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Original Research

Area deprivation and age related macular degeneration in the EPIC-Norfolk Eye Study

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ABSTRACT

Objectives: To investigate the relationship between area deprivation, individual socioeconomic status (SES) and age related macular degeneration (AMD).
Study design: Cross sectional study nested within a longitudinal cohort study.
Methods: Data were collected in the EPIC-Norfolk Eye Study by trained nurses, using standardized protocols and lifestyle questionnaires. The English Index of multiple deprivation 2010 (IMD) was derived from participants' postcodes. AMD was identified from standardized grading of fundus photographs. Logistic regression was used to examine associations between IMD, SES and AMD.
Results: 5344 pairs (62.0% of total 8623) of fundus photographs were of sufficient quality for grading of AMD. Of 5182 participants with complete data, AMD was identified in 653 participants (12.60%, 95%CI = 11.7–13.5%). Multivariable logistic regression showed that people living in the most affluent 5% of areas had nearly half the odds of AMD compared to those living in comparatively more deprived areas (OR = 0.56, 95% CI = 0.36–0.89, $P = 0.02$), after adjusting for age, sex, education, social class and smoking.
Conclusions: The authors found that living in the most affluent areas exerted a protective effect on AMD, independently of education and social class. Further investigation into underlying mechanisms will inform potential interventions to reduce health inequalities relating to AMD.
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Introduction

Age-related macular degeneration (AMD) is a leading cause of low vision and blindness in developed countries.[1] Early disease with minor symptoms can progress to either geographic atrophy ('dry' AMD) or choroidal neovascularisation ('wet' AMD), both of which can have devastating effects on central vision in late stages of the condition. AMD causes approximately 5% of global blindness, with an estimated 71,000 new cases of late AMD per year in the UK.[2] Furthermore, both incidence and prevalence are expected to increase due to the ageing population structure since older age is the strongest risk factor for AMD. Pooled findings from three continents showed that the prevalence of AMD was 0.2% in those aged 55–64 years compared to 13.1% in people aged 85 and over.[3]

Rudolf Virchow was one of the first physicians to identify medicine as a social science.[4] Since then, health inequalities and the importance of social causes of poor health have been highlighted in public health policy by the Black report,[5] the Acheson report[6] and the WHO Commission on Social Determinants of Health.[7] People living in poorer areas, from less affluent backgrounds, have a higher risk of morbidity and mortality. There is substantial evidence that lower socioeconomic status (SES) is associated with visual impairment (VI),[8–10] higher prevalence and incidence of eye disease[11,12] and ocular risk factors.[13–16] However, less is known about the relationship between eye health and area deprivation. The impact of individual SES on health can differ from the effects of the local social and physical environment. Studies investigating the relationship between area deprivation and adverse visual outcomes have provided mixed results. Neighbourhood deprivation has been linked to late presentation of glaucoma,[15,16] acute angle closure incidence[17] and variations in provision of eyecare services in the UK.[18,19] Fraser and coworkers found that people living in more deprived areas were more likely to present in the late stages of glaucoma and that this effect was partly accounted for by optometry access.[16] However, studies from Australia[20] and the UK[21,22] have failed to demonstrate an association between area deprivation and VI. Deprivation was not associated with visual acuity at presentation in a study of 240 hospital records of patients with exudative AMD from two Scottish National Health Trusts. A recent study of routine data has shown that certification of visual impairment was not associated with deprivation[21]; although the authors suggested that variations in the registration process may have contributed to their conclusions.

The authors have previously reported that area deprivation was associated with a higher prevalence of low vision, and that this effect was independent of individual SES. There is a potential association between AMD and area deprivation through mutual risk factors such as smoking and poor diet or poorer access to health care. In the present study, it was

Table 1 – Descriptive analysis of 5182 participants from the EPIC Norfolk Eye study by quintile of index of multiple deprivation.

	Quintile 1 (least deprived)		Quintile 2		Quintile 3		Quintile 4		Quintile 5 (most deprived)		P-value*
Age (Years)	67.6	(7.5)	66.8	(8.1)	67.2	(7.7)	67.5	(7.7)	67.9	(7.2)	0.02
Sex											0.48
Male	475	(45.6)	436	(41.9)	428	(42.7)	463	(43.9)	445	(42.6)	
Female	567	(54.4)	605	(58.1)	575	(57.3)	592	(56.1)	596	(57.3)	
Education											<0.01
Less than O level	161	(12.5)	267	(20.8)	249	(19.4)	288	(22.4)	319	(24.8)	
O levels	118	(18.5)	139	(21.8)	130	(20.4)	130	(20.4)	121	(19.0)	
A levels	496	(21.3)	481	(20.6)	447	(19.2)	471	(20.2)	438	(18.8)	
Degree or higher	267	(28.8)	154	(16.6)	177	(19.1)	166	(17.9)	163	(17.6)	
Social class											<0.01
Non-manual	844	(24.7)	650	(19.0)	657	(19.2)	657	(19.2)	610	(17.9)	
Manual	198	(11.2)	391	(22.2)	346	(19.6)	398	(22.6)	431	(24.4)	
Smoking											<0.01
Current	32	(14.4)	44	(19.8)	31	(14.0)	48	(21.6)	67	(30.2)	
Former	448	(19.3)	441	(19.0)	454	(19.5)	472	(20.3)	507	(21.8)	
Never	562	(21.3)	556	(21.1)	518	(19.6)	535	(20.3)	467	(17.7)	
Physical activity											<0.01
Inactive	313	(17.2)	352	(19.4)	360	(19.8)	396	(21.8)	398	(21.9)	
Moderately inactive	364	(23.3)	311	(20.0)	309	(19.8)	291	(18.7)	285	(18.3)	
Moderately active	182	(19.2)	211	(22.3)	174	(18.4)	192	(20.3)	189	(20.0)	
Active	183	(21.4)	167	(19.5)	160	(18.7)	176	(20.6)	169	(19.8)	
Alcohol intake (Units in previous week)	8.1	(9.0)	7.1	(9.0)	7.6	(8.6)	7.6	(9.8)	7.5	(9.6)	0.25
Visual impairment	30	(20.7)	26	(17.9)	23	(15.9)	33	(22.8)	33	(22.8)	0.69
AMD	123	(18.8)	136	(20.8)	129	(19.8)	131	(20.1)	134	(20.5)	0.92

Data presented as *n*(%) for categorical and mean (SD) for quantitative variables.
*P-value from χ^2 test for trend for categorical and analysis of variance for continuous variables.

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