CLINICAL STUDY

Vision-related quality of life impairment in an elderly UK population: associations with age, sex, social class and material deprivation

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Abstract

Purpose **To describe the prevalence of vision-related quality of life (VR-QOL) impairment in an elderly UK population sample.**
Method **The survey, using the VCM1 questionnaire, was based on an age- and sex-stratified random population sample of 2783 individuals aged 55 years or over.**
Results **One thousand eight hundred and forty-six (69.7%) of 2647 eligible subjects responded. One thousand six hundred and eighty-three individuals completed all 10 VCM1 items. Overall the prevalence of a VCM1 score >2.0 ('more than a little' concern about vision) was 4.6% (95% CI = 3.7% to 5.7%), leading to an estimate of more than 550 000 individuals in England with substantial VR-QOL impairment. The prevalence increased with age from 2.1% in the 55–64 year age group to 17.9% in the group aged 85 years and older. The prevalence also increased as social class became lower, from 0 in social class I to 10.2% in social class V, and increased with increasing material deprivation, from 1.2% in the most affluent quintile to 6.8% in the most deprived quintile. Multivariable logistic regression analysis showed that age ($p = 0.0001$), decreasing social class ($p = 0.03$) and increasing material deprivation ($p = 0.008$) were independently associated with VR-QOL impairment (VCM1 score >2.0), whilst gender and means of questionnaire administration were not associated with VR-QOL impairment at the 5% level.**
Conclusions **The findings suggest a substantial national prevalence of VR-QOL impairment, and are consistent with earlier studies linking ocular disease with social deprivation. Consideration should be given to directing resources more carefully towards groups at higher risk of VR-QOL impairment, in particular the very elderly and socially deprived.**

Key words Ageing, Population survey, Prevalence, Quality of life, Questionnaire survey, Socio-economic factors, Visual impairment

Visual impairment is a common finding in surveys of the elderly in both developing and developed countries, including the United Kingdom (UK), and it is believed that poor vision reduces the quality of life of many elderly people. In the UK, opportunistic studies of elderly outpatients,[1,2] elderly attendees at an accident and emergency department[3] and acute geriatric admissions[4] have revealed substantial prevalences of potentially correctable visual problems. Two population surveys have also suggested high prevalences of unmet need for ophthalmic services on the basis of vision tests and ocular examination findings.[5,6] However, the results of such studies have been criticised as estimates of need because of the poor relationship between clinical examination findings and subjective perceptions of visual impairment.[7] Awareness of the importance of vision-related quality of life (VR-QOL) assessment is now increasing. Calls have been made for improved instruments with which to just self-reported problems, for the purposes of more accurately defining needs.[8,9]

Numerous vision questionnaires are already available which are based on physical (visual) symptoms and physical function, such as the VF-14[10] and the ADVS.[11] 'Screening' questions such as difficulty seeing distant objects, recognising a friend across the road and reading newspaper print have been used in population surveys.[12,13] But it is uncertain whether questions about physical function can be used to demonstrate a need for ophthalmic intervention, because an individual with visual impairment may find the particular activities covered irrelevant to their own situation or may not be concerned by their impairment. It is becoming clearer that assessing selected

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physical activities gives an inadequate description of VR-QOL impairment.[14] Recently the NEI-VFQ (National Eye Institute Visual Function Questionnaire)[15,16] has become available in the USA and the VCM1 questionnaire in the UK.[14] These questionnaires aim to cover a broader range of quality of life issues. The aim of the present study was to describe the prevalence of VR-QOL impairment in an elderly UK population sample using the VCM1 questionnaire.

Method

The source of potential subjects for this study was all those who were sampled for the original Somerset and Avon Survey of Health (SASH) which was conducted in 1994 and 1995.[17] SASH recruited 40 general practices with a minimum list size of 1000 patients aged 35 years or over representing a mix of urban, rural and inner city areas. The sampling frame was the Family Health Services Authority (FHSA) register for Avon and Somerset. The sampling was stratified according to the age–sex distribution of England and Wales at the 1991 census.[18] Of the SASH sample 85.3% responded to a questionnaire from which information on self-reported health status, ethnic background, marital status, employment status and social class was derived.[17] This information was therefore available for the majority of those in the subsample used for the present study.

For organisational reasons, individuals registered with 19 of the 40 practices in the SASH study were sampled for the present study, the Somerset and Avon Eye Study (SAES). However, not all individuals in the SASH database were available for recruitment. Of those individuals potentially eligible for the present study, 9.9% were excluded, either by their general practitioners (for example because of dementia or cancer) or because of refusal to participate in activities related to SASH. The frequency of exclusions progressively increased with age, from 5.0% in the age group 55–64 years through 7.7% (aged 65–74 years) and 16.7% (aged 75–84 years) to 27.8% in those aged 85 years and older. Others had died or moved out of the study area. In order to achieve the desired sample size and composition, the sampling procedure involved a random, age- and sex-stratified selection of 147 people from those available (not dead, moved or excluded) from a stratified random pre-sample of approximately 200 in each practice. If insufficient numbers were available in any of the age–sex groups, then the final sample was smaller than 147. The actual numbers sampled in the age groups thus varied to some extent across the practices, producing a total final sample size of 2783.

Social class was estimated from the Standard Occupational Classification[19] at the time of the SASH study and the SASH codes were used in the present study. Women were classified according to their own full-time occupation if given. Women in part-time employment or retired from part-time employment were classified according to their partner's occupation. Those who had retired were coded under their most recent full-time occupation (or their partner's most recent full-time occupation if their own occupation was not given).

Townsend scores of material deprivation[20] based on 1991 census data were obtained for enumeration districts at the time of the SASH study (1993–5).[17] The same scores were used in the present study. The available Townsend scores for enumeration districts for 2643 of the 2647 potential recruits were divided into quintiles for the purposes of evaluating response rates by degree of material deprivation.

The VCM1 questionnaire is a valid and reliable measure of VR-QOL and contains 10 broadly applicable items referring to physical, social and psychological issues (embarrassment, anger, depression, loneliness, fear of deterioration in vision, safety at home, safety outside the home, coping with everyday life, inability to do preferred activities and life interference).[14] The VCM1 summary score acts as a global measure of concern about vision. The VCM1 score ranges from 0.0 (no problem) to 5.0 (extreme problem) with 50 intervals and is strongly associated with responses to questions about a wide range of quality of life issues including mobility, reading and leisure. Ideally all items should be completed, but the questionnaire shows high internal consistency, suggesting that substitutions for missing values can be made with caution if necessary. In the present study a conservative approach was taken to calculation of the VCM1 scores. No score was calculated if it required the substitution of a missing value.

All individuals who were considered eligible for the study were sent a postal invitation to attend a research clinic. Clinic attendees completed the VCM1 questionnaire at the clinic before any vision tests were performed. If the VCM1 could not be self-completed it was administered by an interviewer in a standardised manner. Non-responders to the clinic invitation were contacted by telephone where possible or mailed a second invitation. Those who refused the invitation were asked if they were willing to accept a home visit, where administration of the questionnaire was performed in the same manner as in the clinic. Those who refused the offer of either a clinic visit or home visit were asked to self-complete the VCM1 at home and return it by post. If completion of the VCM1 could not be achieved by any of the above methods it was administered by telephone. The reliability of postal, telephone and clinic administration has been tested.[14,21] A short telephone questionnaire containing 2 items only (inability to do preferred activities and life interference) was used in situations where administration was difficult. The questionnaires were completed between May 1996 and June 1998.

For present purposes a VCM1 score of greater than 2.0 was chosen as the criterion for defining VR-QOL impairment. A score of 2.0 approximates to 'a little concern' about vision. An estimate of the prevalence of VR-QOL impairment in England was obtained by multiplying the proportions of individuals with VR-QOL impairment in the study by the numbers in the respective

age–sex strata of the population of England at the 1991 census. The relationship of VCM1 score to vision test results and other self-report measures of vision has been described elsewhere.[14]

The associations between measures were examined by calculating Spearman correlation coefficients and by logistic regression analysis using SAS software, version 6.11. In the logistic regression analysis the VCM1 score was taken as the outcome variable (score > 2.0 vs score ≤ 2.0) with age (in years), sex, social class (I, II, II, IV, V), deprivation quintile, ethnic group (white vs non-white) and means of questionnaire administration (telephone vs other) as potential explanatory variables.

Results

Response rates

Whilst conducting the study 136 people were found to have died or moved out of the area, leaving 2647 eligible subjects. The questionnaire was administered to 1846 individuals, giving an overall response rate of 69.7%. Table 1 describes the numbers who responded to the vision questionnaire by age and sex. Response rates to the questionnaire were lowest in those aged 85 years and older, but were also relatively low amongst men aged 55–64 years. A progressively decreasing response rate to the questionnaire was found with decreasing social class. Response rates to the questionnaire were 88% for social class I (professionals) and 69% for social class V (unskilled workers). The response rate was 42% in those without social class information. A progressively decreasing response rate to the questionnaire was also found with increasing deprivation. The response rate was 80% in the most affluent quintile and 58% in the most deprived quintile. In those for whom SASH had ethnic group information the vast majority classified themselves as white (99%). The response rate was relatively low (61%) amongst those who classified themselves as non-white. Visual acuity data were available for 1078 individuals who attended the research clinic. Information on self-reported eye problems (such as cataract, glaucoma and diabetic eye disease) from the SASH database was available for 618 non-responders. Of the non-responders in the present study, 14.2% had reported eye problems previously in the SASH study. For comparison 19.5% of responders in the present study had reported eye problems in the SASH study.

Table 1. *Response rates by age and sex*

Age group at sampling	Potential recruits (*n*)	Questionnaire administered (*n*)	Response rate (%)
Men			
55–64	471	296	62.8
65–74	422	318	75.4
75–84	234	172	73.5
85+	47	29	61.7
Sub-total	1174	815	69.4
Women			
55–64	498	355	71.3
65–74	493	348	70.6
75 to 84	346	250	72.3
85+	136	78	57.4
Sub-total	1473	1031	70.0
Grand total	2647	1846	69.7

n, number of individuals.

VCM1 missing values

Of the 1846 who partially or wholly completed the vision questionnaire, 163 (8.8%) produced one or more missing values for the VCM1. Missing values resulted mainly from two situations. Firstly, 110 individuals completed the short telephone version containing only 2 VCM1 items. Secondly, the commonest cause of missing values from those who completed the full version was the tendency to miss whole pages of the questionnaire, for example by turning over more than one page simultaneously. This problem occurred for one or more pages of VCM1 items in a further 21 questionnaires. After accounting for these two problems the number of residual questionnaires with missing values was small (1.9%) and for each individual item the number of missing values was less than 1%. The analyses presented below relate to the 1683 individuals with complete VCM1 information, i.e. 10 completed items.

VCM1 scores

Table 2 shows the numbers of individuals who responded with a specified VCM1 score, by age and sex. Overall the prevalence of a VCM1 score > 2.0 ('more than a little' concern about vision) was 4.6% (95% CI = 3.7% to 5.7%), leading to an estimate of more than 550 000 individuals in England with substantial VR-QOL impairment. The prevalence of VR-QOL impairment using the criterion of VCM1 score > 2.0 increased with age from 2.1% in the 55–64 year age group through 3.0% (age 65–74 years) and 7.9% (age 75–84 years) to 17.9% in the group aged 85 years and older.

Information on social class was available for 1637 of 1846 responders to the vision questionnaire. Table 3 lists the prevalences of VCM1 scores greater than 2.0 by social class. The prevalence of VR-QOL impairment using this criterion progressively increased as social class became lower, from 0 in social class I to 10.2% in social class V. Direct age-standardised rates, using the age structure of the study population, were also calculated to eliminate the potential confounding effects of age on the social-class-specific rates. The age-standardised rates (not shown) were almost identical to the unstandardised rates.

Townsend scores (range –3.79 to 15.76, median 0.22, mean 0.81) for enumeration districts were available for 1844 of 1846 responders to the vision questionnaire. The 1844 responders were divided into deprivation quintiles based upon the Townsend scores for enumeration districts. Table 4 lists the prevalences of VCM1 scores greater than 2.0 by deprivation quintile. The prevalence of VR-QOL impairment using this criterion progressively

Table 2. *Number of individuals with a specified VCM1 score by age and sex*

Age at the time of completion of the questionnaire (years)	VCM1 score						Score missing	Total
	0.0	0.1 to 1.0	1.1 to 2.0	2.1 to 3.0	3.1 to 4.0	4.1 to 5.0		
Men								
55–64	88	145	26	5	1	0	12	277
65–74	138	136	23	2	3	0	17	319
75–84	74	71	15	8	2	1	16	187
85+	12	12	0	4	2	0	2	32
Women								
55–64	137	149	17	3	3	0	20	329
65–74	129	160	28	10	3	1	28	359
75 to 84	80	82	29	14	3	2	43	253
85+	19	30	5	8	1	2	25	90
Total	677	785	143	54	18	6	163	1846

increased with increasing material deprivation, from 1.2% in the most affluent quintile to 6.8% in the most deprived quintile.

Of the 16 individuals with complete VCM1 information who classified themselves as non-white, 1 individual had a VCM1 score greater than 2.0.

Relationships between measures

Calculation of Spearman correlation coefficients revealed no correlation between age and social class ($r = 0.04$, $p = 0.15$), a weak correlation between age (in years) and Townsend score ($r = 0.09$, $p = 0.0001$) and a somewhat stronger correlation between social class and Townsend score ($r = 0.33$, $p = 0.0001$). The multivariable logistic regression analysis showed that age in years ($p = 0.0001$), decreasing social class ($p = 0.03$) and increasing material deprivation quintile ($p = 0.008$) were associated with VR-QOL impairment (VCM1 score > 2.0), whilst gender, ethnic group and means of questionnaire administration were not associated with VR-QOL impairment at the 5% level. The analyses were repeated using a cut-off of > 1.0 ('more than hardly any concern about vision') and using a cut-off of > 3.0 ('more than a fair amount of concern about vision'). In each model at least one socio-economic variable was significant at the 5% level.

Amongst the individuals who attended the research clinic in the present study, 40 of 51 (78%) of those with 'more than a little concern' about their eyesight (VCM1 score > 2.0) had a best-corrected visual acuity in the better eye of worse than 6/6 Snellen, compared with 252 of 1017 (25%) of those with a VCM1 score of 2.0 or less. It must be emphasised, however, that the VCM1 score is not a proxy for visual acuity and VR-QOL may be affected by a wide range of other factors, not only other aspects of vision (e.g. visual field) but also individual needs, attitudes and varying environments.

The trend towards more prevalent VR-QOL impairment with lower socio-economic status was also reflected in the vision test results amongst the research clinic attenders. The prevalence of a best corrected acuity in the better eye of worse than 6/6 progressively increased from 18% in social class I through to 38% in social class V. The prevalence of a best corrected acuity in the better eye of worse than 6/6 also increased from 23% in the least deprived quintile to 33% in the most deprived quintile.

Discussion

The VCM1 questionnaire is, to the authors' knowledge, the first questionnaire to be derived primarily from patients' own definitions of VR-QOL. The present study is the first UK population survey of VR-QOL using a valid and reliable questionnaire instrument, although similar UK surveys also using the VCM1 are already under way in Sheffield and in Wiltshire. These studies will provide comparable data with which to gain a more comprehensive impression of VR-QOL nationally.

Table 3. *Prevalence of VCM1 scores greater than 2.0 by social class*

Social class	Score >2.0	Score 0.0 to 2.0	Prevalence (%)	95% CI (%)	Score missing	Total
I Professional occupations	0	66	0	0.0– 5.5	7	73
II Managerial and technical occupations	12	371	3.1	1.8– 5.4	18	401
III Skilled occupations	32	681	4.5	3.2– 6.3	60	773
IV Partly skilled occupations	15	252	5.6	3.4– 9.1	23	290
V Unskilled occupations	9	79	10.2	5.5–18.3	12	100
Missing social class information	10	156	6.0		43	209
Total	78	1605	4.6	3.7– 5.7	163	1846

95% CI is the 95% confidence interval for prevalence estimate.

Table 4. *Prevalence of VCM1 scores greater than 2.0, by deprivation quintile*

Deprivation quintile	Score >2.0	Score 0.0 to 2.0	Prevalence (%)	Score missing	Total
1 (Relatively affluent: −3.97 to −2.32)	4	340	1.2	24	368
2 (−2.32 to −0.80)	11	326	3.3	32	369
3 (−0.80 to 1.14)	19	309	5.8	41	369
4 (1.14 to 3.63)	21	314	6.3	34	369
5 (Relatively deprived: 3.64 to 15.76)	23	314	6.8	32	369
Townsend score missing	0	2	0.0	0	2
Total	78	1605	4.6	163	1846

Representativeness

The age and sex composition of the present study was similar to that of England at the 1991 census, with the exception of slight under-representation of men of working age. There have been no major changes in the age–sex composition of England since the 1991 census. The proportion of very elderly individuals (aged 75+ years) in England has increased slightly from 7.1% in 1991 to 7.3% in 1997.[22] Despite some attrition of the elderly in the target sample, the sampling procedure for the present study has allowed restoration of the intended age composition, but those who remained available for selection from the SASH sample were probably a relatively healthy cohort.

Poorer response rates were found amongst the elderly and the socially disadvantaged. These groups are likely to have higher prevalences of eye disease, suggesting that the prevalence results reported here could be an underestimate of the true prevalence of VR-QOL impairment. However, the Townsend scores suggest that the sample was biased towards recruitment of greater numbers from relatively deprived areas. Furthermore, the SASH data on self-reported eye problems suggest that the present study may have attracted individuals with visual morbidity. Thus the various possible biases may have balanced each other to some extent. The number of individuals who described themselves as non-white was very small and the present findings cannot be generalised to ethnic minority groups.

Main findings

The present study provides the first UK population data on the prevalence of VR-QOL impairment and how this varies with age, social class and material deprivation.

The decrease in vision with age is well recognised and the prevalence of self-reported problems with vision-dependent activities also increases with age.[23] The association of VR-QOL impairment with age in the present study is not surprising and is consistent with the natural history of age-related eye disease. Measuring VR-QOL is not the same as measuring eye disease and the VCM1 should not be considered as a screening test for eye disease. Many individuals will have eye disease but retain good quality of life, and conditions such as glaucoma need to be detected and treated before the patient is aware of poor vision.

The results for social class and material deprivation (Tables 3, 4) suggest a socio-economic gradient in the prevalence of severe VR-QOL impairment. The choice of 'cut-off' point for the VCM1 score of > 2.0 was necessarily arbitrary, although it makes intuitive sense in that a score of > 2.0 approximates to 'more than a little concern about vision'. As might be expected there were changes in the relative contributions of social class and material deprivation to the models when the analyses were repeated using different cut-offs, but in each model at least one socio-economic variable was significant at the 5% level.

The absence of severe levels of VR-QOL impairment in social class I merits discussion. It is unlikely that all individuals nationally in social class I have a complete absence of severe VR-QOL impairment, and there were few individuals in social class I in the oldest age group in our study. The 95% confidence intervals for the prevalence of a VCM1 score > 2.0 in a social class I were 0 to 5.5%. Nevertheless, the findings raise the question of whether severe VR-QOL impairment is largely avoidable, given adequate resources. Such a hypothesis could be tested by suitably designed observational and intervention studies. If confirmed, the low prevalence of severe VR-QOL impairment in social class I could act as a standard to be achieved in other more deprived groups.

Other studies

Earlier studies have suggested a relationship between socio-economic status and eye disease. Several studies have reported associations between lower socio-economic status and cataract.[24,25] Reidy *et al.*[6] found the age-standardised prevalence of poor vision to be significantly higher in underprivileged areas (identified by Jarman scores) in north London. The main contributory disorders were refractive errors and cataract.[6] Socio-economic factors may also influence diseases where the consequences of late presentation may not be reversed so easily. Eachus *et al.*[17] found self-reported diabetic eye disease to be strongly associated with material deprivation in the SASH sample. Deprivation has also been found to be associated with the late presentation of both anisometropic amblyopia[26] and glaucoma.[27]

The findings of the present study are consistent with the current ophthalmic research record and provide further evidence of the relationship between socio-

economic status and inequalities in health. Furthermore, this study adds new evidence that social inequalities in ocular health status are likely to be mirrored by differences in VR-QOL. In other words the observed inequalities are not simply a curiosity but appear to have an important impact on the lives of those affected.

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