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Low Vision Practice and Service Provision Among Optometrists in Ghana: A Nationwide Survey

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ABSTRACT

Purpose: To characterize practice patterns of low vision services among Optometrists in Ghana.

Methods: The nationwide cross-sectional survey identified entities through the Ghana Optometrists Association (GOA) registry and utilized a semi-structured questionnaire to consolidate survey information that comprises practitioners' demographics, available services, diagnostic equipment, barriers to service provision and utilization, and interventions.

Results: 300 Optometrists were identified, with 213 surveyed (71% response rate). About fifty percent (52.6%) were in private practice, and more than two-thirds (77%) did not provide low vision services. Most ($\geq 70\%$) reported lack of assistive devices, and basic eye care examination kits as the main barriers to low vision service provision. Similarly, practitioners reported unawareness of the presence of low vision centres (76.1%), and high cost of low vision aids (75.1%) as the prime perceived barriers for patients to utilize low vision services. Continuous professional development and public education (89–90%) were suggested as interventions to improve the uptake of low vision services. After statistical adjustment, private facility type (Adjusted odds ratio [AOR] = 0.35, $p = 0.010$) and lack of basic eye examination kits (AOR = 0.32, $p = 0.002$) were significantly associated with reduced odds of low vision service provision. Conversely, ≥ 15 years of work experience (AOR = 6.37, $p = 0.011$) was significantly associated with increased odds of low vision service provision.

Conclusions: Overall, the results indicate inadequate low vision coverage and service delivery. Government policies must be directed towards equipping practitioners with equipment and subsidize patient cost of treatment to optimize low vision care.

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Introduction

The increasing burden of eye diseases of refractive and non-communicable origin in Ghana poses a remarkable national health concern owing to the adverse sequelae on the quality of life and productivity of afflicted patients.^{1,2} Such vision deterioration often results in residual and/or low vision; defined by the World Health Organisation as visual acuity worse than 6/18 to light perception with optimum treatment or a visual field under 10 degrees from the fixation point. Unlike patients with optimal vision, visually impaired and/or low vision patients experience aberrant visual-motor coordination, that eventually result in difficulty in performing everyday activities, mobility and/or transportation challenges, and increased physical dependency.^{3,4} Furthermore, several studies have shown a strong

association between visual impairment and falls. Particularly, older patients with low vision are more prone to falls as opposed to their age-matched colleagues with healthy vision.^{5–7} These patients are at risk of a broad spectrum of psychological distress ranging from depression and anxiety that could potentially accentuate into suicide or death.⁸

Low vision and/or visual impairment remains a public health burden with a greater unmet visual need among patients in low resource settings as compared to high income regions. These trends are in part due to decreased doctor-to-patient distribution, inadequate eyecare facilities and medical resources for care givers, as well as the relatively high subsidies on medical treatments.^{9–11} The prevalence of vision impairment and blindness in Ghana is presently on the rise, yet there remains inadequate low vision treatment and

rehabilitation services to address such challenges.¹² Despite the markedly increased motivation of optometry students towards clinical practice, these trained eye care professionals are usually limited by the essential tools to provide adequate primary eye care services including low vision care.^{11,13,14} Although patients with sub-optimal vision usually resort to low vision care, the majority face challenges to access care.¹¹ Previous work by Kyeremeh and Mashige¹¹ provides baseline evidence on the scope of low vision services in Ghana. However, this data is hampered by its under-representation, given its exclusive enrolment of optometrists from only two of the hitherto ten; currently sixteen administrative regions of Ghana.

To extend the prevailing evidence, this nationally representative survey comprehensively describes the scope of practice and coverage of low vision services rendered by primary eye care providers in Ghana. Specifically, the study characterizes the practice patterns of low vision services among optometrists in Ghana. Overall, the study revealed a poor low vision service provision, and this was influenced by institutional factors. The results provide substantive evidence for resource allocation, formulation, and implementation of strategic policies to improve low vision coverage.

Materials and methods

The study was approved by the Committee on Human Research, Publication and Ethics of the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana (CHRPE/AP/286/22) after formal permission was obtained from the leadership of the Ghana Optometric Association. Participants informed consent was obtained, and all protocols were consistent with the tenets of the Declaration of Helsinki. The nationwide cross-sectional survey, conducted between January 2022 and September 2022, assessed the practice patterns of low vision services among optometrists in Ghana. As a lower-and-middle income country (a country with a total economic value between \$1006 and \$3955), Ghana has an estimated population of thirty-two million distributed across sixteen administrative regions.^{15,16} The survey population constituted all optometrists registered under the Ghana Optometry Association (GOA), a nationally recognized professional body that oversees the practice and advancement of optometry in Ghana and integrates the activities of optometrists with the Allied Health Professions Council of Ghana (AHPC).

The structured questionnaire used for this survey was adapted from Kyeremeh and Mashige¹¹ and constituted both open and closed-ended questions which were either in electronic or hard copy versions. As

appropriate, the questionnaire was administered to all participants either face-to-face or electronically via google forms.¹⁷ The data collection form had questions aimed at identifying optometrists' demographics, mode and scope of practice, standards of diagnosis, tests and procedures, treatment/management options, barriers, and a comments section for collating their suggested interventions to improve the delivery and uptake of low vision services. The outcome for this study was defined as "low vision service provision" and responses were categorized as dichotomous (yes or no) in response to the query "Do you currently offer any form of low vision services in your facility?"

Statistical analysis

Statistical analyses were performed with Statistical Product and Service Solution (IBM Corporation IBM® SPSS® Statistics for Windows, Version 25.0 Armonk, NY) compatible with Windows 10. Descriptive statistics (frequencies and percentages) were used to summarize the characteristics of low vision services (demographics, services provided, equipment available, barriers and interventions). Associations between predictor and outcome variables were explored using bivariate logistic regression, and all variables significant at $p < 0.05$ were selected for inclusion into the multivariate logistic regression model. Statistical significance was set at a $p \leq 0.05$ and at a 95% confidence interval.

Results

Out of the 300 eligible optometrists, 213 completed the survey (response rate: 71.0%). Most were males (63.0%), aged 30–39 years (53.1%), worked in private facility (52.6%) and with 1–4 years' work experience (43.6%). The predominant barriers for not providing low vision services were the lack of low vision assistive devices (77.5%) and lack of basic examination kit (71.4%). Suggested interventions to optimize low vision care were continuous professional development (90.1%), specialized training on low vision care (90.1%), public education on low vision and low vision services (89.7%), making low vision assistive devices affordable (88.7%) and provision of low vision equipment for assessment (87.3%) as shown in Table 1.

Low vision services

The majority of Optometrists (79.8%) had patients that sought for low-vision care. However, only 23.0% provided low vision care which was limited to dispensing,

Table 1. Description of the sample.

Variable	N	%
<i>Demographic characteristics</i>		
Sex†		
Male	133	63.0
Female	78	37.0
Age in yearst		
20–29	71	33.6
30–39	112	53.1
40–49	24	11.4
50–59	4	1.9
Facility type		
Public	62	29.1
Private	112	52.6
NGO	5	2.3
CHAG	34	16
Work experience in years†		
1–4	92	43.6
5–9	43	20.4
10–14	65	30.8
≥15	9	5.2
<i>Barriers of low vision service delivery</i>		
Lack of personnel		
Yes	71	33.3
No	142	66.7
Low profit from low vision care		
Yes	55	25.8
No	158	74.2
Lack of basic eye examination kits		
Yes	152	71.4
No	61	28.6
Lack of referral centres		
Yes	85	39.9
No	128	60.1
Lack of low vision assistive devices		
Yes	165	77.5
No	48	22.5
Labour Intensive		
Yes	67	31.5
No	146	68.5
<i>Interventions to low vision service delivery</i>		
Continuous professional development training		
Yes	192	90.1
No	21	9.9
Specialized training on low vision care		
Yes	192	90.1
No	21	9.9
Public education on low vision and low vision service delivery		
Yes	191	89.7
No	22	10.3
Making low vision assistive devices affordable		
Yes	189	88.7
No	24	11.3
Provision of low vision equipment for assessment		
Yes	186	87.3
No	27	12.7

†N ≠ 213 for all variables as some participants failed to respond to all items on the questionnaire; %, percentage frequency.

training on use of assistive devices, and low vision rehabilitation (Table 2).

Low vision equipment and accessories

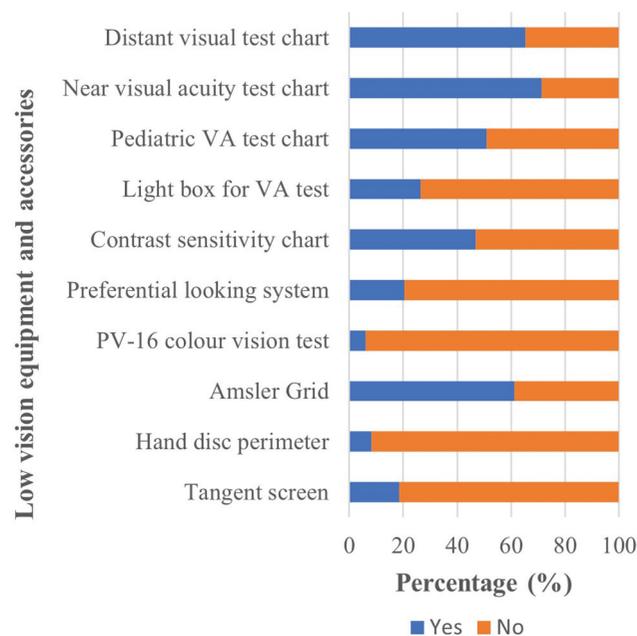
The majority of optometrists (30–94%) lacked low vision equipment and accessories for vision examination (see Figure 1). Most lacked precision vision (PV)-16 colour vision test (93.9%), hand disc perimeter

Table 2. Low vision services.

Variable	n = 49	%
Distance visual acuity		
Yes	39	79.6
No	10	20.4
Near visual acuity		
Yes	42	85.7
No	7	14.3
Distance refraction		
Yes	38	77.6
No	11	22.4
Near refraction		
Yes	36	73.5
No	13	26.5
Binocular vision		
Yes	16	32.7
No	33	67.3
Colour vision		
Yes	21	42.9
No	28	57.1
Visual field testing		
Yes	30	61.2
No	19	38.8
Verification of distance prescription		
Yes	35	71.4
No	14	28.6
Verification of near prescription		
Yes	34	69.4
No	15	30.6
Training in use of assistive devices		
Yes	20	40.8
No	29	59.2
Dispensing of low vision assistive devices		
Yes	19	38.8
No	30	61.2
Counselling/Vision Rehabilitation		
Yes	27	55.1
No	22	44.9

n, number of optometrists that provided low vision care; %, percentage frequency.

(91.8%), tangent screen (81.6%), preferential looking

**Figure 1.** Low vision equipment and accessories.

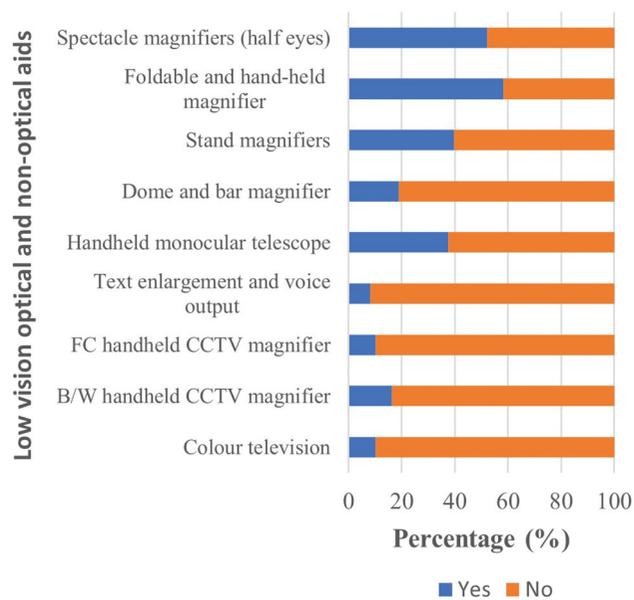


Figure 2. Low vision optical and non-optical aids.

system (79.6%) and light box for VA test (73.5%). Low vision optical and/or non-optical aids were limited in most optometric practices (see Figure 2).

Barriers to utilisation of low vision services

The perceived barriers that prevent patients from utilizing low vision services included: unawareness of the presence of low vision centres (76.1%), high cost of low vision services (75.1%), socially unacceptable assistive devices (43.2%), and patients not seeing the need (35.2%).

Factors associated with low vision services among Optometrist in Ghana

The bivariate logistic regression analysis showed that private facility type (compared with public facility type: odds ratios [OR] = 0.37, $p = 0.007$), ≥ 15 years'

Table 3. Bivariate and multiple regression of factors associated with low vision service.

Variable	Bivariate regression			Multivariate regression		
	COR	95%CI	p-value	AOR	95%CI	p-value
Sex						
Male	ref					
Female	0.82	0.41–1.61	0.553			
Age years						
20–29	ref					
30–39	1.49	0.70–3.18	0.307			
40–49	2.46	0.86–7.04	0.094			
50–59	4.92	0.63–38.42	0.129			
Facility type						
Public	ref			ref		
Private	0.37	0.18–0.76	0.007	0.35	0.15–0.77	0.010
Non-governmental organization	1.21	0.19–7.8	0.840	0.65	0.06–7.23	0.726
CHAG	0.39	0.14–1.09	0.071	0.40	0.13–1.19	0.101
Working experience in years						
1–4	ref			Ref		
5–9	0.86	0.33–2.25	0.756	1.13	0.41–3.10	0.808
10–14	1.56	0.73–3.35	0.252	1.17	0.51–2.68	0.712
≥ 15	7.72	2.03–29.38	0.011	6.37	1.51–26.71	0.011
Barriers to low vision care						
Lack of personnel	0.75	0.37–1.51	0.421			
Lack of profit from low vision service	0.91	0.44–1.91	0.808			
Lack of basic eye examination kits	0.34	0.18–0.67	0.002	0.31	0.15–0.65	0.002
Lack of referral centers	0.94	0.49–1.81	0.854			
Lack of low vision assistive device	0.13	0.28–1.17	0.130			
Labor intensive	1.53	0.79–2.98	0.210			
Interventions to improve low vision care						
Continuous professional development training	3.08	0.69–13.71	0.140			
Specialized training on low vision	3.08	0.69–13.71	0.140			
Public education on low vision & service delivery	1.39	0.45–4.31	0.572			
Making low vision assistive devices affordable	3.64	0.83–16.07	0.088			
Provision of low vision equipment for assessment	2.63	0.76–9.13	0.128			

CHAG Christian Health Association of Ghana; OR, Odds Ratio; CI, confidence interval, Bivariate logistic regression of $p \leq 0.05$ considered for inclusion in the multivariate model; statistical significance set at $p \leq 0.05$.

work experience (compared with 1–4 years' work experience: OR = 7.72, $p = 0.011$), and lack of basic eye examination kits (OR = 0.34, $p = 0.002$) were significantly associated with low vision services. In the multiple logistic regression analysis, private facility type (AOR = 0.35, $p = 0.010$ compared with public facility type) and lack of basic eye examination kits (AOR = 0.31, $p = 0.002$) were significantly associated with reduced odds of low vision services. Conversely having ≥ 15 years of work experience (compared with 1–4 years' of work experience: AOR = 6.37, $p = 0.011$) was significantly associated with increased odds of low vision services (Table 3).

Discussion

The survey reports on the practice patterns of low vision services among optometrists in Ghana and provide evidence on the practice setting, clientele services, equipment, vision aids, barriers and interventions to low vision services in Ghana. After statistical adjustment, private facility type, and lack of basic eye examination kits were significantly associated with reduced likelihood of low vision service provision whereas 15–19 years of work experience were significantly associated with increased likelihood of low vision service provision.

Optimal vision remains essential for performing activities of daily living such as mobility, recognizing currency, and reading inscriptions on medicines. Whereas efficient vision results in proficient productivity, uncorrected vision impairment culminate in physical dependency. Unlike elderly, childhood vision loss is worrying owing to the long years lived with disability and consequences on their career aspiration.^{18,19} Residual and/or low vision presents a myriad of psychological consequences, notably shock, anxiety, denial, depression, withdrawal, and emotional acceptance. Consequentially, such visual handicap extends to negatively impact social interactions and further places an economic burden on self and family due to the cost of treatment and securing optical aids. The availability of accessible and proficient low vision treatment and rehabilitation support systems remains paramount and underscores optimizing residual vision to improve patient's overall quality of life.^{20,21} In addition, establishing appropriate referral pathways could improve referral for low vision treatment and rehabilitation services during the end stage of ocular lesions and putatively mitigate functional impairments and the associated mental distress.^{4,22,23} However, the scope of practice of such services in

Ghana is poorly understood. Therefore, the present study describes the practice patterns of low vision service delivery in Ghana.

About half (52%) of the respondents were into private optometric practice. Specialised eye care services are commonly provided by private eyecare facilities in Ghana.^{10,13,24} For instance, previous work on the practice patterns of amblyopia by Acheampong et al. identified that slightly less than half of optometrists that managed amblyopia were in private practice.¹³ Similarly, a report by Mensah-Debrah and colleagues revealed that private facilities constitute fifty percent of the centres offering diabetic retinopathy treatment services.¹⁰ Contrary to public facilities, private practices are well-resourced with advanced ophthalmic arsenal for treatment/management and highly trained personnel for specialized care services.^{25,26} However, the observed decreased likelihood of private facilities to provide low vision care might be attributed to the limited coverage of the National Health Insurance Scheme and the relatively high cost treatment of private specialized treatment services that could limit access to care.²⁷

More than two-thirds (77%) of practitioners did not provide low vision care service for clientele that sought for care. The results are comparable to a previous study by Akuffo et al. where only 23.8% of optometrists provided low vision care.²⁴ Although the access to basic ophthalmic care such as clinical examination and management, refraction, and optical dispensing were markedly higher than the present study, the findings here are not surprising as most existing clinical infrastructure are not adapted for specialized care including low vision.²⁴ Furthermore, the limited low vision rehabilitation and counselling services remains a challenge, as uncorrected visual impairment could culminate in psychological distress.²⁸

Providing adequate low vision care remains paramount to preventing further functional impairment of visual function. However, the reported lack of basic eye examination kits among Optometrists was observed to be associated with decreased likelihood of provision of low vision care. The findings are consistent with an earlier work by Kyeremeh and Mashige, where most optometrists lacked equipment for low vision services.¹¹ Given the equipment constraints, most underlying pathologies causing residual vision could aggravate into complete blindness.^{29,30}

In this study, we found having 15 years and over of work experience was significantly associated with increased likelihood of provision of low vision services. The findings underscore the crucial role of experience practitioners in compensating for the equipment gap through their systematic approach to treatments.

The study found the availability of optical aids for patients with residual vision to be low, which is disturbing. Despite substantial vision deterioration and functional impairment in low-vision patients, providing visual and non-optical assistive devices to optimize residual vision could reconcile and improve the quality of life of these patients.³¹

Optometrists indicated a lack of awareness of low vision centres and the high purchasing cost of low vision assistive devices as the patient barriers to utilisation of low vision service. Our findings are consistent with previous reports.^{32–34} In mitigating these barriers, public education campaigns on low vision care and low vision centres, as well as increasing affordability of low vision aids, were suggestive interventions to improve the uptake of low vision services in this population.

Strengths and limitation

Although the current work presents comprehensive evidence on the practice patterns of low vision services in Ghana, it is subjected to some few limitations. The report on the available resources for low vision treatment may be underestimated due to recall bias. Similarly, given the design of the study, intricate patterns on the service provisions could not be explored in depth, and we recommend future studies to qualitatively explore the barriers to low vision service provision using in-depth interviews. Although our study had a high response rate, we acknowledge the non-response bias and our inability to account for non-respondents' characteristics. However, the comprehensive nature of the data collection elicited essential parameters on the present scope and practice of low vision care services in Ghana.

Conclusion

There is an unmet eye care need for patients with low vision in Ghana. The equipment to provide both basic and comprehensive low vision assessment is lacking leaving a considerable number of low vision clientele underserved. Given the prevailing evidence, we implore government, policy makers, corporate stakeholders of health to implement pragmatic strategies to equip optometrists with the requisite armamentarium for low vision care as well as subsidizing the cost of low vision assistive devices. Furthermore, the findings suggest the initialisation of health education and health promotion to improve low vision awareness. Future research programs should explore low vision rehabilitation and

referral pathways and their potential enablers and barriers.

Disclosure statement

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Data availability statement

The datasets used and analysed during the current study are available from the corresponding authors upon reasonable request.

Ethics approval

The study was conducted according to the Tenets of the Declaration of Helsinki and ethical approval was obtained from the Committee on Human Research, Publication and Ethics, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana (CHRPE/AP/286/22). Approval was also obtained from the president of the Ghana Optometric Association.

Patient and public involvement

Patients and/or the public were not involved in the design, conduct, reporting, or dissemination plans of this research.

Patient consent

All participants agreed and gave their consent to partake in the study after the aims and potential benefits and risks were well spelt out.

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