

Utilization of eye care services among Ghanaian elderly population: Evidence from a peri-urban community.

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ABSTRACT

Introduction: Despite being more affected by visual impairment and blindness than any other population age group, the elderly are least likely to seek help when faced with eye problems. Eye care utilization among the aged is influenced by a number of predisposing, enabling and need factors.

Aim: To assess the care needs and utilization of eye care services among Ghanaian elderly population.

Methods: A cross sectional survey of 170 elderly persons (52.0% of those eligible) aged 60+ years and above in peri-urban community in the Central region of Ghana were purposively sampled and interviewed using a semi-structured questionnaire to collect information regarding demographics, eye care use, barriers and eye care seeking behavior. They also underwent ophthalmic examination.

Results: The mean age of the respondents was 70 years with 58.2% of them being females. Nearly three out of four (75%) were registered with the national health insurance scheme (NHIS). Conditions identified were cataract 117 (29.2%), uncorrected refractive error 75 (18.8%), pterygium/pinguiiculi 55 (13.8%), presbyopia 40 (10.0%), and retinal disorders in 23(5.8%) eyes. About one third 61(35.8%) have never had eye examination. Among 137 (80.5%) with eye problems, 76.9% self-reported eye problems before examination but only 51.2% utilized eye services in the previous five years. By proportion, more males (59%) than females, increasing age and those with higher level of education were able to utilize

care. The study showed that sex, education but not age were statistically related to the utilization of eye care services ($P = 0.05$).

Conclusion:

A large proportion of the elderly who require eye care are currently not utilizing eye care services. The barriers that lead to the low utilization of eye care services among the elderly should to be explored to reduce the burden of visual impairment.

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Keywords: Utilization, elderly, population, eyecare, Ghana

1. INTRODUCTION

35 Population ageing is a global phenomenon associated with a range of health care
36 challenges [1]. Ageing results in a number of health conditions including eye diseases and
37 visual impairments that increases the number of elderly persons needing care [2-3]. Age-
38 related eye diseases and resultant visual impairment causes functional impairment among
39 the elderly undermining independence and quality of life [4-5]. Interventions aimed at the
40 timely recognition and treatment of such age-related eye disorders can prevent disability
41 from these conditions.

42 Ophthalmic and optometric best practices recommends that older adults visit an eye care
43 professional regularly to have a comprehensive eye examination but some elderly persons
44 are not able to utilize eye care services due to some factors seen as barriers [4-6].
45 Healthcare utilization is influence by a number of interactive factors, namely predisposing,
46 enabling and need factors [7]. Predisposing factors subsist before the occurrence of disease
47 and reflect the tendency of a person to use health care services. Enabling factors influence
48 an individual's capacity to utilize healthcare services whiles need factors describe the use of
49 healthcare in the presence of eye disease or a perceived health state. Barriers to the
50 utilization of eye care among the elderly result in delays in treatment, which causes
51 dissatisfaction and may lead to worsening clinical and patient outcomes [8-10].

52 To some extent, utilization of eye care services reflects the effective coverage of eye health
53 services and a marker of existing eye health system performance [4, 6, 11]. In Ghana,
54 payment for health care is either by cash (cash and carry) or by a National Health Insurance
55 Scheme (NHIS). Under the NHIS, operated under the authority of the Government of Ghana,
56 patients who pay an annual renewable subscription fee and elderly persons (70 years and
57 above) receive free selected medical services covered by the scheme, including some
58 ophthalmic services [12]. Payment for health care by private health institutions is by cash, as
59 only few people can afford private health insurance. Records indicate that as many as twice
60 rich people are signed up to the NHIS than the poor and vulnerable persons. Government
61 puts the coverage rate for the NHIS at about 70% of the population but the actual figure
62 could be as low as 18% and only 29% of the poor compared to 64% of the rich are
63 registered with the health insurance [12]. Ophthalmic services in Ghana are provided mainly
64 by ophthalmologists, optometrists and ophthalmic nurses with some general practitioners
65 offering some ambulatory care. There are about 50 Ophthalmologist, 200 Optometrist and
66 300 ophthalmic nurses in Ghana, serving the over 24 million population [13]. Most rural and
67 peri-urban communities are underserved as majority of ophthalmologists and optometrists
68 practice in larger towns and cities only.

69 The elderly who live in rural and distant areas of developing countries have limited access
70 and worse eye care outcomes relative to urban and more modernized towns [6, 9, 14 -15].

71 The World Health Organization estimated that though the number of people visually impaired
72 from infectious diseases has greatly reduced in developing countries within the last 20 years,
73 the lack of access to cataract surgeries in developing countries poses a major challenge to
74 eradicating needless and avoidable blindness by the year 2020 [16]. Notwithstanding the
75 fact that the elderly are more affected by visual impairment and blindness than any other
76 population group, they are least likely to seek care when faced with deterioration of their
77 vision due of the presence of comorbid conditions [5, 15]. It is estimated that only one in
78 three older people with cataract actually receives surgery in least developed countries [3,
79 17]. In addition to eye problems, older people usually have other age-related health
80 problems, such as hearing impairment, arthritis, cardiovascular disorders, and diabetes [1].
81 The disabilities caused by such disorders could make some older people reluctant to visit
82 health facilities. The study assesses the need for and the pattern of eye care service
83 utilization among the elderly at a peri-urban community and has implications for health
84 planning considering the emerging aging population in Ghana.

85 86 **2. MATERIAL AND METHODS**

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89 The study was a community based cross-sectional survey conducted in 2012 at Yamoransa,
90 a peri-urban community in the Mfantseman West District of the Central Region of Ghana. The
91 district has a district hospital which provides primary eye care. The Central Region however,
92 has three major eye clinics which provide full scope eye care services [13]. The total
93 population of the town was 5,413 comprising 45.8% males and 54.2% females in 2010¹⁷.
94 Using the United Nations age criteria and also the age criteria used to define who an elderly
95 person is in the last population census in Ghana in 2000, respondents aged 60 years and
96 above were sampled to take part in the study. A total of 308 persons (5.7% of 5413) aged 60
97 years and above [18] were initially enumerated to take part in the study but 170 (55.2%)
98 respondents were purposively sampled and were involved in the study. The minimum
99 sample size (n) was determined using the formula $n = [(Z)^2 P(1-P)] / d^2$. Where, Z = 1.96 for
100 95% confidence level, P= proportion of population (50%) in percentage expressed as
101 decimals and d= confidence interval (± 5) expressed as decimals. After having corrected for
102 the finite population size with the expression $ns = n / [1 + (n-1)/pop]$, where ns = new sample
103 size and pop = population, a minimum sample size of 110 was calculated but 170 were
104 sampled using the age inclusion criteria. The district bears demographic characteristics
105 similar to that of the Central Region and other peri-urban communities in Ghana making it
106 ideal for the study [18]. Semi-structured questionnaires were administered by three trained
107 social workers and five Optometrists to collect information on respondents' demographic
108 background, current and previous use of eye care services in the previous five years,
109 barriers to uptake of eye care services, satisfaction with previous eye care and eye care
110 seeking behaviour. The questions were interpreted in the local dialect (Fanti) to allow for
111 those who could not speak and understand English.
112 Respondents were also screened for abnormal ocular conditions and visual impairment by
113 five experienced Doctors of Optometry. Ophthalmic examinations performed included
114 detailed ocular history, presented visual acuity (PVA) measured with or without glasses
115 according to what the patient was wearing at the time of the examination with a tumbling "E"
116 at six meters, external eye examination using a magnifying loupe under penlight, dilated
117 internal eye examination using direct ophthalmoscopy to evaluate retinal status, including
118 vessels, macula and optic disc features and hand held applanation tonometry to measure
119 intraocular pressure (IOP) when indicated. Pinhole examination was performed to identify
120 those who had refractive errors and would benefit from refraction. Ocular conditions
121 identified were verified on subsample at the regional hospital where referrals were sent for
122 treatment with consultant Ophthalmologist. All the team members also had previously been
123 involved in community eye screening and so were conversant with their roles. Each

124 questionnaire and eye examination took about 45 minutes to complete. All elderly persons
125 that met the age criteria for the study had an equal chance of participating in the research.
126 National Health Insurance (NHIS) and voter identification cards were used to verify
127 participants' ages.

128 The research was done according to the Helsinki Declaration on Research regarding Human
129 Subjects. This study was reviewed and approved by the Department of population and
130 Health, University of Cape Coast on behalf of the Institutional Review Board of University of
131 Cape Coast (UCCIRB). Participants were made to sign informed consent forms attached to
132 the questionnaires after the processes had been explained to them. Confidentiality was
133 assured at all times.

134 Visual impairment was determined using PVA (with or without spectacles) less than 6/18 to
135 6/60 in the better eye and blindness using visual acuity of less than 3/60 in the better eye
136 based on the guidelines drafted by the World Health Organization (ICD-10) [19]. Likewise,
137 respondents self reported vision was graded according the visual acuity criteria 6/4- 6/5
138 (Excellent, 6/6-6/18 (Good), 6/24-6/60 (Poor), 3/60 or worse (Very poor), no perception of
139 light (completely blind) [20]. Criteria for identification of abnormal ocular conditions have
140 been described in other studies [11]. Data obtained was analyzed using the Statistical
141 Product for Service Solutions (SPSS v 16) application to carry out descriptive statistics and
142 chi-square to test the hypothesis that utilization of care services has an independent
143 relationship on selected socio-demographic variables. Independent variables included age,
144 sex, and education level while dependent variable utilization was defined as the ability to
145 see an eye care professional or a qualified health professional when in need of eye care
146 service or had an episode of eye condition that requirement treatment in a 5-year period.
147 Statistical significance was defined at an alpha level of 0.05. We categorized people
148 requiring eye care/treatment in our study population as people with PVA worse than 6/18
149 in the better eye and/or identified ocular pathology/disease after examination.

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151 3. RESULTS

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153 A total of 170 elderly persons who were interviewed, 41.8% were males and 58.2% were
154 females (Table 1). The distribution shows that half of the respondents (50.6%) were aged
155 between 60-69 years (young old), 31.8% were aged between 70-79 years (older old) and
156 those aged 80+ (oldest old) accounted for 17.1%. The mean age of the respondents was 70
157 years (SD = +/-8.7, Range = 60 - 101). The data showed that respondents who had had
158 primary education were 58.3% for both sexes (78.8% among females and 31% among
159 males) and 31.7% had had middle or secondary education. Over half of males, (66.2%) had
160 had more than primary education compared to only 20.2% females. Only 8.2% had had
161 post-secondary education.

162 Using their PVA twenty five (14.7%) exhibited unilateral visual impairment, 113 (66.5%)
163 bilateral impairment, 39 (22.9%) unilateral blindness, and 10 (5.9%) had bilateral blindness.
164 Visual acuity in the better eye indicated in, 58.7% had visual impairment and 5.9% were
165 found to be blind in at least one eye. Respondents were asked to grade their perception
166 about well they can see and this is matched to the PVA in Table 2 to show discrepancies in
167 respondents self perception of the vision and measured vision. Overall, only 6.5% said the
168 eye sight was excellent, whilst a third of them (34.1%) said the health was fair and about the
169 same number (32.3%) graded the vision as worse poor or worse.

170 **Table 1: Background characteristics of respondents in percentages**

Education	Male				Female				Grand
	60-69*	70-79	80+	Total	60-69	70-79	80+	Total	Total
No education	5.0	-	-	2.8	2.1	-	-	1.0	1.8
Primary	12.5	35.3	78.6	31.0	63.0	89.2	100	78.8	58.3
Middle Sch./JSS	17.5	11.8	-	12.7	8.7	2.7	-	5.1	8.2
Secondary/Tech/Voc ational	45.0	47.1	14.3	39.4	21.7	2.7	-	11.1	23.5
Post secondary	20.0	5.9	7.3	14.1	4.3	5.4	-	4.0	8.2
Total	100	100	100	100	100	100	100	100	100
Total number	40	17	14	71	46	37	16	99	170

171 *Age group

Table 2: Matching PVA against self-evaluation by respondents

Self-Evaluation	Presenting better eye VA								Total
	>=6/6	6/9	6/12	6/18	6/24	6/36	6/60	<=3/60	
Excellent	3(17.6)	3(10.0)	2(15.4)	0(0.0)	0(0.0)	2(5.0)	1(4.3)	00(0.0)	11(6.5)
Good	3(17.6)	10(33.3)	4(30.8)	9(37.5)	7(53.8)	10(25.0)	3(13.0)	00(0.0)	46(27.1)
Fair	6(35.3)	11(36.7)	4(30.8)	8(33.3)	4(30.8)	18(45.0)	7(30.4)	00(0.0)	58(34.1)
Poor	3(17.6)	5(16.7)	2(15.4)	6(24.0)	2(15.4)	6(15.0)	9(39.1)	00(0.0)	33(19.4)
Very poor	2(11.8)	1(3.3)	1(7.7)	1(4.2)	0(0.0)	4(10.0)	3(13.0)	2(20.0)	14(8.2)
Completely blind	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	8(80.0)	8(4.7)
Total	100	100	100	100	100	100	100	100	100
Total number	17	30	13	24	13	40	23	10	170

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Percentages are in parenthesis

173 Of the 340 eyes of the 170 participants examined, 400 conditions were observed (Table 3).
 174 Cataract was the most occurring condition, affecting 117 (29.2%) eyes, followed by
 175 uncorrected refractive error in 75 (18.8%), pterygium/pingui culi 55 (13.8%), presbyopia
 176 among those could read 40 (10.0 %), and retinal disorders in 23(5.8%) eyes. Among 137
 177 (80.5%) individuals who were identified as either having an impairment or condition that
 178 required seeing an eye care provider, 76.9% affirmed that they had an eye problem before
 179 ophthalmic examination whilst only 4.2% perceived that they did not have any condition or
 180 the condition was minor or normal to warrant seeing an eye care provider. There was no
 181 statistically significant difference between respondents with perceived they had eye
 182 problems and those identified as requiring treatment after eye examination (p, 0.127) (Table
 183 4).

184 **Table 3: Prevalence of Ocular conditions among respondents**
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Condition	Frequency	Percentage
No abnormalities	2	0.5
Refractive error	75	18.8
Cornea opacity/scar	7	1.8
Cataract	117	29.2
Suspected glaucoma	16	4.0
Chronic/Acute conjunctivitis	34	8.5
Pseudophakia	18	4.5
Pterygium/ Pingueculae	55	13.8
Strabismus/Squint	1	0.2
Trauma	3	0.8
Presbyopia**	40	10.0
Retinal disorders (RT)*	23	5.8
Blind eye***	9	2.2
Total	400****	100.0

*RT = Hypertensive retinopathy (2.5%), chorio-retinal degeneration (1.0%), Macular scar (0.5%) and Diabetic retinopathy (0.2%). **Presbyopia = Among those with reading ability (those with near impairment were 33.5%). ***Blindness due to loss of eye.

****Multiple diagnosis among 170 persons

187 Among those who had ever had their eyes checked, 36.7% visited eye clinics when they had
 188 a problem with their eyes and 27.5% visited a general hospital or health centre to consult
 189 general physician or general health for eye care services. The rest resorted to self-
 190 medication, herbalist treatment (traditional healer) or pharmacy or chemical shops to treat
 191 their eye problems. Others depended on 'friends' or 'family relations' advice (Figure 1). One
 192 person who was reportedly aged 101 had never had an eye examination, indicating the lack
 193 of regular eye check up among the study population.

194 The study also sought to find out the reasons or barriers to the up-take of regular eye care
 195 services among the respondents. Table 5 shows first and second reasons for not seeking
 196 eye care service when they had eye problems. The most reported obstacle to the uptake eye
 197 care services was lack of money (35.4%), followed by those who 'did not think it was
 198 important' (22%), 'advised by others to do something else' (13.4%) and time constraints
 199 (12.2%).

200 Among them, (61) 35.8% had never had an eye examination in their lifetime. Within the
 201 previous five years however, as many of them (51.2%) have visited an eye care professional
 202 compared to those who had not (48.8%). By proportion, slightly more males than females,
 203 increasing age and increase in level of education was associated use of eye care service.
 204 The characteristics of eye care utilization in the 5-year period are shown in Table 6. Self-
 205 perceived eye problem, sex and education showed statistical significance at an alpha level
 206 of 0.05

Table 4: Association between self evaluation and identified eye problems

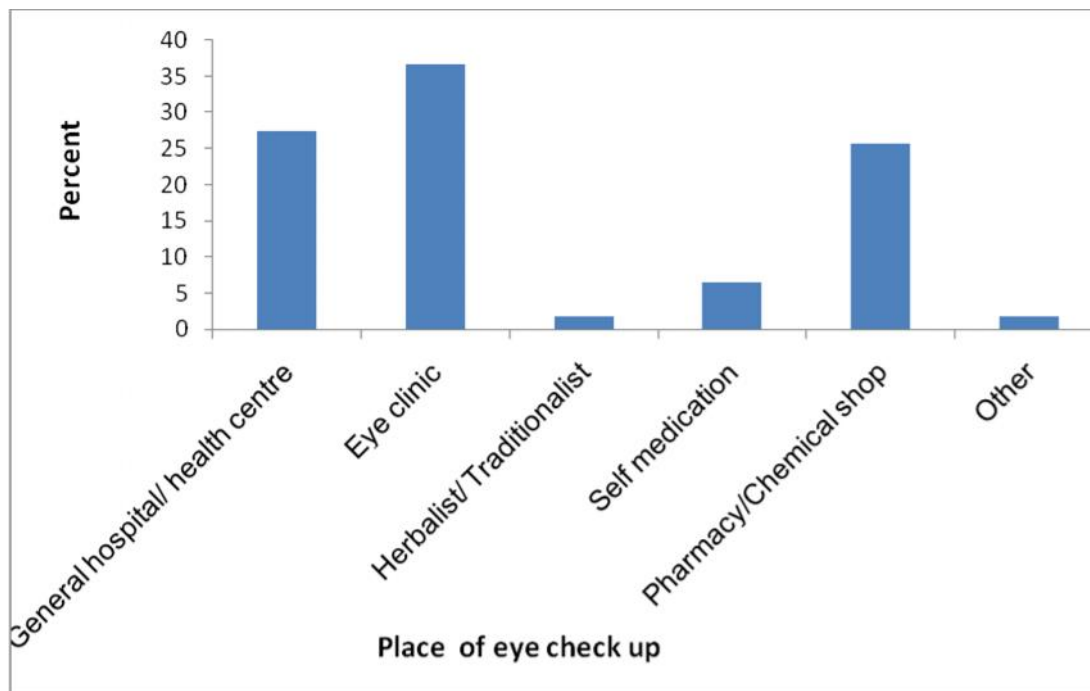
Personal evaluation	Eye examination		Total	Number
	Eye problem	No eye problem		
Eye problem	76.9	16.6	93.5	158
No eye problem	4.2	2.3	6.5	12
Total	81.1	18.9	100	
Total number	137	32		170

$X^2 = 2.328$; df = 1; p-value = 0.127

207 Overall 75% were registered under the national health insurance scheme (NHIS). Though
 208 the health scheme is free for persons 70 years and above, (49.4% of study population), just
 209 over 42% of this age group were registered with the scheme and therefore could access eye
 210 care services under it.

211 The study also sought to find out how the lack of utilization to eye care services due to the
 212 varied reasons, in the face of manifest or perceived eye problems and visual impairment
 213 affected the general disposition and patients satisfaction with eye care services and
 214 programmes available to them in the community. Overall, about 85% percent indicated that
 215 they had spent some time in the past worrying about their eye sight. They included twenty
 216 42.3% who had spent 'little' or 'sometime' worrying about the eye sight, 12.4% who spent 'all

217 the time' worrying' about their eyes and 30% who spent 'most of the time' worrying about the
 218 eye sight. Only 15.3% spent 'no time' worrying about their eye sight.
 219 Respondents, who had ever had an examination during their lifetime, were asked to grade
 220 the impression of eye care services available to the elderly in the community. About 12.4%
 221 of them were 'very satisfied' with care that they had received and about 3 fold that number
 222 (43.2%) were satisfied. Another 18.1% were dissatisfied, 4.5% were very dissatisfied and
 223 15.3% were partly satisfied and partly dissatisfied.
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Figure 1: Places where respondents sought eye care service

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Table 5: Reasons for not visiting eye clinics

Reasons	First reason	Second reason
Cost	35.4	-
Time constraints	12.2	-
Transportation/No escort	6.1	5.9
Thinks problem was minor	22.0	35.3
Fear	6.1	5.9
Advised by others to do something else	13.4	52.9
Do not know where to go	3.7	-
No improvement from previous visit	1.2	-
Total	83	17

233 **Table 6:** Eye care utilization among respondents

Demographic characteristics	Eye care utilization			Chi-square(p-value)
	Sought care N= 87(51.2%)	Did not seek care N= 83(48.8%)	Total N=170(100%)	
Sex*				4.721(0.013)
Male	37 (42.5)	34 (41.0)	71 (42.0)	
Female	50 (57.5)	49 (59.0)	99 (58.0)	
Age group				1.405(0.317)
60-69	43 (49.4)	43 (52.4)	86 (50.6)	
70-79	27(31.0)	27(31.7)	54 (31.8)	
80+	17(19.5)	13(15.9)	30 (17.6)	
Educational level*				3.441(0.021)
No formal education	1(1.1)	2(2.4)	3(1.8)	
Primary	54(62.1)	45(54.2)	99 (58.3)	
Middle school/JHS	9(10.3)	5(6.1)	14 (8.2)	
Secondary/Tech/ Vocational	18(20.7)	22(26.5)	40 (23.5)	
Post-secondary	5(5.7)	9(10.8)	14(8.2)	
Self-perception of eye problem *				5.309(0.012)
Yes	81(93.1)	77(92.8)	158(92.9)	
No	6(6.9)	6(7.2)	12(7.1)	
Presence of VI				1.528(0.376)
Yes	57(65.5)	58(69.9)	115(67.6)	
No	30(34.5)	25(30.1)	55(32.4)	

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4. DISCUSSION

237 In the present study, a history of eye care use in previous five years was considered as the
238 determinant of eye care service utilization. Some studies have examined the rate of eye care
239 utilization among the elderly in other countries [3-5]. We found that elderly persons in peri-
240 urban communities do not utilize eye care services to a large extent despite the presence of
241 eye condition needing treatment. Over one third (35.8%) have never used eye care yet
242 80.5% of respondents were identified with eye conditions that needed eye care attention.
243 The rate of eye care utilization (51.2%) in the study population was higher than the average
244 of 18% found in developing countries [6], 35.5 % found in Cameroon [15], 45.5% found in
245 India [11] but lower than 64% among older America [4] and over 90% found in older
246 Australians [5]. Some other studies in other countries among the elderly have also focused
247 on utilization and ageing [5, 21], elderly diabetics [22] and elderly glaucoma patients [23].
248 Depending on the geographical variation, the target population and period used to define

249 utilization different rates of eye care utilization have been reported. Extrapolation of these
250 results should therefore be carefully applied.

251 Sight is essential in everyday activities therefore it is clear that any disturbance in vision or
252 symptom associated with the use of the eyes will easily be noticed and lead to eye care
253 visits, yet we found only half (50.4%) of those with visual impairment had not sought for eye
254 care in the previous five years. Although majority of respondents (76.9%) identified as
255 having conditions that needed treatments were much aware of their visual status, more than
256 one third had never had an eye examination in their lifetime for persons 60 years and above.

257 Increasing age has been associated with increased utilization of eye care due to the high
258 risk of blindness and visual impairment at old age. In the study, though there was increase in
259 utilization of eye care with increasing age by proportion we did not find statistically significant
260 relationship between age and utilization. More men than females utilized eye care services.
261 In general, women have substantially worse eye care outcomes than men to the lower rate
262 of eye care utilization [24 -25]. Two- thirds of the world's blind and vision impaired people are
263 women [24]. The differences in the occurrence of eye disorders and treatment outcomes in
264 women have been attributed to the lack of access and utilization of eye care due lower
265 economic status and early change in the physiology of women [26]. The relationship
266 between gender and utilization of eye care in this study is at variance to other studies that
267 showed women are more likely to seek eye care [7, 9] but comparable to a study where men
268 sought eye care more than women in Cameroon [15]. Other studies have reported no
269 significant difference found between the gender in Ireland [8] and in India [11].

270 Some studies have found an inverse relationship between both income and education and
271 ability to utilize eye care services and visual impairment. Utilization among persons with low
272 education and income have been found to be almost twice as low compared to those with
273 higher income [3, 26 -28]. This study showed significant differences in eye care utilization
274 and level of education. Educational is an important factor in the determination of visits to eye
275 care professionals. Those with lower educational levels may be unaware of the need for
276 regular eye examinations with increasing age. The finding suggests that even in the
277 presence of perceived eye problems, close to half of them had not sought care. Socio-
278 economic background was not included in this study because of the homogeneity of subjects
279 used as respondents were elderly persons who had similar economic background.

280 Consistent with other studies, the main barriers preventing uptake of eye care service
281 identified in the study were related to medical costs of the services, time constraints,
282 transportation and escort and poor knowledge about eye disease [4, 11, 14]. Respondents
283 expressed that they thought the episodes of eye conditions they previous experienced were
284 not serious or mild be to merit an eye care visit. This could inherently explained by the low
285 level of education among the study population.

286 A study of the health profile and emerging aging issues in Ghana confirms that access to
287 medical care remains problematic for the elderly in Ghana, especially for those without
288 medical insurance and particularly those considered vulnerable [29]. In Ghana, eye care
289 services are available in public hospitals and private clinics where medical insurance cover
290 part of the fees incurred. However, unequal distribution of Ophthalmologists, Optometrists
291 and Ophthalmic nurses in Ghana deprive eye care access to people in remote and rural
292 areas. About a quarter of the study population were not registered with the national health
293 insurance scheme. The elderly, due to their lower socio-economic status find the cost of
294 health care especially eye care high in comparison with their mean income and it seems
295 some can't afford them, when even available.

296 **5. CONCLUSION**

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298 The study examined the eye care seeking behavior and barriers to the uptake of eye care
299 services among an elderly population in Yomoransa, a peri-urban community in Ghana. A
300 number of the respondents who were diagnosed of various ocular health conditions had not
301 utilized eye care services in the last five years preceding the survey. The associations
302 between utilization of eye care services and sex and educational level of respondents were
303 statistically significant. Efforts should be made by the Ghana Health Service to investigate
304 the barriers to up-take of eye care services and educate the elderly about their eye health to
305 increase the utilization of eye care services. Since we used cross sectional data one needs
306 to be cautious when interpreting the results. Also, because the clinical examination was
307 conducted on site, some equipment needed for certain clinical or investigative procedures
308 could not be conveyed to the site. Despite employing more than the minimum required
309 sample size, the prevalence of eye problems may be over or underestimated assuming that
310 respondents were more or less likely to suffer from ocular disorders than those who did not
311 take part in the study. Utilization was also self-reported and was not verified by
312 crosschecking from the places respondents claimed to have visited. The study also
313 covered 5-year retrospective periods and may be subject to recall errors by respondents. In
314 spite of these, the results provide valuable insight into the extent of eye care utilization
315 among the aging population in the Ghana. The results of this study are very informative and
316 indicate that a considerable proportion of the studied population had never utilized eye care
317 services, even among those who had eye problems.

318

319 **CONSENT**

320 All authors declare that written informed consent was obtained from the respondents before
321 their participation

322

323 **ETHICAL APPROVAL**

324

325 All authors hereby declare that this study was approved by the appropriate ethics committee
326 and have therefore been performed in accordance with the ethical standards laid down in the
327 1964 Declaration of Helsinki.

328

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330

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334

335

336 **COMPETING INTERESTS**

337 Author(s) disclose no potential conflicts of interest.

338

339 **AUTHORS' CONTRIBUTIONS**

340 Stephen Ocansey, Akwasi Kumi-Kyereme and Kofi Awusabo-Asare designed the study,
341 Akwasi Kumi-Kyereme and Stephen Ocansey performed the statistical analysis, Stephen
342 Ocansey, Alex Azuka Ilechie and Samuel Bert Boadi-Kusi wrote the protocol, Stephen
343 Ocansey wrote the first draft of the manuscript. Kofi Awusabo-Asare, Akwasi Kumi-Kyereme
344 and Alex Azuka Ilechie managed the analyses of the study. Carl Halladay Abraham and
345 Samuel Bert Boadi-Kusi managed the literature searches. All authors read and approved the
346 final manuscript.

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