

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 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 determine the need for, pattern of eye care utilization and explore self-reported factors influencing the up-take 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 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/pinguiuli 55 (13.8%), presbyopia 40 (10.0 %), and retinal disorders in

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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

Keywords: Utilization, elderly, population, eyecare, Ghana

1. INTRODUCTION

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

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

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

68 areas are well underserved as most ophthalmologists and optometrists practice in larger
69 towns and cities only.

70 The elderly who live in rural and distant areas of developing countries have limited access
71 and worse eye care outcomes relative to urban and more modernized towns [6, 9, 14 -15].
72 The World Health Organization estimated that though the number of people visually impaired
73 from infectious diseases has greatly reduced in developing countries within the last 20 years,
74 the lack of access to cataract surgeries in developing countries poses a major challenge to
75 eradicating needless and avoidable blindness by the year 2020 [16]. Notwithstanding the
76 fact that the elderly are more affected by visual impairment and blindness than any other
77 population group, they are least likely to seek care when faced with deterioration of their
78 vision due of the presence of comorbid conditions [5, 15]. It is estimated that only one in
79 three older people with cataract actually receives surgery in least developed countries [3,
80 17]. In addition to eye problems, older people usually have other age-related health
81 problems, such as hearing impairment, arthritis, cardiovascular disorders, and diabetes [1].
82 The disabilities caused by such disorders could make some older people reluctant to visit
83 health facilities. The study assesses the need for and the pattern of eye care service
84 utilization among the elderly at a peri-urban community and has implications for health
85 planning considering the emerging aging population in Ghana.

88 2. MATERIAL AND METHODS

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

120 intraocular pressure (IOP) when indicated. Ocular conditions identified were verified on
 121 subsample at the regional hospital where referrals were sent for treatment with consultant
 122 Ophthalmologist. All the team members also had previously been involved in community eye
 123 screening and so were conversant with their roles. Each questionnaire and eye examination
 124 took about 45 minutes to complete. All elderly persons that met the age criteria for the study
 125 had an equal chance of participating in the research. National Health Insurance (NHIS) and
 126 voter identification cards were used to verify participants' ages.
 127 The research was done according to the Helsinki Declaration on Research regarding Human
 128 Subjects. This study was reviewed and approved by the Department of population and
 129 Health, University of Cape Coast on behalf of the Institutional Review Board of University of
 130 Cape Coast (UCCIRB). Participants were made to sign informed consent forms attached to
 131 the questionnaires after the processes had been explained to them. Confidentiality was
 132 assured at all times.

133 2.1 Data analysis

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 Package 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 in
 149 the better eye and/or identified ocular pathology/disease after examination.

150 3. RESULTS AND DISCUSSION

151 A total of 170 elderly persons who were interviewed, 41.8% were males and 58.2% were
 152 females (Table 1). The distribution shows that half of the respondents were aged between
 153 60-69 years (young old), and those aged 80+ (oldest old) accounted for 17.1%. The mean
 154 age of the respondents was 70 years (SD = +/-8.7, Range = 60 - 101).
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158 **Table 1: Respondents by age and by sex in percentages**

Age range	Sex		Total
	Male	Female	
60-69	54.9	47.5	50.6
70-79	26.7	36.3	31.8
80+	18.3	16.1	17.6
Total	100	100	100
Total number	71	99	170

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160 The data (Table 2) showed that respondents who had had primary education were 58.3% for
161 both sexes (78.8% among females and 31% among males) and 31.7% had had middle or
162 secondary education. Over half of males, (66.2%) had had more than primary education
163 compared to only 20.2% females. Only 8.2% had had post-secondary education.
164 Using their PVA twenty five (14.7%) exhibited unilateral visual impairment, 113 (66.5%)
165 bilateral impairment, 39 (22.9%) unilateral blindness, and 15 (8.8%) had bilateral blindness.
166 Visual acuity in the better eye indicated in, 58.7% had visual impairment and 5.9% were
167 found to be blind. Respondents were asked to grade their perception about well they can
168 see and this is matched to the PVA in Table 3 to show discrepancies in respondents self
169 perception of the vision and measured vision. Overall, only 6.5% said the eye sight was
170 excellent, whilst a third of them (34.1%) said the health was fair and about the same number
171 (32.3%) graded the vision as worse poor or worse.
172
173 Of the 340 eyes of the 170 participants examined, 400 conditions were observed (Table 4).
174 Cataract was the most occurring condition, affecting 117 (29.2%) eyes, followed by
175 uncorrected refractive error in 75 (18.8%), pterygium/pinguiculi 55 (13.8%), presbyopia 40
176 (10.0 %), and retinal disorders in 23(5.8%) eyes. Among 137 (80.5%) individuals who were
177 identified as either having an impairment or condition that required seeing an eye care
178 provider, 76.9% affirmed that they had an eye problem before ophthalmic examination whilst
179 only 4.2% perceived that they did not have any condition or the condition was minor or
180 normal to warrant seeing an eye care provider. There was no statistically significant
181 difference between respondents with perceived they had eye problems and those identified
182 as requiring treatment after eye examination (p, 0.127) (Table 5).
183
184 Among them, (61) 35.8% had never had an eye examination in their lifetime. Within the
185 previous five years however, as many of them (51.2%) have visited an eye care professional
186 compared to those who had not (48.8%). By proportion, more males than females,
187 increasing age and increase in level of education was associated use of eye care service.
188 The characteristics of eye care utilization in the 5-year period are shown in Table 6. Self-
189 perceived eye problem, sex and education showed statistical significance at an alpha level
190 of 0.05
191 Among those who had ever had their eyes checked, 36.7% visited eye clinics when they had
192 a problem with their eyes and 27.5% visited a general hospital or health centre to consult
193 general physician or general health for eye care services.
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197 **Table 2: Respondents by highest level of education and sex 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/Vocational	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

*Age group

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Table 3: 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

* Percentages are in parenthesis

207 The rest resorted to self-medication, herbalist treatment (traditional healer) or pharmacy or chemical shops to treat their
 208 eye problems. Others depended on 'friends' or 'family relations' advice (Figure 1). One person who was reportedly aged
 209 101 had never had an eye examination, indicating the lack of regular eye check up among the study population.
 210 The study also sought to find out the reasons or barriers to the up-take of regular eye care services among the
 211 respondents. Table 7 shows first and second reasons for not seeking eye care service when they had eye problems. The
 212 most reported obstacle to the uptake eye care services was lack of money (35.4%), followed by those who 'did not think it
 213 was important' (22%), 'advised by others to do something else' (13.4%) and time constraints (12.2%).

214 **Table 4: Prevalence of Ocular conditions in 340 eyes of the 170 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

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Table 5: Difference between self evaluation and identified eye problems that needed treatment

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

$X^2 = 2.328$; $df = 1$; $p\text{-value} = 0.127$

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

The study also sought to find out how the lack of utilization to eye care services due to the varied reasons, in the face of manifest or perceived eye problems and visual impairment affected the general disposition and patients satisfaction with eye care services and programmes available to them in the community. Overall, Sixty three percent indicated that they had spent some time worrying about their eye sight. Twenty seven percent spent 'little' or 'no time' worrying about the eye sight, 12.4% spent 'all the time' worrying' about their eyes, while about 30.0% of them either spent 'sometimes' or 'most of the time' worrying about the eye sight.

Respondents, who had ever had an examination during their lifetime, were asked to grade the impression of eye care services available to the elderly in the community. About 12.4% of those who were 'very satisfied' with care that they had received and twice that number were 'satisfied'. Another 11.8% were dissatisfied and 10.0% were neither satisfied nor dissatisfied.

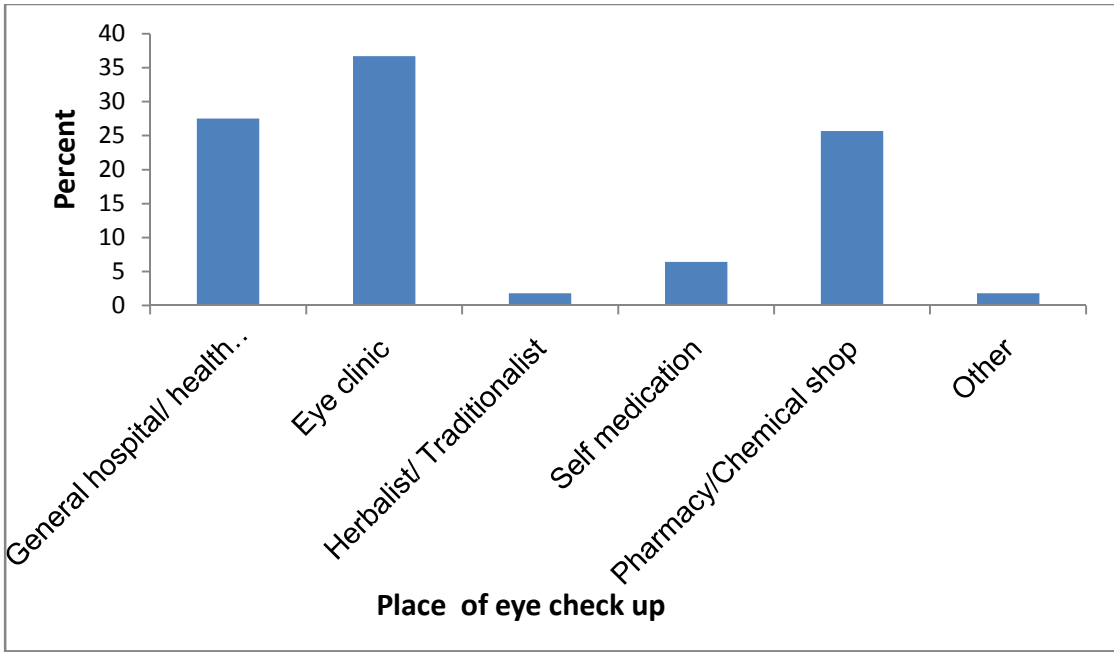


Figure 1: Places where respondents sought eye care service

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Table 6: Characteristics of those who sought eye care compared to those did not seek eye care

Demographic characteristics	Eye care utilization			Chi-square(p-value)
	Sought care (N= 87)	Did not seek care (N= 83)	Total (N= 170)	
Sex*				
Male	37 (42.5)	34 (41.0)	71 (42.0)	4.721 (0.013)
Female	50 (57.5)	49 (59.0)	99 (58.0)	
Age group				
60-69	43 (49.4)	43 (52.4)	86 (50.6)	1.405 (0.317)
70-79	27(31.0)	27(31.7)	54 (31.8)	
80+	17(19.5)	13(15.9)	30 (17.6)	
Educational level*				
No formal education	1(1.1)	2(2.4)	3(1.8)	3.441 (0.021)
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 *				
Yes	81(93.1)	77(92.8)	158(92.9)	5.309 (0.012)
No	6(6.9)	6(7.2)	12(7.1)	
Presence of VI				
Yes	57(65.5)	58(69.9)	115(67.6)	1.528 (0.376)
No	30(34.5)	25(30.1)	55(32.4)	

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Table 7: 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

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DISCUSSION AND CONCLUSIONS

The study examined the need for, reported use of care services, eye care seeking behavior and barriers to the uptake of eye care services among an elderly population in a peri-urban community in Ghana for a 5-year period.

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

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

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

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

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

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

The study encountered some challenges in the field that must be acknowledged. Firstly, because the clinical examination was conducted on site, some heavy equipment needed for certain clinical or investigative procedures could not be conveyed to the site. As result, some diagnosis could not be confirmed on site and could affect the findings. secondly, despite employing more than the minimum required sample size, the prevalence of eye problems may be over or underestimated assuming that respondents were more or less likely to suffer from ocular disorders that those who did not take part. In spite of these, data from this study will provide valuable insight into the extent of eye care utilization among the aging population in the Ghana, as the study area bears demographic characteristics and features similar to other peri-urban communities in Ghana and other developing countries. Utilization was also self-reported and not verified by crosschecking from the places respondents claimed to have the visited. The study also covered 5-year retrospective periods and may be subject to recall errors by respondents. However, results of this study are very informative and indicate that a considerable proportion of the studied population had never utilized eye care services, even among those who had eye problems. Efforts have to be made to better comprehend the barriers to up-take of eye care services and educate the elderly about their eye health to increase the utilization of the available eye care services among the elderly population in Ghana.

CONSENT

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

ETHICAL APPROVAL

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

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COMPETING INTERESTS

Author(s) disclose no potential conflicts of interest.

AUTHORS' CONTRIBUTIONS

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

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