





# Exploring the prevalence of and factors associated with advice on prescription medicines: A survey of community pharmacies in an English city

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## Abstract

Service users rely upon pharmacy staff to provide advice on prescription medicines. The purpose of this study was to compare the prevalence of advice-giving in pharmacies located across different areas within an inner-city population. A questionnaire was administered with service users outside 29 community pharmacies in an English Midlands city between February and July 2014. The primary outcome measure was the percentage who had received information or advice when collecting a prescription medicine. A total of 1206 service users took part, of whom 49.1% were female and 50.9% were of minority ethnicity (48.8% white British). The age ranges were: 17–30 years (21.0%), 31–60 years (55.0%) and 61–80+ years (24.1%). Sixty-nine per cent of participants had collected a prescription for themselves, and the proportions of new and repeat prescriptions were 22.1% and 77.6% respectively. A subset of 141 participants had requested advice, of whom 94% confirmed that they had received it. Overall, 28.6% of 1065 participants received unsolicited information or advice. The overall prevalence of unsolicited advice-giving varied per pharmacy from 14% to 63% and for new and repeat prescriptions was 41.9% and 25.5% respectively ( $p < .001$ , new vs repeat). In areas of greater deprivation, a higher proportion of service users of minority ethnicity received unsolicited repeat prescription advice, compared to that of white British (33.0% vs 17.3% respectively;  $p < .001$ ). Thus, the low incidence and contrasting patterns of prescription advice-giving suggests that the training and expertise of pharmacy staff may not always be used effectively within the UK NHS. Therefore, the current challenge is how community pharmacies can work in partnership with colleagues across the wider healthcare system when optimising the use of medicines and reducing health inequalities. The research performed here provides new insights reflecting the low prevalence of advice-giving and potential inequity associated with delivery of this pharmacy service.

## KEYWORDS

advice, equitable, equity, medicine, pharmacy, prescription

## 1 | INTRODUCTION

In 2014, over 1 billion prescription items were dispensed in England, costing nearly £9 billion—an increase of 55% over 10 years (Health and Social Care Information Centre Prescribing and Medicines Team, 2015). Approximately, £2 billion of this sum comprised fees paid to community pharmacies for each prescription item dispensed (NHS Prescription Services, 2015). The cost of this “essential service” of dispensing medicines, specified within the current community pharmacy contract that was introduced in 2005, incorporates “the provision of information and advice to enable safe and effective use by patients and carers” (Pharmaceutical Services Negotiating Committee, 2016a). Advanced services, including “Medicines Use Reviews” (MURs) and, more recently, the “New Medicines Service” (NMS) were introduced, for which training and formal accreditation are required, together with an additional fee payment. These latter advisory services are intended to help improve patients’ knowledge of medicines, and also to optimise medication-taking behaviour. However, the total number of combined MUR and NMS consultations represents approximately 3 million—only three for every 1000 prescription items dispensed in 2014/2015 (Pharmaceutical Services Negotiating Committee 2016b,c).

Prescription medicines offer many benefits, but are also associated with adverse effects and ill-health. Approximately, 7% of all admissions to UK hospitals arise from the adverse effects of prescription medicines (Pirmohamed et al., 2004). The causes of drug-related morbidity include inappropriate medication-taking by patients. In addition, about half of patients do not, in fact, adhere to their prescribed regimen (NICE Guideline CG76 2009), and wastage from unused prescribed medicines is estimated to cost almost £100 million every year in the UK (Trueman et al., 2010).

As the main providers of prescription medicines, pharmacy staff are responsible for ensuring service users are informed regarding how best to optimise their medication. Furthermore, such staff have an opportunity to identify patients at risk of poor adherence, and also to develop personalised strategies which take into account their individual circumstances (Sukkar, 2015). Many studies demonstrate benefits to patients resulting from the expert input of pharmacists in the UK and other countries. For example, patients provided with medication advice by pharmacists in England were willing to discuss their medication in detail (Chen & Britten, 2000). In Australia, pharmacists have successfully advised on medicines to manage sleep disorders (Noor, Smith, Smith, & Nissen, 2014), and patients with asthma in this country valued specialist asthma services provided by community pharmacies (Naik-Panvelkar, Armour, Rose, & Saini, 2012). Pharmacists in the USA have demonstrated successful management of anticoagulant control (Truong & Armor, 2012) and antibiotic therapy (Beaucage et al., 2006). In Spain, Alegre Del Rey, Martinez Rodriguez, Tejedor De La Asuncion, and Rabadan Asensi (2001) reported on medication problems detected by pharmacists, an initiative which resulted in a reduction in multiple medications. Canadian patients were receptive to advice on prescription refills (Kelly, Young, Phillips, & Clark, 2014). These worldwide examples of studies show considerable potential for pharmacists to enhance the use of medicines during specific clinical

### What is known about this topic

- The community pharmacy contract within the UK National Health Service requires pharmacy staff to provide advice on prescription medicines when required.
- Equity of community pharmacy services has, to date, primarily been considered only in terms of the accessibility of pharmacy premises.

### What this paper adds

- Approximately 7 of 10 service users who did not request advice when collecting a prescription had no interaction with pharmacy staff.
- Unexplained patterns of prescription advice-giving, supported by evidence derived from factor analysis, suggest that community pharmacy services may not always be equitable.
- The training and expertise of community pharmacy staff could more effectively be utilised within the UK NHS.

interventions. However, the prevalence and equity of advice-giving when prescriptions are dispensed in the community are not yet acknowledged in the literature within the context of routine daily service provision.

As the community pharmacy is the last point of contact where professional advice is available prior to patients commencing their therapies, it may be expected that pharmacists should offer advice every time a prescription medicine is dispensed (Horvat & Kos, 2015). Notwithstanding, there is considerable inconsistency between community pharmacies in relation to the prevalence of advice-giving. A comprehensive review of research from several countries revealed wide-ranging prescription counselling rates from 8% to 100%—and additionally noted that the actual counselling rates were difficult to estimate because of methodological differences and limitations (Puspitasari, Aslani, & Krass, 2009). A UK survey of 245 consumers who collected new and repeat prescriptions reported an overall counselling rate of 16% (Morrow, Hargie, & Woodman, 1993). A random sample of pharmacies in London yielded a counselling rate of 39% (Aslanpour & Smith, 1997), and Cooper, Phul, and Cantrill (2002) found that the rate of advice-giving varied from nearly two-thirds at one pharmacy, to no patients at all at another—an overall rate of 18%. Advice was less likely to be offered if a prescription collection and delivery service was utilised. Furthermore, Raynor (2013) reports evidence that some patients with long-term conditions, such as diabetes mellitus, might never receive advice from a pharmacist about their medicines.

The UK Department of Health (2008) stated that the future of pharmacy lies in the provision of high-quality, patient-facing care that facilitates the safe and effective use of medicines. However, the funding of an advisory role in relation to ensuring that prescription medicines are used safely, a role for which pharmacists are extensively trained (General Pharmaceutical Council 2011), has largely been

assumed and not always acknowledged or remunerated as a service in its own right (International Pharmaceutical Federation 2015).

The picture of highly variable advice-giving practices raises the question of whether prescription advice is available on a fair basis—a notion reflected in the general term “health equity” (Braveman et al., 2011). The concept of equity of prescription advice is founded upon a moral goal to reduce health inequalities via improvements in advice-giving to the socially disadvantaged.

As an initial exploration of contrasting advice-giving practices, the rationale for this study was based upon the premise that interaction between pharmacy staff and the recipients of prescription medicines should be fair, and thus depends primarily upon the needs of the patient or carer. We therefore elected to compare the prevalence of advice-giving by pharmacy staff located within different geographic locations and socioeconomic groups. This was performed in order to provide an acceptable starting point from which equity in advice-giving could be measured, and which could be explored in greater depth in the future.

The primary aim of the study was to assess the value of the community pharmacy as a healthcare provider, specifically by determining the prevalence of prescription advice-giving by pharmacy staff according to (i) the ethnicity of the recipient; (ii) who collected the prescription (patient or representative); (iii) the time of day that the prescription was collected; and (iv) the level of deprivation of the electoral ward where each pharmacy was located. A secondary aim was to provisionally assess the equity of prescription advice using prevalence as the outcome measure.

## 2 | METHODS

Puspitasari et al. (2009) reviewed 40 research articles investigating verbal counselling and types of information provided for prescription medicines in community pharmacies. An analysis of this literature revealed considerable variation in counselling rates when observational studies were used to capture the whole picture of counselling practice. Self-report research, where researchers approached either consumers or pharmacists, was the most widely used by researchers in the USA, Europe and Australia, and considered to be more reliable than observation alone (Krska, Kennedy, Milne, & McKessack, 1995). Lower counselling rates were noted in consumer studies, as service users may have forgotten the actual information they received. Conversely, pharmacists may over-report their counselling service in order to fulfil social expectations. We therefore decided to adopt a self-reporting questionnaire, and in order to maximise the recall of participants, arranged to approach service users on the street after having just left a pharmacy. The survey was not administered within the pharmacy itself in order to reduce the possibility of pharmacy staff behavioural modifications in the presence of interviewers.

A face-to-face interview was conducted lasting approximately 4 minutes, and based upon a structured questionnaire in which response to the first question determined whether the participant had just collected a prescription from a local pharmacy. If the response

was affirmative, the researcher read a description of the research and then asked whether they were willing to confirm verbal informed consent. The survey was conducted in an English Midlands city by a team of five researchers from 1 February to 31 July 2014. The work was completed under the auspices of a university “Frontrunner” undergraduate student employment scheme and in collaboration with the relevant Local Pharmaceutical Committee (LPC). The primary question, which required a “yes/no” response, was: “Apart from checking the name and address on the prescription, would you say someone in the pharmacy gave you information or advice about the medicine you collected today?” Standard demographic and diversity data were collected, along with information on the type of prescription (new or repeat), role of participant (patient collecting for self, carer, friend or family member), and whether advice relating to medicines on the prescription was requested. The researchers received simulation training where they practised administering the draft questionnaire with each other, i.e. as if they were approaching people in the street. This enabled them to refine and standardise their approach to the public, and also improve the wording and layout of the questionnaire. The research received ethics approval from the Faculty of Health and Life Sciences Human Research Ethics Committee (Ref:1225), and interviews were administered in accordance with the Market Research Society’s code of conduct (Market Research Society Code of Conduct 2012). After explaining the purpose of the research, the identity of the research organisation and the nature of the questions, verbal consent to proceed with the interview was recorded on the questionnaire.

Community pharmacy managers were informed, with the agreement of the LPC, that the research would take place on any day of the week within the proximity of inner-city pharmacies and during specified weeks. It was agreed, for logistical reasons, that it would not be possible to inform individual pharmacies of precise time-slots available for researchers to conduct interviews within the environs of a given pharmacy. Only a small proportion of those who were approached agreed to be interviewed—a problem that is common when conducting “open-street” surveys. The researchers did not record the total number of persons approached so a response rate could not be computed. However, they attempted to gain the maximum number of responses during the overall period of the study. The number of responses obtained within electoral wards was monitored throughout the data collection period, and this enabled researchers to move into adjacent electoral wards in order to boost response rates, where necessary.

### 2.1 | Sampling strategy

The sampling strategy was devised in order to ensure that each pharmacy was within reasonably close proximity to a general practitioner (GP) medical practice and thus maximise the footfall per pharmacy. Using the randomisation function of IBM SPSS Statistics version 22 (IBM Corp 2010), a random sample of 50 General Practice surgeries was selected from the full list of GP practices registered within a single inner-city National Health Service Clinical Commissioning Group. Subsequently, community pharmacies located within half a mile of

these surgeries were identified, giving a sampling frame of 62 community pharmacies, of which 29 were surveyed. This was a convenience sample, based upon the distance from the researchers' bases, and a requirement to cover as many electoral wards as possible to facilitate matching with relevant socioeconomic population data. A sample size of at least 1000 was selected in order to enable the overall prevalence rate to be quoted within an error margin of 3%.

## 2.2 | Statistical analysis

The prevalence of advice-giving was analysed using SPSS to compare subgroups of the study sample. If a service user were to request advice, this would invariably be provided—artificially inflating routine advice-giving by pharmacy staff. Therefore, the prevalence of advice-giving, expressed as a proportion of service users who did not request advice, i.e. the unsolicited rate, provides a more accurate reflection of proactive intervention. A total of 1206 service users who were approached by researchers gave consent to taking part in the survey and, of these, 141 had requested advice. Therefore, to provide some comparability with previous surveys reported in the literature, an overall prevalence rate was first computed using 1206 as the denominator. Subsequent analyses were based upon the 1065 participants who received unsolicited advice, and the latter denominator was used to compute detailed prevalence rates within various subgroups of the sample.

The 95% confidence intervals of percentages of respondents who received information or advice were computed using a standard formula for large samples that assumes the sample proportions were approximately normally distributed. The chi-square test was used to explore bivariate differences in the proportion of advice-giving with  $p \leq .05$  considered as the significance level. Secondary outcome measures were tabulated based upon standard health, social and economic indicators, and ranked in comparison with the descending rank order of advice-giving practice for each pharmacy. The level of deprivation for each electoral ward was derived from population-weighted (mid-2008) average scores of the lower level super output areas obtained from the National Index of Multiple Deprivation (Department of Communities and Local Government, 2011). The average scores were ranked so that the ward with greatest deprivation (highest score) was ranked as number 1. Each ward was allocated into one of three approximately equally sized groups with the lowest ranked multiple deprivation scores representing approximately one-third of the wards ("greatest deprived"), the middle third ("medium deprived") and those wards with the highest ranked scores were allocated to the "least deprived" group. This simplified analysis by enabling advice prevalence rates to be compared against three broad categories of deprivation for locations in which a prescription medicine was collected.

Partial correlation and factor analyses were performed to explore the prevalence of advice and socioeconomic variables in relation to advice-giving using XLSTAT2016 software. The data set was generalised log (glog)-transformed and autoscaled prior to performing factor analysis to satisfy assumptions of normality and variance homogeneity. Both Pearson and partial correlation coefficients were computed between each of the 12 variables present in the multivariate data

set. Factor analysis was performed via the principal factor analysis extraction method, with squared multiple correlations for communalities and 10,000 iterations. The variables included were ADVICENEW, ADVICEREP, ASKEDFOR, NDEPIND, LIMLONILL, UNEMPLOY, SMR <75, GENDER (scored 0 and 1 for females and males respectively), ETHNICITY (scored 0 and 1 for minority ethnic and white British respectively), MEDIAN AGE, ROLE (self or carer, scored 2 and 1 respectively) and TIME OF COLLECTION (abbreviated AM/PM and scored 1 and 2 respectively) for each participant (Table 1). The percentage of ADVICENEW, ADVICEREP and ASKEDFOR variables were aggregated at the pharmacy level, and the LIMLONILL, UNEMPLOY and SMR <75 ones were aggregated at the electoral ward level. Therefore, for the ADVICENEW, ADVICEREP and ASKEDFOR variables, the factor analysis performed searched for factors related to the behaviour of pharmacies interacting with their service user participants. The GENDER, ETHNICITY, MEDIAN AGE, ROLE and TIME OF COLLECTION variables were, of course, individual-specific. In total, 1033 responses were derived from the 23 pharmacies where at least 20 questionnaires were completed. Varimax factor rotation was conducted with a maximum of three factors, and application of the Kaiser normalisation process. Stop conditions involved a convergence value of  $10^{-4}$ . Factor loadings vector values of 0.40 were considered as the minimum required for a significant contribution towards each factor isolated. The robustness of the principal factor analysis model employed was confirmed by its performance both with and without the third factor, and also by the application of an alternative rotation strategy, i.e. quartimax rather than varimax approaches. Indeed, performance of factor analysis following removal of the third factor confirmed its importance, and also that of the single significant variable loading thereon (further details on this are available in the Results section). Moreover, performance of the quartimax rotation strategy with the maximum three factors gave rise to exactly the same classification of loadings of each of these variables as obtained with the varimax approach, with very similar loading vectors to those computed with the latter; indeed, differences between these loading vectors for the two rotation methods ranged from  $\pm 0.002$  to a maximum of only  $\pm 0.029$ .

Kaiser–Meyer–Olkin (KMO) statistic values for the individual variables were  $>0.80$  for ETHNICITY and ADVICEREP,  $>0.75$  for ROLE,  $>0.65$  for GENDER, AM-PM, ADVICENEW and ASKEDFOR, but only 0.55, 0.51 and 0.51 for the AGE, NDEPIND and UNEMPLOY ones respectively. Moreover, those for the LIMLONILL and SMR <75 variables were only 0.41 and 0.36 respectively. However, that for the overall model was 0.56, a value close to the minimum required for sampling adequacy (0.60).

## 3 | RESULTS

### 3.1 | Demography of whole sample

A total of 1206 participants took part in the survey, of whom 49.1% were female; 50.9% were of minority ethnicity and 48.8% were white British. There were 324 participants who collected prescriptions from pharmacies located in the greatest deprived wards, of whom 225

**TABLE 1** Names, descriptions and sources of data for the variables evaluated via principal factor analysis in this study

Variable name	Description	Source of data
ADVICENEW	Percentage, per pharmacy, of new prescriptions when advice was received.	Derived from project survey.
ADVICEREP	Percentage, per pharmacy, of repeat prescriptions when advice was received.	Derived from project survey.
ASKEDFOR	Percentage, per pharmacy, of respondents who asked for advice.	Derived from project survey.
NDEPIND	National Deprivation Index—Ranked by Individual Lower Layer Super Output area scores averaged at electoral ward level.	Derived from the English Indices of Deprivation 2010 and published by the Department of Communities and Local Government (2011). Average scores at ward level were obtained from a “look-up” table produced by the London Health Observatory and North East Public Health Observatory. Based upon this score, each electoral ward in England was allocated a rank (low rank = high deprivation).
LIMLONILL	Percentage of ward population with limiting long-term illnesses.	Derived from the Office for National Statistics 2011 Census and produced by the East Midlands Public Health Observatory Collaborative Project.
UNEMPLOY	Percentage of ward population who are unemployed.	Derived from the 2011 Census statistics published by Office of National Statistics (2013). Data were compiled by the Research & Intelligence Services of the city council where the research was conducted.
SMR <75	Standard Mortality Ratio within ward population for the <75 years age band.	Derived from Office for National Statistics 2011 Census, and produced by the East Midlands Public Health Observatory Collaborative Project.
GENDER	Male or female.	Derived from project survey.
ETHNICITY	Minority ethnicity or white British.	Derived from project survey.
MEDIAN AGE	The grouped median was computed. A maximum of 85 years in place of “80+” was used as an estimate of the oldest participant.	Derived from project survey.
ROLE	Role of participant (collected prescription for self or other person).	Derived from project survey.
TIME OF COLLECTION AM/PM	Morning or afternoon.	Derived from project survey.

(69.4%) were of minority ethnicity. There were 565 from pharmacies within medium-deprived wards, of whom 323 (57.1%) were of minority ethnicity, and 317 from pharmacies within the least deprived wards of whom 66 (20.8%) were of minority ethnicity (chi-square = 170.1,  $df = 2$ ,  $p < .001$ ). The age ranges of participants were: 17–20 years (4.3%), 21–30 years (16.7%), 31–60 years (55.0%) and 61–80+ years (24.1%). There were 837 (69.4%) participants who collected a prescription for themselves, and 369 (30.6%) for another person. Of the latter, 60.2% defined themselves as family carers, 0.8% as paid carers and 37.9% were running an errand. There were 410 (33.9%) who took part in the survey in the morning, and 796 (66.0%) in the afternoon. The number of new prescriptions was 266 (22.1%), 1st time repeats was 88 (7.3%) and 2nd or more time repeats was 848 (70.3%); four participants did not know whether the prescription was a new or repeat one.

### 3.2 | Overall and unsolicited prevalence of advice for whole sample and by pharmacy

Overall, 437 of 1206 participants (36.2%; 95% CI: 33.2–39.2) received advice or information when collecting a prescription. There were 305 (28.6%; 95% CI: 25.6–31.6) who received advice out of

the 1065 participants who did not request advice (unsolicited). There was no statistically significant difference in unsolicited advice prevalence by gender (chi-square = 0.091,  $df = 1$ ,  $p = .76$ ) or by age group (chi-square = 10.72,  $df = 6$ ,  $p = .097$ ). A description of unsolicited advice-giving at each pharmacy is presented to enable comparison with associated health and socioeconomic data at electoral ward level (Table 2). It is noteworthy that variations in the level of unsolicited advice provided by individual pharmacies for all prescriptions ranged fourfold (from 14% to 63%). However, there is no clear and consistent pattern of pharmacies that can be derived from this descriptive data that enable a logical prediction of the proportion of participants who would receive advice. For example, there were five pharmacies (numbers 8, 18, 28, 49 and 53) that were situated in wards of least deprivation with correspondingly relatively lower standardised death rates, and that were ranked 11th or lower in the provision of unsolicited advice, where the percentage of respondents who received advice varied between 14% and 25%. In contrast, pharmacies identified as numbers 45 and 33 were both situated within wards with the greatest level of deprivation, but had contrasting unsolicited advice-giving rates of 52% and 14%, ranking them 2nd and 19th, respectively, in terms of advice-giving prevalence.

**TABLE 2** Percentage of respondents who received unsolicited advice per pharmacy: Presented in descending rank order of prevalence for 23<sup>a</sup> community pharmacies alongside advice-giving statistics and health and socioeconomic data associated with the electoral ward where pharmacy is situated

Pharm ID <sup>a</sup>	n	%/rank received advice	% Given advice of new scripts ADVICENEW	% Given advice of repeat scripts ADVICEREP	% Asked for advice ASKEDFOR	% Collected by self
4	23	63/1	63	80	30	74
45	26	52/2	57	58	12	65
30	79	47/3	86	45	19	66
50	39	46/4	63	48	10	77
1	65	44/5	42	54	12	54
48	72	41/6	63	40	15	63
52	38	38/7	63	38	11	63
47	67	36/8	29	42	09	67
31	38	33/9	78	31	13	68
27	45	32/10	50	29	02	49
20	35	25/11	33	31	09	80
49	57	25/11	43	26	09	72
56	26	23/12	60	24	15	81
43	71	22/13	39	21	04	87
26	27	21/14	75	22	11	85
40	53	21/14	60	24	11	64
18	80	20/15	60	22	14	73
8	63	19/16	40	19	06	76
51	34	18/17	56	24	18	68
9	45	18/17	55	19	11	84
53	61	17/18	33	20	11	74
28	56	14/19	68	14	21	71
33	67	14/19	10	16	1	57

<sup>a</sup>Excludes six pharmacies where fewer than 20 questionnaires were completed.

<sup>b</sup>Statistically significant higher than national rate.

<sup>c</sup>Statistically significant lower than national rate.

### 3.3 | Overall prevalence of unsolicited advice for new and repeat prescriptions in areas of varying levels of deprivation (greatest, medium and least deprivation)

The prevalence of unsolicited advice for new ( $n = 203$ ) and all repeat prescriptions ( $n = 858$ ) was 41.9% and 25.5% respectively (chi-square = 21.46,  $df = 1$ ,  $p < .001$ ) and the odds of receiving advice for new prescriptions was twice as high as that for those receiving repeats (OR 2.1, 95% CI: 1.5–2.9;  $p < .001$ ). A greater proportion of minority ethnic, compared with that of white British participants received unsolicited advice for repeat prescriptions (minority ethnic:  $n = 448$ , 33.0% compared with white British:  $n = 410$ , 17.3%, chi-square = 27.83,  $df = 1$ ,  $p < .001$ ). There was a similar, although not statistically significant trend for new prescriptions (minority ethnic: 45.6% vs white British: 35.9%, chi-square = 1.86,  $df = 1$ ,  $p = .19$ ). However, this difference occurred only in locations with greater levels of social deprivation. Participants of the minority

ethnicity classification in the combined “medium” and “greatest” (but not “least”) deprived wards who collected repeat prescriptions were statistically significantly more likely to receive advice than those who were white British (36.0% minority ethnic received advice vs 16.7% white British: chi-square = 26.4,  $df = 1$ ,  $p < .001$ )—see Figure 1.

### 3.4 | Prevalence of unsolicited advice per time of day (morning and afternoon)

There were 34.7% of 357 participants who received advice in the morning vs 25.6% of 708 who received advice in the afternoon (chi-square = 9.8,  $df = 1$ ,  $p = .002$ ), odds ratio 1.5 (95% CI: 1.2–2.0;  $p < .001$ ). This provides evidence that the odds of receiving advice in the morning was 1.5 times that of receiving it in the afternoon. This association and its statistical significance were maintained for both repeats (chi-square = 8.0,  $df = 1$ ,  $p = .005$ ) and new prescriptions (chi-square = 3.9,  $df = 1$ ,  $p = .049$ ).

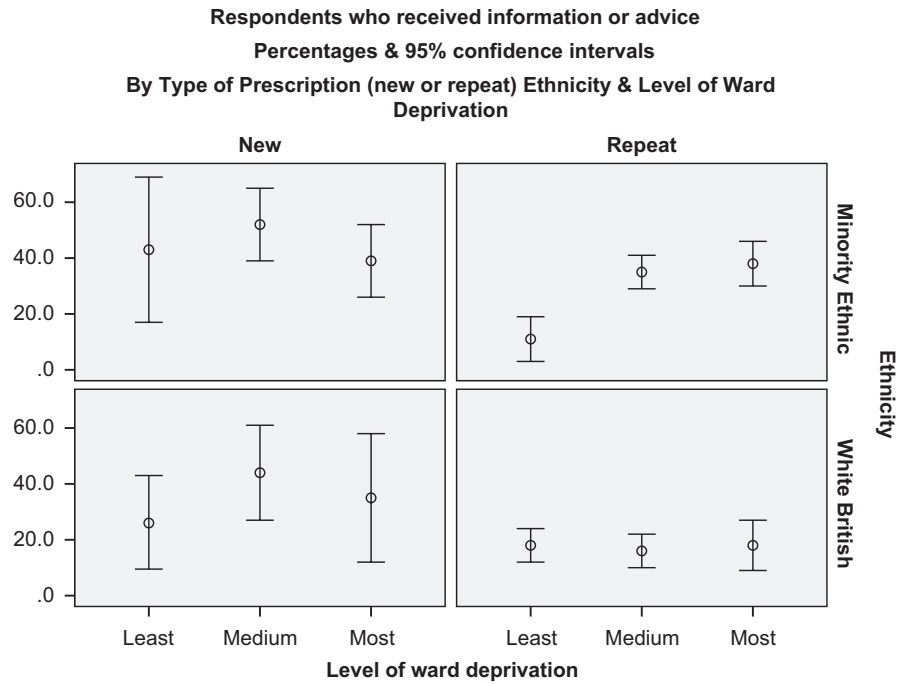
% Minority Ethnicity	Electoral Ward ID	National Deprivation Index NDEPIND	% Limiting Long-term illness LIMLONILL	% Unemployment Rate UNEMPLOY	SMR <75 years
87	A	Medium deprived	21.2	10.6	117 <sup>b</sup>
92	B	Greatest deprived	21.2	11.4	137 <sup>b</sup>
99	C	Medium deprived	17.9	12.1	113
82	A	Medium deprived	21.2	10.6	117 <sup>b</sup>
97	D	Greatest deprived	18.1	14.1	130 <sup>b</sup>
78	E	Greatest deprived	19.6	13.6	163 <sup>b</sup>
90	F	Medium deprived	16.4	12.0	103
73	G	Medium deprived	20.0	10.5	124 <sup>b</sup>
82	F	Medium deprived	16.4	12.0	103
84	D	Greatest deprived	18.1	14.1	130 <sup>b</sup>
69	D	Greatest deprived	18.1	14.1	130 <sup>b</sup>
16	L	Least deprived	18.4	5.8	114
31	J	Medium deprived	14.8	8.1	160 <sup>b</sup>
31	K	Medium deprived	14.9	7.6	146 <sup>b</sup>
15	J	Medium deprived	14.8	8.1	160 <sup>b</sup>
43	K	Medium deprived	14.9	7.6	146 <sup>b</sup>
35	N	Least deprived	15.5	4.8	87 <sup>c</sup>
24	L	Least deprived	18.4	5.8	114
41	J	Medium deprived	14.8	8.1	160 <sup>b</sup>
44	F	Medium deprived	16.4	12.0	103
23	L	Least deprived	18.4	5.8	114
25	H	Least deprived	19.1	6.6	111
25	M	Greatest deprived	20.7	11.2	158 <sup>b</sup>

### 3.5 | Multivariate analysis of socioeconomic and prescription advice-giving variables

For the principal factor analysis model employed, a total of three factors were selected for the analysis on the basis of their eigenvalues, i.e. the mean number of variables that the factor represents (and also the level of variance in the data set accounted for by that factor) prior to rotation, which were 2.93, 2.22 and 0.69 for factors 1, 2 and 3 respectively. The eigenvalue for factor 4 was only 0.26, so this, together with further smaller eigenvalue factors were discarded. Although that for factor 3 was only 0.69, it did have one variable loading strongly on it (LIMLONILL, loading score 0.64), which loaded less so on factors 1 and 2 (loading scores 0.40 and -0.25 respectively). Indeed, this overall inclusion of three factors was adopted in order to ensure that there were a sufficient number of them to sufficiently account for all the correlations among the measured variables. Moreover, this precaution was also taken as the incorporation of more than an adequate number of variables (known

as over-factoring) in such models nearly always offers deductive and statistical improvements over those involving too few (under-factoring). Limiting the principal factor analysis model to a maximum of only two factors resulted in a model with the LIMLONILL variable's loadings of 0.39 and -0.17 on factors 1 and 2, values very similar to those obtained with the three-factor model; however, all other variable loadings on factors 1 and 2 were very similar to those obtained in the three-factor model.

Principal factor analysis confirmed that the 12 potential predictor variables were clearly segregated into three separate orthogonal (uncorrelated) factors. These independent factors comprised sets of correlated or highly correlated variables arising from Factor 1—Repeat prescription advice, which was associated with greater social deprivation, illness and minority ethnicity; Factor 2—New and repeat prescription advice, associated with greater “asked for” advice/less social deprivation; and Factor 3—Limiting long-term illness prevalence, in that order of importance. A detailed explanation of the sources of the correlated variables significantly contributing to each of these factors



**FIGURE 1** Proportion and associated 95% confidence intervals (CIs) of participants who received unsolicited advice for new and repeat prescriptions by ethnicity of participant, and the level of deprivation of electoral ward where pharmacy was situated

is provided in Table 1, and Bartlett’s sphericity test for this factor analysis model was statistically significant ( $p < .001$ ).

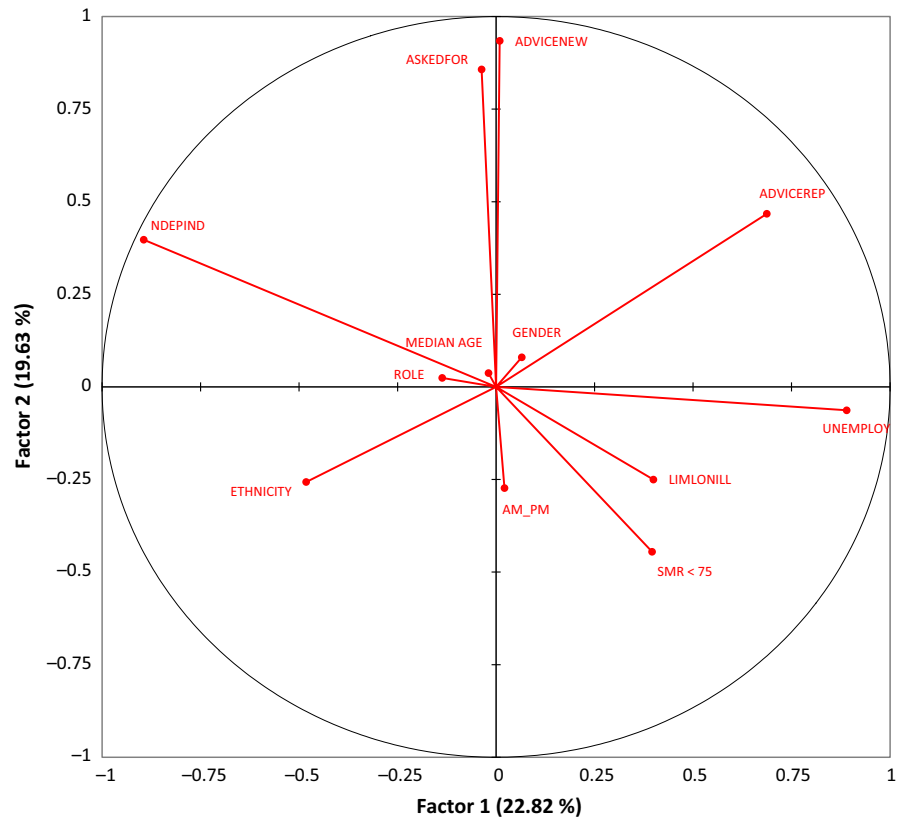
First, Factor 1—that with the highest variance contribution (22.8%)—represents a combination of (i) the ranked position of each ward according to the National Multiple Deprivation Index; (ii) the percentage of the population within a given electoral ward (where the pharmacy is located) who are unemployed; (iii) the Standardised Mortality Ratio for those dying below the age of 75 for the electoral ward in which the pharmacy was located; (iv) ethnicity score (0 for minority ethnicity and 1 for white British); and (v) advice available for repeat prescriptions. These five variables each had statistically significant loading scores vectors on this factor (−0.89, 0.89, 0.40, −0.48 and 0.69 respectively)—see Figure 2. The negative loadings score vector for the National Multiple Deprivation Index variable is rationalised in terms of its expected negative correlations with the electoral ward unemployment and SMR <75 ones (specifically, the lower the rank of the Multiple Deprivation Index, the higher the average score commensurate with a greater level of deprivation). Similarly, the negative correlation of ethnicity scores with this factor provides evidence for an increased association of ethnic minorities with these lower (more deprived) Multiple Deprivation Index value wards. Conversely, the unemployment level and SMR <75 variables are expected to be positively correlated, and in view of this, they both have positive loading scores vectors on this factor. Therefore, this first factor reflects a greater prevalence of advice for repeat (not new) prescriptions in line with increased levels of social deprivation and unemployment, together with associated mortality rates and an increased presence of minority ethnicity within each electoral ward explored. However, it should also be noted that the SMR <75 variable had intermediate positive and negative loadings on Factors 1 and 2 respectively (discussed below).

Second, the variables representing the prevalence of advice for new and repeat prescriptions, along with the variable representing the proportion of participants at a given pharmacy, who requested advice (ASKEDFOR) all strongly loaded on Factor 2 (representing 19.6% of the total variance). These variables were highly correlated with each other, and had statistically significant positive loadings of 0.47–0.93. Thus, this factor reflects that the prevalence of advice-giving for new prescriptions is strongly correlated with the prevalence of advice-giving for the repeat prescriptions, and is positively influenced by advice-seeking behaviour. The NDEPIND variable was also found to be positively correlated with this factor (loading 0.40), which indicates that, for a sector of the population with less deprivation, the prevalence of prescription advice increases. Moreover, the contrasting moderate positive and negative loadings of the SMR <75 variable on Factors 1 and 2 respectively can be rationalised in terms of its (1) positive correlations with an increasing level of social deprivation, illness and minority ethnicity (as expected), together with the availability of repeat prescription advice (Factor 1), and (2) negative ones with the availability of new and repeat prescription unsolicited advice in areas with less social deprivation (i.e. areas of relatively greater affluence).

Third, Factor 3 (the “Limiting long-term illness factor”, variance contribution 5.9%) is predominantly explicable by only a single variable, specifically the percentage of the population within a given electoral ward (where the pharmacy is located) who have a limiting long-term illness (loading scores vector 0.64), and it therefore appears that this variable remains relatively distinct from those incorporated into Factors 1 and 2 in this principal factor analysis model. Moreover, the median age of participants was a variable which also positively loaded on Factor 3 (loading scores vector 0.30), and that unexpectedly, the pharmacy-based incidence of participants receiving advice



Variables (axes Factor 1 and Factor 2: 42.45 %) after Varimax rotation



**FIGURE 2** Plot of variable loadings on (i.e. correlations with) Factor 1 and Factor 2 arising from the principal factor analysis performed on the data set [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

when collecting a new prescription, negatively loaded on this ( $-0.31$ ). However, as these loading vectors are  $\geq 0.40$  or  $\leq -0.40$ , they should be interpreted with some caution. As noted above, this factor only explained 5.9% of the variance. Therefore, the practical interpretation of Factor 3 is that rising levels of limiting long-term illness are positively associated with the median age of recipients, and negatively with advice-giving for new prescriptions.

The above factor analysis offers insights into advice-giving prevalence that otherwise cannot be derived from the descriptive statistics alone. The provision of repeat prescription advice (Factor 1) is more closely associated with socioeconomic variables (notably the level of deprivation and extent of minority ethnicity) than the time of day when the prescription was collected, or the role or age of the service user. Although the latter three variables impact on the overall advice prevalence rate, they are relatively less important as determinants of prescription advice-giving. Factor 2 indicates that there is a sector of the population that enjoys relatively low levels of deprivation and correspondingly low morbidity where greater advice-seeking behaviour will be commensurate with higher rates of advice-giving for both new and repeat prescriptions. Although relatively weak, Factor 3 suggests that there may be a sector of the population that is characterised by limiting long-term illness and ageing (but *not* socioeconomic deprivation) where advice-giving for new prescriptions is less prevalent. Partial correlation analysis confirmed the same statistically significant trends as those identified from the above factor analysis (data not shown) (Table 3).

## 4 | DISCUSSION

In 2000, a UK government report on the future of pharmacy (Department of Health 2000, pg. 18) described a “good community pharmacy service” as one “...where pharmacists make themselves available to respond to requests for advice and take the initiative in offering help where appropriate [and] where patients can discuss personal matters in privacy if they wish ... the kind of community pharmacy service that should be available everywhere—in areas of social exclusion as much as areas of affluence”. In this study, we report that a minority of 29% of participants received unsolicited information or advice when a prescription was collected from a community pharmacy. In 13 (45%) of pharmacies, the prevalence of unsolicited advice-giving was 25% or less, and in only two pharmacies did more than half of participants receive unsolicited advice. This lack of interaction with patients raises uncertainty with regard to whether service users who would benefit from advice are actually receiving it, and the basis upon which pharmacists determine which patients should receive advice.

Within the literature, many authors have put forward plausible reasons for low prevalence rates of prescription advice. Ambiguity surrounding the extent to which pharmacists are legally able to delegate tasks such as dispensing to pharmacy technicians in the UK may curtail the extent to which time can be liberated to provide such advice (Torjesen, 2016). Pharmacists may more clearly identify with a priority to reduce risk from errors in prescribing and medicines management (Avery, 2010). Alternatively, there may be a greater focus on medicines

**TABLE 3** Loading scores vectors of (correlations between) variables and factors following application of orthomax rotation in the principal factor analysis performed ( $n = 1033$  participants). Loadings scores vectors  $\geq 0.40$  are in bold

Variable	Factor 1	Factor 2	Factor 3
% of variance explained	22.8%	19.6%	5.9%
	Repeat prescription advice: greater social deprivation, illness and minority/ethnicity	New and repeat prescription advice: greater "asked for" advice/less social deprivation	Limiting long-term illness
ADVICENEW	0.01	<b>0.93</b>	-0.31
ADVICEREP	<b>0.69</b>	<b>0.47</b>	0.29
ASKEDFOR	-0.04	<b>0.86</b>	0.06
NDEPIND	<b>-0.89</b>	<b>0.40</b>	0.14
LIMLONILL	<b>0.40</b>	-0.25	<b>0.64</b>
UNEMPLOY	<b>0.89</b>	-0.06	-0.06
SMR <75	<b>0.40</b>	<b>-0.45</b>	-0.36
GENDER	0.07	0.08	0.10
ETHNICITY	<b>0.48</b>	0.26	0.09
MEDIAN AGE	-0.02	0.04	0.30
ROLE	-0.14	0.02	-0.06
AM/PM	0.02	-0.27	-0.17

administration than information on safety aspects such as adverse effects, precautions, interactions or contraindications (Puspitasari, Aslani, & Krass, 2010). The level of advice-giving may also be determined by the properties of medicines themselves, such as adverse events or therapeutic classifications (Tully, Beckman-Gyllenstrand, & Bernsten, 2011).

Some have blamed the low prevalence of advice-giving on high workload (Raisch, 1993), together with the competing interests of pharmacies as businesses (Resnik, Ranelli, & Resnik, 2000). In the UK, NHS dispensing still constitutes the bulk of pharmacists' workload (Hassell, Seston, Schatheutle, Wagner, & Eden, 2011), and there is some evidence that speaking to prescription customers is reduced during peak dispensing times (Savage, 1997). In Sweden, predictor variables for the unavailability of counselling included the age of pharmacy staff, i.e. when they were over 50, and also when the prescription was presented during a lunchtime period (Tully et al., 2011). It is possible that service users "do not know what they do not know", and hence the requirement for advice genuinely represents an "unknown unknown". Thus, a lack of engagement and interaction between pharmacy staff and service users may be perpetuated through a public lack of awareness, alongside competing priorities within pharmacies. As community pharmacies are also retail businesses, service users' expectations may reflect the qualities of service such as speed of dispensing, convenience, comfort and cleanliness within a pharmacy's environment, rather than those that are directly related to healthcare.

An alternative explanation for the paucity of prescription advice is that service users may not trust the pharmacist to provide it as much as they would a doctor (Gidman, Ward, & McGregor, 2012) and, as Anderson, Blenkinsopp, and Armstrong (2004) reported, they may view them as "drug experts" rather than experts in health and illness or, as suggested by Bond (2015), perceived to be "suppliers of

medication" rather than a healthcare professional able to offer and provide clinical advice. Within the profession itself, there is some acknowledgement that a first-rate professional experience within a community pharmacy is currently not the norm (Anon 2015).

The prevalence of unsolicited advice-giving for new prescriptions in the present study (41.9%) was statistically significantly greater than that observed for repeat prescriptions (25.5%). These findings are consistent with prevalence rates for new and repeat prescriptions reported elsewhere (Aslanpour & Smith, 1997; Puspitasari et al., 2009). Some researchers attribute the lower prevalence of advice for repeat prescriptions to a lack of patient interest, and also a belief that counselling for regular prescriptions is unnecessary (Cooper et al., 2002). Patients using community pharmacies may not value pharmacy counselling for repeat prescriptions, in contrast to over-the-counter medicines and first-time prescription medicines (Kaae, Traulsen, & Norgaard, 2014).

While acknowledging differences in rates of advice-giving for new compared with those of repeat prescriptions, equity in relation to the prevalence of prescription advice has not previously been addressed in the literature other than to note the ready accessibility of pharmacies as healthcare providers on the high street (Andalo, 2014). Rural pharmacies have, however, been characterised as being providers of more substantive advice compared with those within inner-city locations (Payne, Cameron, Kay, Henry, & Doyal, 2005).

In the present study, when comparing the lowest rate of 14% of advice with that of one pharmacy which offered the highest rate of 63%, it is difficult to find reasons to explain how such a wide difference could arise from the contrasting requirements of service users. The pharmacy offering only 14% of such advice appears to offer an inequitable service in comparison to that offering 63%. Furthermore, the overall lower prevalence of advice-giving in the afternoon, compared with the morning, is an example of potential inequity because

this difference is unlikely to be associated with the requirements of service users.

Factor analysis suggests that prescription advisory activity by pharmacy staff may be characterised by two distinctive groups of service user. The first group represents those who collect prescriptions from pharmacies located within areas of greater deprivation and disadvantage where illness and unemployment is more prevalent, and where proportionately more of the minority ethnic population reside. Our findings suggest that, for this sector of the population, pharmacy staff more frequently provide advice for service users of minority ethnic origin, in comparison to that for white British, when dispensing repeat prescriptions. This additional, and indeed favourable, provision of advice to those of minority ethnicity could be perceived as an example of inequity by service users of white British ethnicity. In this context, it is noteworthy that the level of cultural competency of pharmacy staff has been established as being of much importance in the quest for meaningful healthcare interactions (Zweber, 2002).

The second distinctive service user group represents a relatively affluent population, of both minority and white British ethnicity, where social deprivation is less prevalent and the population enjoys overall a higher level of health and reduced mortality rates. Service users of either ethnicity who visit pharmacies in these locations are less likely to receive advice when collecting a new or repeat prescription from pharmacies located in areas where the level of deprivation is greater. Within this relatively less deprived group, it might be argued that service users who collect prescriptions from pharmacies in areas of greater deprivation are receiving an inferior, and therefore inequitable, service in comparison with pharmacies located in less deprived ones. We remain cautious when interpreting the reduced prevalence of advice-giving suggested by the Factor 3 loadings, when new prescriptions are dispensed in locations where a greater proportion of the population has limiting long-term illness. However, a possible explanation is that pharmacy staff might, inadvertently, disadvantage those with limiting long-term illness if it is assumed that the experience of illness confers a level of expertise in medicine-taking that obviates the need for advice.

Our study confirms established international trends whereby socioeconomic deprivation is associated with greater unemployment morbidity and death rates (Marmot, 2005). Greater social deprivation is known to be associated with multimorbidity and limiting long-term illness such as heart failure (Struthers, Anderson, Donnan, & MacDonald, 2000), with correspondingly more medicines being prescribed—this is known as “polypharmacy” (Duerden, Avery, & Payne, 2013; Payne et al., 2014). Therefore, where polypharmacy exists, a greater need for prescription advice might be expected.

The unpredictability of prescription advice-giving and its overall low prevalence contradicts an important recent initiative to define standards for pharmacy staff in the development of a consultation skills competency framework (Cutts & Howard, 2014). If, as our research indicates, there is often no communication at all between pharmacy staff and service users, important professional development is required to embed basic two-way interaction. This would help to create an environment in which shared decision-making can take place

and the values, beliefs and expectations of both service users and advisors are established during routine practice.

The strengths of this study include the fact that this was a large survey of advice-giving prevalence with a low margin of error. The study presents advice prevalence within contrasting socioeconomic profiles of an inner-city population with an effective representation of service users of minority ethnicity. The study therefore offers novel initial insights into the extent of equity of prescription advice-giving. It also provides unsolicited advice rates that more appropriately, in comparison with previously reported total rates, reflect the level of proactivity of pharmacy staff.

The limitations of the study include the knowledge that the nature and quality of advice was not assessed, and also that it did not consider the ethnicity of pharmacy staff or the type and properties of the prescribed medicine, nor the type of pharmacy (multiple or independent). Prevalence rates in this study may not be representative of rural areas or locations where the proportion of the minority ethnic population is closer to that of national norms. In future, studies that explore the lay beliefs and cultural preferences of service users associated with the use of prescription medicines are required so that barriers to advice-seeking and giving may be identified and overcome. A clearer understanding of factors that impact upon advice-giving that arise within the working environment of community pharmacies is also required.

The recent publication of a strategic document “Community Pharmacy—forward view” (Pharmacy Voice, 2016) acknowledges that the unique contribution community pharmacies can make is underutilised in the healthcare system, and in the combat against health inequalities. As medicines are the most common method of managing long-term conditions, community pharmacies could play a greater role in providing support for service users.

The Department of Health proposed a £170 million (6%) reduction in community pharmacy funding (Pharmaceutical Services Negotiating Committee 2016d) for essential and advanced services in England. Dispensing of prescriptions, which includes the provision of associated advice, is a major essential service that will be affected by this diminished level of funding. The recent publication of NHS England’s *GP Forward View* (2016) states that £112 million will be made available to ensure that every GP practice can access a clinical pharmacist, leading to an estimated 640 additional pharmacists in general practice by April 2017, and 1500 by 2020. However, this positive allocation of funding offers potential benefit *only* to patients who consult with a GP in terms of receiving advice from a pharmacist on their prescribed medication.

Our findings suggest that community pharmacy staff do not sufficiently interact with patients by providing advice on prescription medicines. Professional/scientific skills and knowledge are therefore not being deployed sufficiently in pharmacies in a manner that is likely to facilitate a reduction of side effects or adverse reactions from medicines. Recommendations to place community pharmacies at the centre of medicines optimisation and personal care, alongside the introduction of pharmacists to GP medical practices, bring into question how pharmacists are best utilised within the NHS and how their knowledge may complement the role of medical practitioners. If community

pharmacies are to take forward these more patient-focused agendas, as proposed in a recent review of community pharmacy clinical services (The King's Fund, 2016) in a manner that equitably meets the contrasting needs of the population living within different socioeconomic circumstances, greater interaction between pharmacy staff and service users is required. By stepping up the interactive role of pharmacy staff as expert advisors on the use and effects of prescription medicines, the skills and training of pharmacy staff would be more effectively utilised and valued by the public.

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