidence to suggest an association between urbanity and numbers of consultations for other services.

Pharmacy type

Multiple pharmacies provided the majority of consultations in all services and the mean number of consultations per pharmacy was higher overall in multiples than independents (313.0 consultations per year versus 262.2 consultations per year). The mean number of consultations per pharmacy was skewed however, by EC service consultations with independents having higher mean consultation rates in the other services studied. After adjusting for other factors, pharmacy type was associated with consultation numbers across all four public health services. However, its effect was not consistent. Multiples were associated with providing 68% higher numbers of consultations for EC, but 23, 22 and 19% lower numbers of consultations for the CA, SFV and SC services, respectively.

Extended opening hours

Overall, other than in the EC service, lower numbers of consultations took place in pharmacies with extended opening hours. This was largely because the majority of pharmacies (70.8%, 507/716) did not offer extended opening. In all services, the mean number of consultations per pharmacy was higher in pharmacies providing services over extended hours. Statistically significant associations were observed between higher consultation rates and extended opening hours for the SC, EC and SFV services but not the CA service.

Prescription volume

There was a trend towards increasing prescription volumes being associated with increased consultation numbers across the CA, EC and SC services. The mean number of consultations was highest in the quintile of highest prescription volume for these services, with strong associations ($P < 0.001$).

The results of the univariable and multivariable analyses of explanatory variables are shown in Tables 2 and 3, respectively.

The impact of providing more than one service

As the number of services pharmacies provided increased, a trend towards increasing consultation numbers was observed for the EC, CA and SFV services where pharmacies providing only one (2 in the case of SFV) of the services had 83, 65 and 26% lower mean consultation numbers, respectively (table 4).

Discussion

Main findings of the study

A range of factors influence the provision of services by pharmacies, although the extent to which individual factors contribute to higher consultation numbers is not consistent. Although pharmacy type was found to influence consultation numbers in all services studied, its effect was not uniform. Increasing prescription volumes and providing more services led to higher consultation numbers as, other than in the CA service, did more extensive opening hours; busy pharmacies that are open longer, complete more service consultations than their less busy, less accessible counterparts. Urbanity did not play a significant role in determining service provision other than in the supply of EC where a rural pharmacy could be expected to provide 60% fewer consultations. Overall numbers of consultations were higher in areas of socioeconomic deprivation, with > 50% of consultations taking place in the top two WIMD quintiles. Despite this, the average pharmacies in these areas did not provide higher numbers of consultations than the average pharmacy in more affluent neighbourhoods.

What is already known on this topic

Typically, people living in areas with high levels of socioeconomic deprivation face greater disadvantage and have higher health needs than those living in more affluent areas.[2–4] Individuals in more deprived areas fall victim to the inverse care law where the availability of good medical care varies inversely with the need for it in the population served.[14] This manifests itself as people living in those areas experiencing poorer access to quality healthcare services,[15] higher consultation rates with general practitioners (GPs),[16] using more prescription medication,[17] having lower rates of vaccination[18] and being more likely to get pregnant before they are 18 years old.[19]

Proponents of the broader role of pharmacies argue their established relationships with local populations combined with their accessibility make them ideal locations from which to offer services to tackle health inequalities. Accordingly, the contractual frameworks for community pharmacies in England and Wales have increasingly supported the provision of additional pharmaceutical services.[20] These include amongst others, services to promote appropriate access to care for minor ailments,[21] reduce smoking prevalence,[22] improve vaccine uptake[23] and prevent teenage pregnancies.[24]

Previous studies have identified the existence of the so called 'positive pharmacy care law' which exists in England[25] and Wales[26] that means people living in areas of higher deprivation have better access to pharmacies. The location and accessibility of pharmacies have been levered to help meet the health needs of hard to reach populations where harms are disproportionately borne by disadvantaged groups.[27] However, other studies have suggested new pharmacy services may not preferentially reach those with lower socioeconomic status.[8,9,28]

What this study adds

Previous studies support developing pharmacy public health services,[29] but we believe this is the first study to evaluate the association between provision of services commonly provided from UK pharmacies and determinants of access to health services including socioeconomic deprivation and urbanity.

This study demonstrates the limitations of equating good physical access to pharmacies with access to care. We found providing healthcare services from pharmacies does not necessarily translate into take up of those services by the public[30] or to a greater focus on service provision in pharmacies in more deprived areas. That said, we found the higher prevalence of pharmacies in disadvantaged communities led to higher absolute numbers of public health service consultations. This suggests the clustering of pharmacies observed in more deprived communities[31] is an important factor in ensuring pharmacy services support reducing inequalities.

Our findings help allay concerns about pharmacies' capacity to deliver services. In contrast to previous research, we found as the number of services provided increased so did consultation numbers with no evidence of one service displacing others.[8] Our findings reinforce the argument for providing public health services from pharmacies particularly those open at times when general practices may be closed. In the case of access to EC, our findings suggest multiple pharmacies in urban areas are more acceptable to service users, the reasons for this have been explored previously.[32]

Table 2 Univariable analysis of explanatory variables' association with consultation numbers by community pharmacy public health service ($n = 716$ pharmacies)

	All pharmacies, n (%)		*All consultations, n (%)*		*Rate (any service)*	*Common ailment service*		*Emergency contraception*		*Seasonal influenza vaccination*		*Smoking cessation*	
						Incidence rate ratio (95%CI)	*P*	*Incidence rate ratio (95%CI)*	*P*	*Incidence rate ratio (95%CI)*	*P*	*Incidence rate ratio (95%CI)*	*P*
Pharmacy type													
Independent	214	(29.9)	56 110	(26.3)	262.2	-	-	-	-	-	-	-	-
Multiple	502	(70.1)	157 129	(73.7)	313.0	0.80 (0.65–0.99)	0.036	3.37 (2.43–4.66)	<0.001	0.92 (0.78–1.10)	0.372	0.86 (0.73–1.01)	0.058
Rural urban classification													
Urban	513	(71.6)	161 271	(75.6)	314.4	-	-	-	-	-	-	-	-
Rural	203	(28.4)	51 968	(24.4)	256.0	0.89 (0.71–1.11)	0.294	0.39 (0.26–0.57)	<0.001	1.02 (0.86–1.20)	0.851	0.92 (0.77–1.09)	0.338
Deprivation quintile													
1 (highest)	182	(25.4)	58 255	(27.3)	320.1	-	-	-	-	-	-	-	-
2	181	(25.3)	54 470	(25.5)	300.9	0.93 (0.73–1.17)	0.024	0.65 (0.45–0.93)	0.075	1.02 (0.82–1.25)	0.302	1.03 (0.82–1.28)	0.198
3	160	(22.3)	47 752	(22.4)	298.5	0.82 (0.64–1.04)		1.20 (0.65–2.22)		1.02 (0.82–1.26)		0.96 (0.78–1.18)	
4	108	(15.1)	32 179	(15.1)	298.0	0.95 (0.62–1.45)		0.69 (0.41–1.15)		1.21 (0.97–1.51)		0.84 (0.66–1.07)	
5 (lowest)	85	(11.9)	20 583	(9.7)	242.2	0.62 (0.46–0.83)		0.74 (0.42–1.31)		1.19 (0.93–1.51)		0.72 (0.52–0.99)	
Extended hours pharmacy													
No	507	(70.8)	123 612	(58.0)	243.8	-	-	-	-	-	-	-	-
Yes	209	(29.2)	89 627	(42.0)	428.8	1.03 (0.78–1.36)	0.844	5.41 (4.03–7.26)	<0.001	1.68 (1.46–1.94)	<0.001	1.18 (0.97–1.43)	0.096
Annual prescription volume quintile													
1 (lowest)	143	(20.0)	29 569	(13.9)	206.8	-	-	-	-	-	-	-	-
2	143	(20.0)	34 860	(16.3)	243.8	1.50 (1.11–2.03)	<0.001	0.82 (0.49–1.39)	0.326	0.92 (0.74–1.15)	0.126	1.29 (1.00–1.66)	<0.001
3	143	(20.0)	43 546	(20.4)	304.5	1.79 (1.33–2.42)		1.07 (0.65–1.77)		1.16 (0.92–1.46)		1.40 (1.09–1.80)	
4	143	(20.0)	42 525	(19.9)	297.4	1.91 (1.44–2.54)		0.94 (0.59–1.51)		1.07 (0.85–1.35)		1.44 (1.12–1.84)	
5 (highest)	144	(20.0)	62 739	(29.4)	435.7	3.01 (2.19–4.15)		1.64 (0.86–3.13)		1.20 (0.96–1.49)		2.12 (1.63–2.76)	
Total	716		213 239		297.8								

Table 3 Association between explanatory variables (adjusted) and consultation numbers by community pharmacy public health service (n = 716 pharmacies)[a]

	Common ailment service		*Emergency contraception*		*Seasonal influenza vaccination*		*Smoking cessation*	
	Incidence rate ratio (95%CI)	*P*	*Incidence rate ratio (95%CI)*	*P*	*Incidence rate ratio (95%CI)*	*P*	*Incidence rate ratio (95%CI)*	*P*
Pharmacy type								
Independent	-	-	-	-	-	-	-	-
Multiple	0.77 (0.63–0.94)	0.010	1.68 (1.30–2.16)	<0.001	0.78 (0.65–0.94)	0.008	0.81 (0.69–0.94)	0.007
Rural urban classification								
Urban	-	-	-	-	-	-	-	-
Rural	1.01 (0.82–1.24)	0.950	0.49 (0.39–0.62)	<0.001	1.04 (0.86–1.25)	0.682	1.06 (0.89–1.27)	0.511
Deprivation quintile								
1 (highest)	-	-	-	-	-	-	-	-
2	0.86 (0.69–1.06)	0.053	0.95 (0.76–1.19)	0.573	1.01 (0.84–1.22)	0.243	0.95 (0.78–1.16)	0.253
3	0.80 (0.64–1.02)		1.15 (0.82–1.61)		1.06 (0.86–1.29)		0.92 (0.75–1.14)	
4	0.90 (0.63–1.27)		1.00 (0.71–1.40)		1.23 (0.99–1.52)		0.82 (0.65–1.05)	
5 (lowest)	0.65 (0.48–0.87)		0.81 (0.57–1.14)		1.19 (0.96–1.48)		0.73 (0.53–1.00)	
Extended opening hours								
No	-	-	-	-	-	-	-	-
Yes	1.06 (0.86–1.32)	0.579	4.42 (3.46–5.63)	<0.001	1.81 (1.57–2.08)	<0.001	1.28 (1.07–1.52)	0.006
Average prescription volume quintile								
1 (lowest)	-	-	-	-	-	-	-	-
2	1.50 (1.13–1.99)	<0.001	1.01 (0.66–1.53)	0.009	1.01 (0.80–1.27)	0.113	1.29 (1.01–1.64)	<0.001
3	1.78 (1.34–2.37)		1.10 (0.75–1.60)		1.17 (0.94–1.45)		1.40 (1.10–1.80)	
4	1.90 (1.44–2.51)		1.30 (0.89–1.88)		1.19 (0.95–1.48)		1.48 (1.16–1.90)	
5 (highest)	2.99 (2.19–4.07)		1.71 (1.12–2.59)		1.29 (1.03–1.62)		2.12 (1.63–2.75)	

[a]Model estimates were insensitive to choice of variables in the inflated part

Table 4 The association between total number of public health services provided and number of consultations delivered in each public health service

	Unadjusted		*Adjusted*	
Number of services offered	*Incidence rate ratio (95%CI)*	*P*	*Incidence rate ratio (95%CI)*	*P*
Emergency contraception				
1	0.10 (0.05–0.22)	<0.001	0.17 (0.05–0.61)	0.005
2	0.33 (0.21–0.52)		0.63 (0.38–1.04)	
3	0.83 (0.49–1.41)		0.77 (0.62–0.95)	
4	-	-	-	-
Common ailment service				
1	0.39 (0.24–0.62)	<0.001	0.35 (0.22–0.53)	<0.001
2	0.45 (0.34–0.60)		0.43 (0.34–0.55)	
3	0.61 (0.50–0.74)		0.62 (0.53–0.73)	
4	-	-	-	-
Seasonal influenza vaccination				
2	0.80 (0.59–1.09)	0.103	0.74 (0.57–0.96)	0.008
3	0.86 (0.71–1.02)		0.82 (0.70–0.96)	
4	-	-	-	-
Smoking cessation				
2	0.48 (0.27–0.87)	0.051	0.56 (0.30–1.03)	0.177
3	0.96 (0.78–1.18)		0.99 (0.81–1.20)	
4	-	-	-	-

Limitations of this study

This study is limited by its observational design; all comparisons are made at the pharmacy rather than pharmacy user level meaning there is a risk of ecological bias. It is assumed pharmacy users are drawn from and share the characteristics of people living in the communities in which each pharmacy is located; we cannot be sure this is the case particularly in urban areas. Although we have adjusted for a range of

confounding variables, there are others where we were unable to do so, some pharmacies may have characteristics that make them more accessible than others, that we were unable to account for in our analysis. It has been established that GP consultation rates increase with deprivation this could mean the number of pharmacy consultations in deprived areas are suppressed by people visiting their GP rather than their pharmacy. We were unable to account for this in our analysis but if correct would only strengthen the rationale for wider use of pharmacies as a provider of health services. Finally, we looked at four commonly provided pharmacy services, whilst widely available they are not necessarily universally commissioned. Commissioning decisions by NHS bodies may mean our findings are not necessarily generalizable; however, excluding pharmacies that did not offer particular services from the analysis should address this.

Supplementary data

Supplementary data are available at the *Journal of Public Health* online.

Authorship

AE and EM conceptualized the study. DG advised on the statistical method and undertook the analysis. AE, EM, LH, DG, GS and NY were involved in the data interpretation and manuscript preparation. All authors were involved in critically reviewing versions of the manuscript.

Conflicts of interest

None.

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