



## Hospice at Home: Inequalities in referrals to a Hospice at Home Service between two socio-economically distinct areas of Manchester, UK.

[Link to publication record in Manchester Research Explorer](#)

### Citation for published version (APA):

Wilson, C., Campbell, MG., Caress, A., Roberts, D., & Grande, GE. (2008). *Hospice at Home: Inequalities in referrals to a Hospice at Home Service between two socio-economically distinct areas of Manchester, UK.*. Poster session presented at European Association of Palliative Care, 28th-31st May 2008., Trondheim.

### Citing this paper

Please note that where the full-text provided on Manchester Research Explorer is the Author Accepted Manuscript or Proof version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version.

### General rights

Copyright and moral rights for the publications made accessible in the Research Explorer are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

### Takedown policy

If you believe that this document breaches copyright please refer to the University of Manchester's Takedown Procedures [<http://man.ac.uk/04Y6Bo>] or contact [uml.scholarlycommunications@manchester.ac.uk](mailto:uml.scholarlycommunications@manchester.ac.uk) providing relevant details, so we can investigate your claim.



# Palliative Medicine

<http://pmj.sagepub.com/>

---

## Exploring differences in referrals to a hospice at home service in two socio-economically distinct areas of Manchester, UK

Malcolm Campbell, Gunn Grande, Charlotte Wilson, Ann-Louise Caress and Dai Roberts  
*Palliat Med* 2010 24: 403 originally published online 16 December 2009  
DOI: 10.1177/0269216309354032

The online version of this article can be found at:  
<http://pmj.sagepub.com/content/24/4/403>

---

Published by:



<http://www.sagepublications.com>

**Additional services and information for *Palliative Medicine* can be found at:**

**Email Alerts:** <http://pmj.sagepub.com/cgi/alerts>

**Subscriptions:** <http://pmj.sagepub.com/subscriptions>

**Reprints:** <http://www.sagepub.com/journalsReprints.nav>

**Permissions:** <http://www.sagepub.com/journalsPermissions.nav>


**Citations:** <http://pmj.sagepub.com/content/24/4/403.refs.html>

>> [Version of Record](#) - May 27, 2010

[Proof](#) - Dec 16, 2009

[What is This?](#)

# Exploring differences in referrals to a hospice at home service in two socio-economically distinct areas of Manchester, UK

*Palliative Medicine*  
24(4) 403–409  
© The Author(s) 2010  
Reprints and permissions:  
sagepub.co.uk/journalsPermissions.nav  
DOI: 10.1177/0269216309354032  
pmj.sagepub.com  


**Malcolm Campbell** *School of Nursing, Midwifery and Social Work, University of Manchester, Manchester, UK*  
**Gunn Grande** *School of Nursing, Midwifery and Social Work, University of Manchester, Manchester, UK*  
**Charlotte Wilson** *School of Nursing, Midwifery and Social Work, University of Manchester, Manchester, UK*  
**Ann-Louise Caress** *School of Nursing, Midwifery and Social Work, University of Manchester, Manchester, UK*  
**Dai Roberts** *St Ann's Hospice, Manchester, UK*

## Abstract

In order to provide equitable access to hospice at home palliative care services, it is important to identify the socio-economic factors associated with poorer access. In this population-based study we aimed to test the inverse care law by exploring how socio-economic status and other key demographic indicators were associated with referral rates in two distinct areas (Salford and Trafford) served by the same service. Secondary data from the UK National Census 2001, North West Cancer Intelligence Service (2004) and hospice at home service referral data (2004–06) was collated for both areas. Descriptive analysis profiled electoral ward characteristics whilst simple correlations and regression modelling estimated associations with referral rates. Referral rates were lower and cancer mortality higher in the most deprived areas (Salford). Referral rates were significantly associated with deprivation, particularly multiple deprivation, but not significantly associated with cancer mortality (service model and resources available were held constant). At the population level, the socio-economic characteristics of those referred to hospice at home rather than service provision strongly predicted referral rates. This has implications for the allocation and targeting of resources and contributes important findings to future work exploring equitable access at organizational and professional levels.

## Keywords

Access to health care, home-care services, palliative care, referral, socio-economic factors

## Introduction

Research has repeatedly shown that patients of low socio-economic status (SES) are less likely to gain access to palliative care services, particularly palliative home care,<sup>1–5</sup> but also inpatient hospice care<sup>6,7</sup> and specialist palliative care.<sup>8</sup> Indicators positively correlated with access include patients being of higher educational level, income or social class,<sup>1,2</sup> married/living with someone or living in a less deprived area.<sup>3</sup> Further variables with a negative association to access include being unmarried,<sup>1</sup> living alone or being aged over 75 or 85 years.<sup>3</sup> This research aimed to explore how SES and other demographic indicators influence access to hospice

at home. Differential socio-economic access may be due to service availability being poorer in areas with higher deprivation, i.e. the inverse care law<sup>9</sup> and therefore, a problem of service resources and availability rather than a referral bias affecting disadvantaged groups. A hospice at home service encompassing two local authorities in the Northwest region of England presented an opportunity to test this hypothesis. St Ann's Hospice provides two hospice at home services with identical organizational structure, management and resources to two very different socio-demographic areas (Salford and Trafford). By examining the referral data and socio-economic characteristics of these areas, where the service model and resources available were held constant,

---

## Corresponding author:

Gunn Grande, University of Manchester, Jean McFarlane Building, Oxford Road, Manchester M13 9PL, UK. Email: [gunn.grande@manchester.ac.uk](mailto:gunn.grande@manchester.ac.uk)

we were able to assess whether socio-economic differences in access are still observed under conditions of identical service provision.

In the UK levels of inequality are at their widest for over 40 years as urban clustering of poverty and wealth has increased socio-economic polarization and segregation.<sup>10</sup> In Manchester, there is a higher concentration of the nation's most deprived wards, combined with lower than average life expectancies and a cancer mortality of 10% above the national average (1995–7).<sup>11</sup> There is, therefore, an increasing need to understand the relationship between wider socio-economic and regional inequalities and unequal access to palliative care. The present study utilizes population data at ward level to assess whether socio-economic differences can explain the observed differences in referrals between wards with a similar level of hospice at home provision.

## Methods

Using secondary data analysis, the relationship between age, socio-economic variables and referrals to hospice at home at ward level was investigated. Cancer deaths were considered as a further variable in the analysis. Since cancer patients constitute 90% of St Ann's Hospice referrals, we hypothesized that if referrals were based on disease variables, cancer deaths should explain more of the variance in referrals than socio-economic variables.

### Data collection

Variables and relevant categories were included for consideration where previous research pointed to their potential value as indicators of referral patterns.<sup>1–7</sup> Using secondary data collated from the UK National Census Data 2001,<sup>12</sup> and guided by the literature, key predictor variables were included: age, household type, educational attainment, economic activity and the Approximated Social Grade (ASG) as an indicator of class. The Index of Multiple Deprivation (IMD) was also used as a measure of deprivation including its composite variables: income, employment, education and housing. These demographic and socio-economic variables were then aggregated within each of the 41 census wards within Salford and Trafford. Frequency counts in variables were converted into percentages of the total number of eligible persons or households for each category.

Cancer mortality data for the most currently available year (2004) were collected from the North West Cancer Intelligence Service<sup>13</sup> and then standardized by calculating the number of cancer deaths per 10,000 population for each ward. Referral data were collected from St Ann's Hospice records for 2004–6 and patients'

postcodes were matched with the postcodes for Salford and Trafford wards. A small number of referrals were excluded as their postcodes were invalid or lay beyond Salford/Trafford boundaries (6 out of 189 in 2004, 10 out of 267 in 2005, 10 out of 267 in 2006). The numbers of referrals within a ward tended to be low and variable from year to year. For this exploratory study, the mean number of referrals per 10,000 population over the 3 years was used as a more representative measure of referral for each ward.

### Data analysis

The analysis first considered differences in socio-economic and demographic variables and referral rates between Salford and Trafford. Univariate correlations and linear regression analysis were performed to investigate the relationship between predictor variables and referral rates at ward level within Salford and Trafford. Data were analysed using SPSS release 15 and Stata 9.2. For this exploratory analysis, it was reasonable to assume that percentages within wards for the different socio-demographic characteristics in the 2001 Census were still valid in 2004–6, and that the rates of cancer deaths by ward in 2004 also applied to 2005 and 2006. *p*-values were considered to be statistically significant at  $\alpha = 0.05$ , although given the exploratory nature of the analysis, the overall patterns of results were considered more important.

Socio-demographic characteristics of wards in 2001, the incidence of cancer deaths per 10,000 population in 2004, mean numbers of referrals to the hospice at home service during 2004–6 and mean annual rates of referral per 10,000 population during 2004–6 were compared between the local authorities of Salford and Trafford using *t*-tests, and confirmed with Mann-Whitney *U* tests for those with skewed distributions.

Regression models provided estimated associations with referral rate. As there are likely differences between Salford and Trafford beyond the variables considered here, the overall effect of local authority was also controlled for in the analysis. Interactions and then local authority were dropped if non-significant to give simpler parsimonious solutions. Owing to high correlations between ward-level socio-demographic variables and given the small sample size, it was infeasible to investigate rigorously the effect of combinations of such variables. As such, analysis concentrated on assessing each variable in turn whilst continuous explanatory variables in all models were centred by subtracting the sample mean in order to reduce the impact of collinearity.

Both linear regression models and, given the low referral rates, corresponding negative binomial regression models with a log-link function were used to estimate associations with rates of referrals in 2004–6.

**Table 1.** Socio-demographic characteristics and cancer mortality of 41 census wards in Salford and Trafford in 2001

Ward level characteristic	Salford (n = 20) Mean(SD)	Trafford (n = 21) Mean(SD)	t	d.f.	p	Effect size Cohen's d
<b>Demographic</b>						
% persons aged 30–59	54.1 (5.2)	58.8 (3.3)	–3.45	39	0.001	–1.08
% persons aged 60–74	18.6 (2.2)	18.5 (2.5)	0.05	39	0.962	0.02
% persons aged 75 or over	10.6 (2.4)	10.6 (2.2)	–0.08	39	0.936	–0.03
% persons ethnic white (British, Irish, other)	95.9 (2.4)	90.8 (11.8)	1.92	21.8	0.068 <sup>c</sup>	0.59
<b>Education</b>						
% persons aged 16–74 with no qualifications	36.4 (6.4)	25.3 (7.3)	5.20	39	<0.001	1.62
% persons aged 16–74 with secondary-level qualifications <sup>a</sup>	42.7 (3.8)	44.6 (3.6)	–1.67	39	0.104	–0.52
% persons aged 16–74 with tertiary-level qualifications <sup>b</sup>	14.2 (6.0)	23.6 (9.5)	–3.77	39	0.001	–1.18
<b>Adults in household</b>						
% households with one adult (with/without children)	46.5 (9.7)	38.1 (7.1)	3.20	39	0.003	1.00
% households with two or more adults (with/without children)	47.5 (11.2)	56.1 (8.4)	–2.81	39	0.008	–0.88
<b>Household tenure</b>						
% households owner-occupied (owned outright or with mortgage/loan)	53.8 (19.2)	72.0 (12.6)	–3.62	39	0.001	–1.13
% households rented (social/council)	33.3 (15.2)	17.3 (11.3)	3.83	39	<0.001	1.20
% households rented (private)	8.7 (4.8)	8.3 (4.7)	0.33	39	0.747	0.10
<b>Approximated Social Grade</b>						
% households managerial, administrative, professional, clerical (ABC1)	42.4 (9.7)	57.5 (11.5)	–4.52	39	<0.001	–1.41
% households skilled/semi-skilled/unskilled manual (C2D)	36.2 (6.4)	27.2 (8.6)	3.77	39	0.001	1.18
% households on state benefit, unemployed, lowest grade (E)	21.4 (4.7)	15.3 (3.5)	4.78	39	<0.001	1.49
<b>Deprivation/economic activity</b>						
Index of Multiple Deprivation score	43.7 (17.0)	21.0 (15.7)	4.44	39	<0.001 <sup>d</sup>	1.39
Income Domain Score	34.7 (10.7)	19.9 (11.2)	4.32	39	<0.001	1.35
% persons aged 16–74 economically active	57.3 (7.4)	65.5 (5.7)	–3.97	39	<0.001	–1.24
Cancer mortality (per 10,000 population)	35.7 (14.1)	25.5 (8.8)	2.77	32	<0.009	0.87

<sup>a</sup>Includes National Vocational Qualification levels 1–3; General National Vocational Qualification.

<sup>b</sup>Includes National Vocational Qualification levels 4–5; Higher National Certificate; Higher National Diploma.

<sup>c</sup>Mann-Whitney U = 118.0;  $p = 0.016$ .

<sup>d</sup>Mann-Whitney U = 62.90;  $p < 0.001$ .

Source: UK National Census 2001.

## Results

Results of multiple linear regression were broadly confirmed by those of negative binomial regression and, for simplicity, the former are presented here.

### Characteristics of the local authorities

The 20 census wards in Salford and the 21 in Trafford showed considerable differences in their

socio-demographic characteristics (Table 1). The wards in Trafford had lower percentages with no educational qualifications and higher percentages with the highest level of qualifications. Trafford wards also had higher percentages of households where the household reference person was in the non-manual ASG, and lower percentages in the manual and lower grades. In contrast, wards in Salford had higher percentages of single-person households, lower percentages of owner-occupiers and higher percentages of social or council-rented households. The wards in Salford also

**Table 2.** Numbers and rates of referrals to hospice at home by local authority and year

Local authority		2004	2005	2006	Total
Salford	Number	85	106	106	297
	Rate	3.93	4.91	4.91	
Trafford	Number	98	151	151	400
	Rate	4.66	7.19	7.19	
Total	Number	183	257	257	697
	Rate	4.29	6.03	6.03	

Rates are per 10,000 population of local authority as of UK National Census 2001. Excludes 6, 10 and 10 referrals in the 3 years with invalid or ineligible postcodes.

Source: St Ann's Hospice, Cheadle, Cheshire, UK (2007).

had higher levels of deprivation in terms of the IMD and Income Domain Score, and lower percentages of persons economically active (all differences at  $p < 0.05$ ). In 2004, the incidence of cancer deaths was significantly higher for Salford (643; mean 35.7 per 10,000 population) than for Trafford (526; mean 25.5 per 10,000 population) (Table 1).

### Referrals to hospice at home

In 2001, Salford and Trafford had similar population sizes (Salford: 216,103; Trafford: 210,145), yet their referral rates differed considerably. Over a 3-year period (2004–6) referral rates to hospice at home were consistently higher for Trafford-based electoral wards (Table 2: mean referral 6.27, SD 1.65, range 2.59–8.72), compared with Salford (mean referral 4.50, SD 1.67, range 2.49–7.86). The number of persons referred to the hospice at home service and the referral rate per 10,000 population in the local authority increased from 2004 to 2005 and remained the same from 2005 to 2006 (Table 2). Referral rates were higher for Trafford in each year, despite Salford having a higher incidence of cancer.

Initial exploration using simple correlations showed that the referral rate was significantly associated with all of the selected socio-demographic variables except for the percentages of persons aged 60–74 years, aged 75 years or over, ethnically white, the percentage of persons aged 16–74 years with secondary-level qualifications and the percentage of privately rented households.

Distributions of referrals at ward level showed a separation by local authority, with Trafford wards showing higher referral rates and Salford wards showing higher death rates on the whole. Overall, the referral rate was not significantly associated with the cancer death rate ( $r = -0.05$ ,  $p = 0.780$ ). A linear regression model showed no significant association between referral rate and cancer death rate ( $B = 0.03$ , 95% confidence interval (CI) =  $-0.02$  to  $-0.07$ ,  $p = 0.239$ ), but a

significant association with local authority ( $B = 2.06$ , 95% CI =  $0.91$  to  $3.20$ ,  $p = 0.001$ ).

Initially, cancer death rate was included as a covariate in regression models for referral rate, but its adjusted effect was not significant in any model. For parsimony, the models were re-run with cancer death rate excluded (Table 3). Estimated coefficients for the characteristics shown in Table 3 give the additive change in referral rate for a one unit increase in the characteristic; those for local authority show the additive change in referral rate for Trafford compared with Salford.

Eight of the 18 predictor variables (percentage of persons aged 16–74 years with no qualifications, percentages of households owner-occupied, rented via the public sector, classified in the highest ASG band or classified in the lowest ASG band, and the three deprivation/economic activity variables) were very strongly significantly associated with referral rate ( $p < 0.001$ ) on their own. For example, referral rate was negatively associated with IMD scores unadjusted for local authority ( $r = -0.63$ ,  $B = -0.06$ , 95% CI =  $-0.08$  to  $-0.04$ ,  $p < 0.001$ ) (Figure 1). Five other variables (percentage of persons aged 30–59 years or 16–74 years with secondary qualifications, percentages of households with one adult, with two or more adults, or rented privately) showed a significant main effect ( $p < 0.05$ ) adjusted for local authority. Two others (percentage of persons aged 16–74 years with tertiary qualifications, and percentage of households classified as manual) showed a non-significant main effect but a significant interaction with local authority; for the other three, there was no significant association adjusted for local authority but the local authority effect itself remained highly significant ( $p < 0.001$ ).

### Discussion

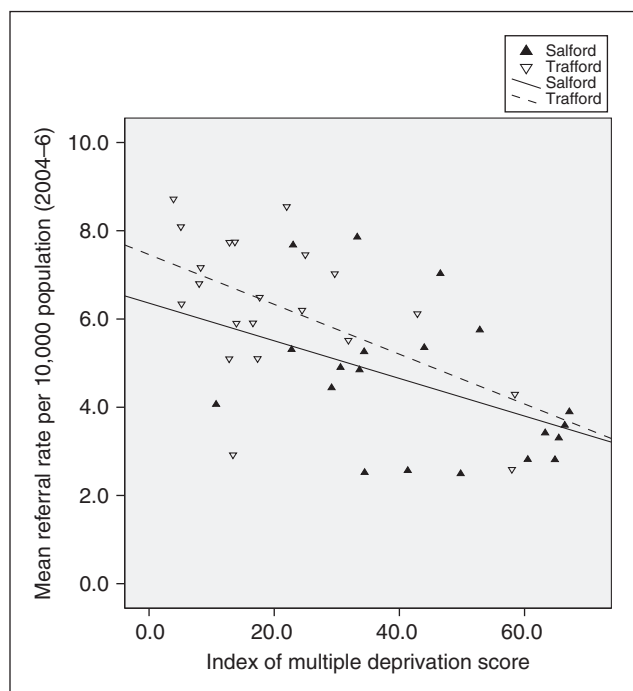
Results suggest that it is socio-economic characteristics rather than cancer mortality or service provision that predict referrals to hospice at home. Inequalities of



**Table 3.** Associations between socio-demographic characteristics and hospice at home referral rate in 41 census wards in Salford and Trafford in 2004–6 using parsimonious linear regression models

Ward level characteristic	Characteristic effect			Local authority effect			Interaction		
	Coeff	95% confidence interval	p	Coeff	95% confidence interval	p	Coeff	95% confidence interval	p
<b>Demographic</b>									
% persons aged 30–59	0.13	0.01 to 0.24	0.039	1.20	0.05 to 2.34	0.042			
% persons aged 60–74	0.18	–0.04 to 0.40	0.110	1.79	0.76 to 2.81	0.001			
% persons aged 75 or over	0.21	–0.02 to 0.43	0.067	1.77	0.75 to 2.78	0.001			
% persons ethnic white (British, Irish, other)	0.03	–0.03 to 0.09	0.346	1.93	0.83 to 3.02	0.001			
<b>Education</b>									
% persons aged 16–74 with no qualifications	–0.12	–0.18 to –0.06	<0.001						
% persons aged 16–74 with secondary-level qualifications <sup>a</sup>	0.24	0.05 to 0.43	0.016	1.66	0.64 to 2.67	0.002	–0.36	–0.63 to –0.08	0.012
% persons aged 16–74 with tertiary-level qualifications <sup>b</sup>	–0.07	–0.19 to 0.05	0.261	1.65	0.48 to 2.83	0.007	0.16	0.03 to 0.30	0.022
<b>Adults in household</b>									
% households with one adult (with/without children)	–0.08	–0.14 to –0.02	0.015	1.15	0.04 to 2.25	0.042			
% households with two or more adults (with/without children)	0.07	0.02 to 0.12	0.010	1.22	0.13 to 2.26	0.029			
<b>Household tenure</b>									
% households owner-occupied (owned outright or with mortgage/loan)	0.06	0.03 to 0.08	<0.001						
% households rented (social/council)	–0.07	–0.10 to 0.03	<0.001						
% households rented (private)	–0.19	–0.34 to –0.04	0.014	1.74	0.75 to 2.73	0.001	0.22	0.00 to 0.43	0.048
<b>Approximated Social Grade</b>									
% households managerial, administrative, professional, clerical (ABC1)	0.08	0.04 to 0.12	<0.001						
% households skilled/semi-skilled/unskilled manual (C2D)	0.04	–0.07 to 0.15	0.476	1.46	0.31 to 2.61	0.014	–0.15	–0.29 to –0.02	0.029
% households on state benefit, unemployed, lowest grade (E)	–0.21	–0.31 to –0.11	<0.001						
<b>Deprivation/economic activity</b>									
Index of Multiple Deprivation score	–0.06	–0.08 to –0.04	<0.001						
Income Domain Score	–0.08	–0.12 to –0.05	<0.001						
% persons aged 16–74 economically active	0.14	0.07 to 0.20	<0.001						

<sup>a</sup>Includes National Vocational Qualification levels 1–3; General National Vocational Qualification.<sup>b</sup>Includes National Vocational Qualification levels 4–5; Higher National Certificate; Higher National Diploma. Source: UK National Census 2001; St Ann's Hospice, Cheadle, Cheshire, UK (2007).



**Figure 1.** Hospice at home referral rate (2004–6) against index of multiple deprivation (2001) in 41 census wards in Salford and Trafford.

referral were strongly related to both global deprivation (IMD) and discrete deprivation indicators at the population level. The association between lower access and higher deprivation has been reported in other studies in terms of access to hospice at home,<sup>3,4</sup> factors influencing death at home<sup>14</sup> and referrals to hospice in-patient services.<sup>6</sup> Most recently, a review of patterns of access to community palliative care studies<sup>1</sup> has also indicated a greater likelihood of referral in those with the least social disadvantage. This present study was able to control for hospice at home service provision as a factor influencing access to hospice at home and show that in this case, inequity of access was not attributable to the inverse care law at this level.<sup>9</sup>

This finding has important implications for the allocation and distribution of resources in services. The 1999 Palliative Care Survey<sup>15</sup> points to the importance of factoring in cancer incidence and relative deprivation of an area when distributing resources, and further notes that ‘there is some evidence that up to twice the resources are needed to support patients at home in areas of acute deprivation compared with the most affluent areas’ (page 5). Our results, therefore, suggest that patients from socially deprived areas may be doubly disadvantaged in having both higher needs yet lower referral rates. The implication for practice is that greater resources should be targeted to more deprived areas according to need. The presumption of disadvantage should be tempered, however, with recognition

that failure to refer to palliative care services does not necessarily equate with unmet need and the contribution of caregivers must also be recognized.<sup>16</sup>

Whilst the role of socio-economic disadvantage in reducing access to hospice at home is clear, further research is needed to clarify whether failure to refer is a result of referral practices within services themselves or the socio-economic characteristics of the client population. The preferences of individuals are also influential in determining access to palliative care services.<sup>1</sup> In order to reduce inequality of access and improve service delivery, measures such as an educational intervention, service re-design, or targeting of resources could be introduced. However, these should be underpinned by strong evidence of the underlying factors shaping access. This study points to the role of socio-economic factors at the population level but likewise, understanding the reasons why health professionals choose to refer or not to refer to specialist palliative care services is important as their practices may be driven by personal, inter-personal and inter-professional factors as well as an assessment of clinical need.<sup>1</sup>

This study was conducted in only two localities with a limited sample size (41 wards). As such, the findings are not widely generalizable. The low number of referrals made to services and differences in the years in which the data were collected also raises questions of reliability and limits the wider application of these results to other contexts. Whilst the general pattern of results is indicative, high correlations between socio-economic indicators mean that regression modelling should be interpreted with caution. The level of analysis has further implications for the interpretation of results. The study was conducted at the population level, so the use of results to make straightforward inferences at the individual level or level of clinical practice, i.e. the ecological fallacy<sup>17</sup>, should be avoided. Population level data provide useful background indicators of trend at the aggregate level but are not designed to measure actual referral practice in clinical environments. Whilst future research will focus further on referral practices, this study has established clear patterns of socio-economic differences in referral rates, which suggest inequitable access to hospice at home services. If referrals were equitable and driven primarily by assessment of clinical need, one would anticipate the strongest correlation to be with cancer death rates. However, this was not the case. Referral rates for wards were significantly associated with most socio-demographic variables, particularly multiple and income deprivation suggesting that those from socially disadvantaged areas may be less likely to be referred. This study adds to the growing body of data indicating the role of social disadvantage in inequitable access to specialist palliative care services but also demonstrates that the problem is not one suggested by



the inverse care law,<sup>9</sup> i.e. poorer service provision in deprived areas. The study also highlights the need for further research at individual, healthcare professional and service level, in order to define the barriers to referral more clearly and ultimately to make recommendations for practice which ameliorate the effects of inequitable access to hospice at home and palliative care in general. Finally, as the ultimate aim is to improve care and support for patients and carers, it is also important that future research moves beyond the consideration of referral patterns to investigate the impact of differences in access and service provision on outcomes for patients and carers.

### Acknowledgements

The research team would like to thank the British Academy for funding the research and Mike Ducie, Research Officer, who aided the collation of statistical data from the Office of National Statistics and Dr Philip Lomax, Medical Director, Consultant in Palliative Medicine, St Ann's Hospice, Manchester.

### References

1. Walshe C, Todd C, Caress A, Chew-Graham CA. Patterns of access to community palliative care services: a literature review. *J Pain Symptom Manage* 2009; 37: 884–912.
2. Costantini M, Camoirano E, Madeddu L, Bruzzi P, Verganelli E, Henriquet F. Palliative home care and place of death among cancer patients: a population-based study. *Palliat Med* 1993; 7: 323–331.
3. Grande GE, Addington-Hall JM, Todd CJ. Place of death and access to home care services: are certain patient groups at a disadvantage? *Soc Sci Med* 1998; 47: 565–579.
4. Grande GE, McKerral A, Todd CJ. Which cancer patients are referred to Hospital at Home for palliative care? *Palliat Med* 2002; 16: 115–123.
5. Addington-Hall J, Altmann D. Which terminally ill cancer patients in the United Kingdom receive care from community specialist palliative care nurses? *J Adv Nurs* 2000; 32: 799–806.
6. Lammi UK, Kosunen E, Kellokumpu-Lehtinen P. Palliative cancer care in two health centres and one hospice in Finland. *Support Care Cancer* 2001; 9: 25–31.
7. Wood DJ, Clark D, Gatrell AC. Equity of access to adult hospice inpatient care within north-west England. *Palliat Med* 2004; 18: 543–549.
8. Currow DC, Abernethy AP, Fazekas BS. Specialist palliative care needs of whole populations: a feasibility study using a novel approach. *Palliat Med* 2004; 18: 239–247.
9. Tudor-Hart J. The inverse care law. *Lancet* 1971; 1: 405–412.
10. Dorling D, Rigby J, Wheeler B, Ballas D, Thomas B, Fahmy E, Gordon D, Lupton R, et al. *Poverty, wealth and place in Britain 1968 to 2005*. Bristol: Policy Press/Joseph Rowntree Foundation, 2007.
11. Manchester Partnership and Manchester City Council. *Manchester's state of the city report 2006–2007*. Available at: [http://www.manchester.gov.uk/downloads/State\\_of\\_the\\_City\\_appendix.pdf](http://www.manchester.gov.uk/downloads/State_of_the_City_appendix.pdf)
12. Office for National Statistics. <http://www.neighbourhood.statistics.gov.uk>
13. North West Cancer Intelligence Service. [www.nwcis.nhs.uk](http://www.nwcis.nhs.uk)
14. Gomes B, Higginson IJ. Factors influencing death at home in terminally ill patients with cancer: a systematic review. *Br Med J* 2006; 332: 515–521.
15. National Council for Hospice and Specialist Palliative Care Services. *Palliative Care Survey 1999*. London: NCHSPCS.
16. Currow DC, Agur M, Sanderson C, Abernethy AP. Populations who die without specialist palliative care: does lower uptake equate with unmet need? *Palliat Med* 2008; 22: 43–50.
17. Morgenstern H. Uses of ecologic analysis in epidemiologic research. *Am J Public Health* 1982; 72: 1336–1344.