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Research Article

Spectacle Lens Utilisation for Correction of Refractive Errors and its Barriers among Patients Attending Eye Clinics in Tertiary Hospitals in Bauchi State, Nigeria

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Abstract

Background: Spectacle lens remains the most cost-effective, non-invasive and widely acceptable means of correcting refractive errors. This study is aimed at assessing the level of spectacle utilisation and its barriers among patients undergoing refraction in tertiary hospitals in Bauchi State.

Methods: Descriptive survey research design was employed in the study. The respondents consisted of three hundred and eighty-four (384) male and female patients, aged18 to 80 years, undergoing refraction at Eye Units of Abubakar Tafawa Balewa University Teaching Hospital, Bauchi and Specialist Hospital, Bauchi; who were conveniently and purposefully sampled. Their mean age was 46.0 ± 15.4 years and 52.1% were males. Respondents' demographics, level of spectacle utilisation and its barriers were collected using questionnaires developed through the literature review. Pearson chi-square test was used to investigate associations between outcome variables and p-value <0.05 was considered statistically significant at 95% confidence level.

Results: There were high spectacle utilisation especially in the areas of reading (73.0%), and vision improvement (73.0%) among the respondents. There were association between patients' educational level and spectacle utilisation in the areas of vision improvement ($X2 = 46.66$, p-value = 0.0000); and reading ($X2 = 20.03$, p-value = 0.0000). High cost (p = 0.0359) was the most significant barrier.

Conclusion: Educational qualification enhances spectacle utilisation, and high cost poses significant barrier. The study recommended the provision of affordable spectacles and counselling of patients on its benefits to enhance utilisation.

Keywords: Refractive Errors; Utilisation; Spectacle Lenses; Barriers; Avoidable Blindness

Introduction

Good vision is essential for full participation in educational and economic activities, as well as personal wellbeing, self-sufficiency and productivity. People cannot realise their potentials without clear and functional vision. These tasks are the sole responsibility of the eye. Its importance is highlighted by the sheer range of measures taken in many societies to enable those with permanent sight loss to navigate their surroundings and tackle everyday tasks independently [1]. Any disorder affecting its integrity, that is, its anatomy, health, and or physiology results in ocular anomalies. These anomalies may manifest as refractive errors, cataract, glaucoma, diabetic retinopathy, strabismus, and many others. Hence the significance of good eye heath cannot be over emphasised. Despite this notable importance of the eye, many people still don't take appropriate care of their eye health; and this is why avoidable causes of blindness are not attended to by majority of people until complications set in [2]. This may be attributable to individuals' perception variance to eye defects and utilisation of its corrective measures. Knowledge of common eye disorders plays vital roles in encouraging people to seek for remedy to them, as well as the utilisation of the prescribed solutions particularly spectacle lens for refractive errors' correction [3]. These refractive errors include hyperopia, myopia, astigmatism, and presbyopia (old-age-sight). These ocular defects cause reduction in individual's visual performance and have several global social and economic implications especially in low and middle income countries if uncorrected [4,5].

They adversely affect the quality of life, educational status and career opportunities as well as social interaction of the victim. The associated symptoms include blurred vision, intermittent double vision, tearing, photophobia (extreme sensitivity to light), eyestrain, itching, and headache [6].

Refractive errors occur when the eyes' optical systems fail to focus light from infinity effectively on the retina for clear vision, with accommodation relaxed, thereby resulting in blurred vision. Uncorrected refractive errors constitute a public health problem due to its prevalence nature. The World Health Organization (WHO) reported that uncorrected refractive errors are one of the leading causes of global vision impairments of which estimated 80% were avoidable [3,7-9]. Avoidable visual impairment or blindness is seen as impairment or blindness that could be treated or managed by known, cost-effective means. Global estimate by WHO, indicated that more than 2.3 billion people suffer from poor vision due to refractive errors; of which 670 million are considered visually impaired because they do not have access to corrective treatment (spectacle lens), and that more than 90.0% of them live in rural and developing nations [5,10,11]. However, only an approximate 1.8 billion world-wide have access to eye test and effective treatment [12]. Furthermore, the study group of the National Blindness and Visual Impairment Survey in Nigeria (2005-2007) found that refractive errors were responsible for 1.4% of avoidable blindness in persons 40 years and above in Nigeria, at the time of the survey [13,14]. Without significant investment in preventative actions, those numbers with avoidable visual impairments are likely to increase, particularly in low and middle-income countries [1].

The exact causes of refractive errors are unknown. Common risk factors include; heredity, nutrition, environment, anterior-posterior length of the eye ball, and shape of the eyes' cornea [7,15,16]. As a physiological phenomenon, refractive errors can also be affected by age, and disease. It cannot be prevented; and overuse of the eyes does not cause or exacerbate refractive errors [12,15]. It has no gender barrier, and affects people of all ages, professionals, socio-economic levels, and ethnic groups [15]. It can easily be diagnosed, measured and "corrected" with spectacle lenses or other means of refractive errors corrections such as contact lenses, low vision devices and photorefractive surgery [15,17]. The choice of correction varies depending upon factors such as cost, profession, socio-economic status and hobbies of an individual [8]. Long-standing uncorrected refractive errors can lead to amblyopia (lazy eye), strabismus (half past 4 o'clock eye), and diplopia [18]. These complications negatively affect the educational, psychological and social well-being of an individual [19,20]. Despite the integration of refractive errors into the national plans for the prevention of avoidable blindness; "VISION 2020 – The Right to Sight", an initiative of WHO and the International Agency for the Prevention of Blindness (IAPB) in 1999, with the mandate of improving the accessibility to cheap spectacle lenses for alleviating refractive errors, the prevalence of uncorrected refractive errors remains high due to ignorance, low demand for spectacles when needed, lack of knowledge of a possible solution (spectacle lens) for their reduced vision, beliefs system and misconception that using spectacles will worsen vision or reduce the power of the eyes [13,21-24]. It could also be related to dearth of qualified eye care professionals to provide effective information and treatment; high cost and financial constraints to afford the corrective devices they required, and attitude of eye care professionals towards patients [13,23]. Others barriers include, breakage, insignificant magnitude of refractive errors, parental disapproval, being teased, and dislike of the shape of the spectacle [5,20]. This study tends to elicit the level of spectacle lens utilisation for refractive errors correction, influence of gender and education on spectacle lens utilisation, and barriers to spectacle lens use by patients assessing refractive eye care services at the selected eye clinics in tertiary hospitals in Bauchi State, Nigeria.

Spectacle lens is an optical instrument consisting of a pair of lenses incorporated into a frame, resting on the nose and held in place by sides extending towards and over the ears and positioned approximately 12 millimetres from the eyes [24]. Its use for correction of refractive errors dates back to the middle ages (5^{th}—15^{th} century) and has remained the most cost-effective, non-invasive and widely acceptable means of correcting refractive errors due to its high success rate in terms of visual acuity, and improved quality of life [23]. But the society is structured in such a way that individuals determine what should be accepted as treatment modalities for their eyes defects. This is why majority of people including the educated ones still don't accept the use of spectacles as a treatment option for common refractive errors [2]. Research had shown that without spectacle lenses, individuals with poor vision (refractive errors) are at major disadvantage both in school and social life because 80.0% of all learning occurs through vision [25,26]. And failure to address poor eye health mainly through spectacle lens utilisation can lead to economic burdens for all, as the Lancet Commission found, based on conservative assessments, that the prevalence figures for 2020 suggest an annual global productivity loss due to vision impairment of approximately US$ 411 billion in

purchasing power parity. The cost to tackle unaddressed refractive errors and cataracts alone is estimated at US$ 24.8 billion[1]. Spectacle lens can also be used as protective device, means to conceal eyes defects, fashion, and mark of dignity [24,27]. However, people who need spectacles are often stigmatised, causing them to shy away from wearing them, even when given free of charge, because they would be thought of as being blind or visually handicapped. An attitude like this could result in serious problems like psychosocial maladjustment, anxiety, depression, loneliness, lowered self-esteem and behavioural problems [6,11,23]. For others, wearing spectacles could diminish their chances of getting a spouse whereas some also perceive it to be for only the old folks, hence cosmetically unacceptable and embarrassing in public [18,22]. Contrary to the above perceptions, people wear spectacles because it improves their vision, appearance augments their confidence, makes them look innocent and humble; and cause an impression of intelligent among peers [5,22]. Besides, there seem to be a significant association between gender, educational level of patients and spectacle lens utilisation for refractive errors' correction which might enhance the degree of utilisation. Furthermore, understanding the psychological and social perception of patients regarding spectacle lens utilisation can help eye care professionals determine the best approach to addressing their challenges. It will also guide eye care specialists and decision-makers to better understand the needs of the society, which will help improve productivity as well as reduce the global and national economic cost in lost productivity due to uncorrected refractive errors. The exhibitions of redundancy in accepting spectacle lenses for vision enhancement by patients accessing refractive eye care services in the eye clinics of the selected tertiary hospitals in the state motivated the uptake of this study, so as to find out the true position. The evaluation of the study outcome will help Government, Non-Governmental Organisations (NGOs), Educators, and Researchers, to obtain a baseline evidence to forecast future coverage of health promotion activities that could facilitate knowledge of refractive errors, utilisation of spectacle lenses for its correction and elimination of the associated barriers.

Methodology

Research design and setting

Descriptive survey research design was employed in order to achieve the purpose of the study. The study was carried out in the Eye Clinics of Abubakar Tafawa Balewa University Teaching Hospital, (ATBUTH), Bauchi and Specialist Hospital Bauchi (SHB), between June, 1 and August, 31, 2023, to assess the level of patients' spectacle lens utilisation, and its barriers for remedy to eye problems. The two hospitals were among the tertiary hospitals in the State. Their eye clinics were chosen because they have well established and functional eye unit, up-to-date clinical equipment, greater man power and patients turn-out. They are located in the state capital and serve as referral centres for other primary and secondary health centres within the state.

Study population, sample size and sampling techniques

The study population consisted of 10,100 of the 27,260 adult patients, male and female aged 18 to 80 years old, accessing refractive eye care services at the eye units of the two tertiary hospitals, seen in 2022; according to the Records and Health Information Units of the Eye clinics of the two hospitals [28]. The sample size for the respondents was 384, calculated using William G. Cochran's formula (1977) for estimating sample size population proportion of a known population as follows:

$$N = Z^2 P \frac{(1-P)}{D^2}$$

Where:

P = estimated proportion of the outcome of the response assumed to be (50.0%) or 0.50 of the respondents' level of spectacle lens utilisation and its barriers for remedy to eye problem. (Since the proportion of the population with the characteristics was not known).

D = maximum acceptable sampling error (degree of precision) = (5.0%) or 0.05 in decimal notation:

Z = Normal deviation at the desired confidence interval. The value of the z-statistic at the 95% confidence interval level = 1.96.

N = minimum number of sample size (where target or total population > 10,000).

The (10.0%) non-respondents rate = 10/100 x 384 = 34 was not taken into consideration because the possibility of drop-outs and unforeseen circumstance were rare, as the respondents were accessed as they visit the clinics to access eye care until the require sample size was reached. They were sampled through a multistage sampling procedure involving convenient and purposive sampling techniques, because not all patients accessing eye care services had need for refractive test. One hundred and ninety-two (192) were sampled from each of the two tertiary hospitals (making a total of 384).

The criteria for inclusion in the study were male and female patients aged 18 years and above, accessing refractive eye care

service (test for glasses), as well as consent to participate in the study. A pretested, structured, self-administered questionnaire developed based on the literature review was employed in order to collect quantitative data from the respondents. It was sectionally divided into (A, B, and C), that gathered information on respondents' demographics, level of spectacle lens utilisation and barriers to spectacle lens utilisation respectively.

Validity and reliability of the instrument

The validity of the instrument was established by three research experts; whose observations and corrections were used for the final draft of the instrument.

The reliability of the instrument was determined using test re-test method. The instrument was administered twice on fifty hospital workers from Federal Medical Centre, Azare, Bauchi State, who had the similar characteristics with the study population. This was done within the interval of two weeks. The workers were not part of sample for the study. The scores obtained from the sampled workers on two separate administrations were subjected to Pearson's Product Moment Correlation coefficient, which yielded coefficient of 0.78 (r = 0.78). However, Cronbach's alpha statistics was further used to ascertain the internal consistency of the instrument which yielded a coefficient value of 0.832. Both coefficient values were high enough and were considered reliable for used in the study.

Method of data collection

Research and Ethical Clearance was obtained from the Research and Ethics Committees, of the Bauchi State Ministry of Health, and ATBUTH, Bauchi, respectively, which was then submitted to the Heads of Ophthalmology Departments, SHB and ATBUTH, Bauchi, respectively before the study commenced. Three hundred and eighty-four (384) copies of the questionnaire were administered by the researcher and three assistants who were workers in the selected hospitals. The research assistants were briefed on the modalities on how to administer the instrument. The questionnaires were taken back the same day they were given as soon as the respondents were done answering them. The process continued until the required sample size was reached.

Method of data analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 23. The results were calculated in frequencies and percentages. Tables were used to present the results for easy appraisal. Descriptive statistics was used to compute the level of spectacle lens utilisation and its barriers for remedy to eye problems. Pearson chi-square (X^2) test was used to assess the significant associations between the outcome variables and $P < 0.05$ was considered statistically significant at 95% confidence level.

Ethical consideration

In order to gain access to the respondents, permission was obtained from the Ethics and Research Committee of the Bauchi State Ministry of Health, and ATBUTH, Bauchi, respectively. Informed consent was obtained from all respondents before the study and the aims of the study were explained to them. Confidentiality and anonymity was ensured with records and the information collected from the respondents and they were used solely for the purpose of the study. The study was also performed in accordance with the tenets of the Declaration of Helsinki, 2013.

Results

Socio-demographic Characteristics

Three hundred and eighty-four (384) patients responded to the study. There were 200(52.1%) males and 184(47.9%) females, with age ranging from 18-80years (mean age: 46.0 ± 15.4). The respondents age, gender and educational level distributions were as presented in (Table 1). The males and females mean ages were 44.9± 15.0 and 47.2 ± 16.0 respectively. There was almost an equal distribution of the respondents' gender. However, the slightly difference in male to female ratio (1.1:1.0) as noted in the study might be accidental as a result of the convenient sampling of the respondents. The age range of 39-59years (44.0%) had the highest number of respondents followed by 18-38years (35.2%), while 60-80years (20.8%) had the least. However, majority of the respondents (79.2%) from both sexes were within the 18-38years (35.2%) and 39-59years (44.0%) age brackets, thereby substantiating the average age established.

Furthermore, sixty (15.6%) of the respondents had primary educational qualification while 150(39.1%), 140(36.5%) and 34(8.9%) had secondary, tertiary and non-formal educational qualifications respectively. In addition, greater proportions of the respondents (75.6%) from both sexes were secondary (39.1%) and tertiary (36.5%) educational qualification holders respectively. This indicated that the respondents were enlightened and the selected tertiary hospitals likely to be situated within the radius of an educational environment.

Age (years)	Male f (%)	Female f (%)	Total f (%)
18-38	74 (19.3)	61 (15.9)	135 (35.2)
39-59	91 (23.7)	78 (20.3)	169 (44.0)
60-80	35 (9.1)	45 (11.7)	80 (20.8)
Total	200 (52.1)	184 (47.9)	384 (100.0)
Education level			
Primary	40 (10.4)	20 (5.2)	60 (15.6)
Secondary	70 (18.2)	80 (20.8)	150 (39.1)
Tertiary	60 (15.6)	80 (20.8)	140 (36.5)
Non- formal	30 (7.8)	4 (1.0)	34 (8.8)
Total	200 (52.1)	184 (47.9)	384 (100.0)

Table 1: Cross tabulation of age, gender and educational levels distribution of the respondents (n = 384).

Source: Researchers' questionnaire 2023.

Utilisation of spectacle lens for remedy to eye challenges by the respondents was high especially in the area of 'reading' (73.0%), 'vision improvement' (73.0%), 'sunshade' (91.2%) and 'fashion' (88.6%). However, there was moderate utilisation in the area of 'concealment of eye defect' (67.8%), and (64.6%) of the respondents had been prescribed glasses before, (54.7%) by a professional, and (59.4%) had been using the glasses (Table 2).

(table 3)

The study indicated that educational levels of the respondents had positive influence on spectacle lens utilisation for remedy to eye problems. All the educational levels agreed that they had been prescribed glasses before, moderate in primary (66.7%), secondary (69.3%), non-formal education (52.9%) and high in tertiary (80.7%), respectively. They also agreed altogether that the glasses were prescribed to them by a professional, primary (60.0%), secondary (73.3%), tertiary (80.7%) and non-formal educational level (55.8%) respectively. However, while other levels agreed to have been using the glasses, moderate in primary (58.3%), secondary (69.3%) and high in tertiary (83.6%); the non-formal educational level disagreed (52.9%). In addition, all the educational levels agreed to the use of spectacle lens for vision improvement; moderate in primary (68.0%), and high in secondary (80.0%) and tertiary (87.9%) except the non-formal educational level which

Statement:Which of the following questions applied to you?	Male f(%)	Female f(%)	Total f(%)	X^2	P-value
Vision improvement Agreed	120(31.3)	160(41.7)	73.0	35.84	0.0000
Reading Agreed	140(36.5)	140(36.5)	73.0	2.46	0.1170
Relief eye discomfort Agreed	60(15.6)	94(24.5)	40.0	18.36	0.0000
Conceal eye defect Agreed	120(31.3)	140(36.5)	67.8	11.96	0.0005
Fashion Agreed	180(46.9)	160(41.7)	88.6	1.52	0.2180
Sunshade Agreed	180(46.9)	170(44.3)	91.2	1.32	0.2510
Protection from work related injury Agreed	40(10.4)	44(11.5)	21.9	1.50	0.2210
Swimming Agreed	20(5.2)	10(2.6)	7.8	3.42	0.0644
I have been prescribed glasses before Agreed	120(31.3)	128(33.3)	64.6	4.46	0.0347
I have been using the glasses Agreed	124(32.3)	104(27.1)	59.4	1.84	0.1750
I have used spectacles prescribed by a professional Agreed	90(23.4)	120(31.3)	54.7	16.44	0.0001
Grand Value				99.12	0.0000

Table 2: Respondents' level of spectacle lens utilisation for remedy to eye challenges and the Pearson chi-square test results of hypothesis 1 (n = 384), df = 1.

Source: Researchers' questionnaire 2023. $X^2_{cal} = 99.12$; $X^2_{0.05'(1)} = 3.841$;p-value = 0.0000; Hypothesis rejected. Scale of spectacle utilisation: 0-49% low, 50-69% moderate, and 70-100% high.

Statement	Educational level distribution of the respondents				X^2	P-Value
Which of the following questions applies to you?	(n = 60) Primary f(%)	(n = 150) Secondary f(%)	(n = 140) Tertiary f(%)	(n = 34) Non-formal f(%)		
I used spectacles for the following:						
Vision improvement Agreed	41(68.3)	120(80.0)	123(87.9)	11(32.4)	46.66	0.0000
Reading Agreed	46(76.7)	110(73.3)	125(89.3)	20(58.8)	20.03	0.0000
Relief eye discomfort Agreed	33(55.0)	108(72.0)	115(82.1)	13(38.2)	32.28	0.0000
Conceal eye defect Agreed	43(71.7)	132(88.0)	115(82.1)	25(73.5)	11.07	0.0114
Fashion Agreed	47(78.3)	138(92.0)	127(90.7)	12(34.3)	74.80	0.0000
Sunshade Agreed	55(91.7)	138(92.0)	124(88.6)	24(70.6)	13.49	0.0039
Protection from work related injury Agreed	33(55.0)	102(68.0)	94(67.1)	9(26.5)	23.36	0.0000
Swimming Agreed	22(36.7)	32(21.3)	55(39.3)	8(23.5)	14.85	0.0019
I have been prescribed glasses before Agreed	40(66.7)	128(85.3)	113(80.7)	18(52.9)	22.17	0.0001
I have been using the glasses Agreed	35(58.3)	104(69.3)	117(83.6)	1(47.0)	24.97	0.0000
I have used spectacles prescribed by a professional Agreed	36(60.0)	110(73.3)	113(80.7)	19(55.8)	14.00	0.0029
Grand Value					297.59	0.0000

Table 3: Influence of the respondents' educational level on spectacle lens utilisation for remedy to eye problem and the Pearson chi-square test results of hypothesis 2. df = 3.

Source: Researchers' questionnaire 2023. X^2_{cal} = 297.59; $X^2_{0.05,(3)}$ = 7.815; p-value = 0.0000; Hypothesis rejected.

disagreed (67.6%). Besides, respondents in three educational levels highly agreed to spectacle lens utilisation for remedy to their reading challenges, primary (76.7%), secondary (73.0%), and tertiary (89.3%), respectively while the non-formal educational level (58.8%) moderately agreed. The above outcomes showcase the influence of education level on spectacle lens utilisation for remedy to eye problems (Table 3).

Statement: Which of the following seem to cause barriers to spectacle use?	Male f(%)	Female f(%)	Total f(%)
It doesn't make any difference to your eye vision Agreed	130(33.9)	120(31.3)	65.2
It is stigmatising Agreed	140(36.5)	150(39.1)	75.6
It makes one look old Agreed	120(31.3)	134(34.9)	66.2
It makes one depend on it Agreed	80(20.8)	140(36.5)	57.3
I feel headache Agreed	110(28.6)	120(31.3)	59.9
It puts limitations to daily activities Agreed	80(20.8)	44(11.5)	32.3
Teased for wearing spectacles by others Agreed	140(36.5)	120(31.3)	67.8
It prevents normalisation of vision Agreed	160(41.7)	164(42.7)	84.4
It causes injury to the eye Agreed	10.4)	84(21.9)	32.3
It is very expensive Agreed	180(46.9)	160(41.7)	88.6

Table 4: Barriers to respondents' spectacle lens utilisation for remedy to eye problems (n = 384).

Source: Researchers' questionnaire 2023. Scale of barriers to spectacle utilisations: 0-49% low, 50-69% moderate, and 70-100% high.

The study indicated that the respondents highly agreed to the following as barriers to spectacle lens utilisation for remedy to eye problems: 'it is very expensive' (86.6%); 'it prevents normalisation of vision' (84.4%); 'it is stigmatising' (75.6%); and moderately in these areas: 'teased for wearing spectacles by others' (67.8%); 'it doesn't make any difference in their vision' (65.2%); and 'it makes one look old' (66.2%) (Table 4).

Hypothesis 1. Ho1: There is no significant association between gender of patients and spectacle lens utilisation for remedy to eye problems.

Table 2 showed the grand calculated Pearson chi-square value of 99.12 with the corresponding table value of 3.841 and a p-value of 0.0000. The hypothesis was rejected because the X^2_{cal} = 99.12 > $X^2_{0.05(1)}$ = 3.841, p = 0.0000. This implies that there was significant association between gender of the respondents and spectacle lens utilisation for remedy to eye problems in selected tertiary hospitals in Bauchi State. The table further showed the calculated Pearson chi-square values for the following components of gender of the respondents and spectacle lens utilisation for remedy to eye problems with their corresponding p-values that were significant: 'vision improvement' (X^2 = 35.84, p-value = 0.0000); 'relief of eye discomfort' (X^2 = 18.36, p-value = 0.0000); 'conceal eye defect' (X^2 = 11.92, p-value = 0.0005); 'I have been prescribed glasses before' (X^2 = 4.46, p-value = 0.0347); and 'I have used spectacles prescribed by a professional' (X^2 = 16.44, p-value = 0.0001).

Hypothesis 2. Ho2: There is no significant association between educational level of patients and spectacle lens utilisation for remedy to eye problems.

Table 3, showed the grand calculated Pearson chi-square value of 297.59 with the corresponding table value of 7.815 and a p-value of 0.0000. The hypothesis was rejected because the X^2_{cal} = 297.59 > $X^2_{0.05(3)}$ = 7.815, p = 0.0000. This implies that there was significant association between the educational levels of the respondents and spectacle lens utilisation for remedy to eye problems in selected tertiary hospitals in Bauchi State. The table further showed the calculated Pearson chi-square values for the following components of the educational levels of the respondents and spectacle lens utilisation for remedy to eye problems with their corresponding p-values that were significant: 'vision improvement' (X^2 = 46.66, p-value = 0.0000); 'reading' (X^2 = 20.03, p-value = 0.0000); 'relief of eye discomfort' (X^2 = 32.28, p-value = 0.0000); 'conceal eye defect' (X^2 = 11.07, p-value = 0.0114); 'fashion' (X^2 = 74.80, p-value = 0.0000); 'sunshade' (X^2 = 13.40, p-value = 0.0039); 'protection from work related injury' (X^2 = 23.36, p-value = 0.0000); 'swimming' (X^2 = 14.85, p-value = 0.0019); 'I have been prescribed glasses before' (X^2 = 22.17, p-value = 0.0001); 'I have been using the glasses' (X^2 = 24.97, p-value = 0.0000); and 'I have used spectacles prescribed by a professional' (X^2 = 14.00, p-value = 0.0029).

Discussion of the findings

Respondents' level of spectacle lens utilisation

Utilisation of spectacle lens is a form of compliance and practical use of spectacle lens for the purpose it was meant. This study showed a high levels of spectacle lens utilisation for remedy to eye challenges among the respondents particularly in the aspect of vision improvement, reading, sunshade, and fashion (Table 2). These outcomes were in line with the studies conducted in Sudan, Ghana, and Ebonyi State respectively [7,23,29]. The respondents in the studies believed that using spectacle lens would improve their vision and make them see clearly. The 'reading' and 'fashion' results were in line with the studies carried out in Ethiopia, and Ghana respectively [11,27]. These adequate spectacle lens utilisations could be attributed to the effective understanding of refractive errors and its management modalities. Besides, this adequate knowledge of refractive errors and efficient spectacle lens utilisation for its correction has the potential to increase quality of life and productivity levels for the working populace, promote inclusive economies, decrease premature retirement, make roads/works safer (limiting road crashes/industrial accidents) and enable individuals to perform at a higher level in school, thereby decrease non-completion rate or dropout syndrome rate due to underperformance by improving visual function. Furthermore, it will guide the eye care specialists, administrative and decision making arms of the government to be conscious of the societal needs and desires. This will help improve the productivity as well as reduce the global and national economic cost in proficiency loss secondary to errors of refraction. The variations in this study results and that of the other studies could be attributed to the differences in study samples, study areas, and the level of enlightenments to spectacle usage.

Barriers to respondents' spectacle lens utilisation

Barriers are factors that pose as limitations to the utilisation of a particular object; in this context, spectacle lenses for correction of refractive errors. In this study, the respondents believed the following as barriers to spectacle use: 'it is very expensive 88.6%'; it prevents normalisation of vision 84.4%'; and 'it is stigmatising 75.6%'; 'it makes one look old 66.2%'. Others include: 'teasing by others for wearing spectacles 67.8%'; 'it doesn't make any difference in their vision 65.2%'; and 'it makes one depend on it 57.3%' (Table 4).

The expensive nature of spectacles revealed in this study was in tandem with the studies conducted in Zaria, Nigeria; Mozambique, and Igabi, North-western Nigeria respectively [10,13,25]. In these

areas, the respondents stated that high cost was responsible for non-purchase and use of spectacle lenses. The high cost of spectacles noticed in this study could be attributed to the effect of public-private-partnership (PPP) engaged upon by the hospitals for the provision of glasses, where every participant in the business network wants to make gain, thereby raising the cost of services. It could also be attributed to the rising inflation in the country attributable to the currency devaluation against the dollar that affects the prices of hospital consumables and other services. Therefore, frantic effort should be made by the Federal Ministry of Health and other Health Care Agencies and Parastatals to incorporate the provision of spectacle lenses into the National and Social health insurance scheme for easy accessibility and affordability by the masses. On the other hand, the general populace should be encouraged to enrol into the scheme for easy access to health care services. The concept of spectacle stigmatisation, teasing, makes no difference in vision, prevents normalisation of vision, and it makes one depend on it, was supported by the studies carried out in Ghana, and India respectively [20,22,29]. These misconceptions towards spectacle use might be related to ignorance, lack of socialisation, and insufficient knowledge of information concerning the benefits spectacle offers in the management of refractive errors. It could also be associated with past experience of the use of incorrect prescription, ill-fitting or uncomfortable spectacle lenses leading to discouragement in using them regularly. It could also result from dearth of eye care specialists to provide the need enlightenment concerning spectacle lens and its benefits. In addition, cultural beliefs could as well be a factor. In some cultures, wearing spectacle lens could be perceived as a sign of weakness, aging or visually handicapped, which could discourage individuals from using them even if they need then for clearer vision. In this regard, adequate eye care practitioners should be engaged by the government and private sector both at urban and rural areas to provide eye care services to the masses and at the same time enlighten them on the benefits associated with spectacle lens use in the management of refractive errors. By this means, misconceptions, disinformation or distorted facts, negative perceptions, along with long-standing stigmas associated with spectacles lenses use among the public could be averted.

Influence of gender of the respondents on spectacle lens utilisation

Pearson Chi-square analysis showed statistical significant association between gender and spectacle lens utilisation among the respondents in selected tertiary hospitals in Bauchi State. In order to determine the influence of gender of respondents on spectacle lens utilisation for remedy to eye problems, psychosocial statements were put across the 384 respondents; and detailed results were as shown in Table 2. Gender and these five statements were statistically significant, with all showing female preponderance: I used spectacles for the following: 'Vision improvement' ($X^2_{(1)}$ = 35.84, p = 0.0000); 'Relief of ocular discomfort' ($X^2_{(1)}$ = 18.36, p = 0.0000); 'Conceal eye defect' ($X^2_{(1)}$ = 11.96, p = 0.0005); 'I have been prescribed glasses before' ($X^2_{(1)}$ = 4.46, p = 0.0347); and 'I have used spectacles prescribed by a professional' ($X^2_{(1)}$ = 16.44, p = 0.0001). This result indicated that females utilises spectacle lenses more than their male counterpart. The result of this study was supported by the study conducted in Ghana [22], where there was a statistically significant difference between sex and history of spectacle wear and women were more likely to wear glasses than men. This outcome might be attributed to the fact that female look more fashionable, pretty and attractive when putting on spectacles than their male counterpart leading to greater demand for fashionable spectacle lenses. In other words, it dignifies their feminine status. Socially, women using spectacles are considered as smart, intellectuals and intelligent. This might also be attributed to chance in which case women may be more likely to seek out vision correction, which could lead to higher reported rates of spectacle utilisation. Also in some localities, men might be less likely to seek vision correction due to cultural and social norms around masculinity and self-care. Research had also shown that refractive errors are most prevalent in female population than male due to their genetic constitution, and female live longer than male counterpart accounting for part of the visual loss disparities, hence females are prone to use glasses more than their male counterpart if they are to succeed academically, socially and economically [1]. Besides, there may be differences in lens preferences between genders, with men preferring lenses that enhance contrast and clarity for sports or work-related activities, while women may prefer lenses that reduce glare and eye strain for computer use and reading. However, the finding of this study was contrary to the study carried out in Sudan, where the population of males who felt that wearing spectacles was larger than females which was statistically significant [7]. This could result from the fact that in some communities, women were not able to access eye care services with the same frequency as men, due to various socio-economic, environmental, lifestyle habits, and cultural factors, resulting in low utilisation of spectacle lenses by women. Overall, gender plays significant role in spectacle utilisation, but individual needs and preferences should always be a primary con-

sideration when prescribing and dispensing spectacle lenses.

Influence of education on the respondents' spectacle lens utilisation

Pearson Chi-square analysis showed statistical significant association between educational level of the respondents and spectacle lens utilisation for remedy to eye problems among respondents in selected tertiary hospitals in Bauchi State. In order to determine the influence of educational level of the respondents on spectacle lens utilisation for remedy to eye problems, psychosocial statements were put across the 384 respondents; and detailed results were as shown in Table 3. Educational levels of the respondents and all these eleven statements were statistically significant, with the secondary, followed by the tertiary and the primary educational levels showing more preponderance: I used spectacles for the following: 'Vision improvement' ($X^2_{(3)}$ = 46.66, p = 0.0000); 'Reading' ($X^2_{(3)}$ = 20.03, P = 0.0000); 'Relief of eye discomfort' ($X^2_{(3)}$ = 0.0000); 'Conceal eye defect' ($X^2_{(3)}$ = 11.07, P = 0.0114); 'Fashion' ($X^2_{(3)}$ = 74.80, P = 0.0000); 'Sunshade' ($X^2_{(3)}$ = 13.40, P = 0.0039); 'Protection from work related injury' ($X^2_{(3)}$ = 23.36, P = 0.0000); 'Swimming' ($X^2_{(3)}$ = 14.85, P = 0.0019); 'I have been prescribed glasses before' ($X^2_{(3)}$ = 22.17, P = 0.0001); 'I have been using the glasses' ($X^2_{(3)}$ = 24.97, P = 0.0000); and 'I have used spectacle prescribed by a professional' ($X^2_{(3)}$ = 14.00, P = 0.0029).

The study showed that educational level of the respondents had significant influence on spectacle lens utilisation for remedy to eye problems, especially the secondary and the tertiary levels. This could be attributed to the vast knowledge of refractive errors and its management methods by the respondents. Higher levels of education are usually associated with greater awareness of the importance of vision care and a higher likelihood of seeking vision correction when needed. This study was in agreement with the study conducted in Ethiopia, in which Occupation and educational level showed an overall statistical significant with attitude towards spectacle lens use [27]. In the study, the reasons mentioned for using spectacles included: near vision (reading), distance vision, protection, and fashion. The respondents indicated that they got their spectacles prescribed by a professional. The marginal differences in the results values could be as a result of the difference in the study setting. The study in Ethiopia was conducted in rural setting while this study was conducted in urban setting and in tertiary health institutions. People in urban settings had multiple source of information: health centres, mass media and higher human network of interactions than those in the rural to know about spectacles and its usage. Besides, the number and educational levels of those living in the urban might be higher than those living in the rural area, which might be the result of the adequate knowledge about spectacles as well as its utilisation.

In addition, cultural differences and beliefs towards spectacle lens utilisation might be another reason. Furthermore, the favourable attitude towards spectacle lens utilisation might be attributed to faithful adherence to advice given by the eye care professionals, coupled with their good educational background as well as the belief that spectacles were prescribed by professionals in the hospital for remedy to their eye problem.

Besides, education entrenched in ethics and principles equips one with moral, ethical and social values that play significant role in personal growth, interactions and decision making or preferences. Undeniably, education is fundamental to the overall development of an individual, inculcating standards and promoting critical thinking abilities to choice making and opinion formation. It also allows an individual to comprehend the difference between right and wrong, merits and demerits, and foster a moral compass that guides its actions especially in this case of spectacle use. Additionally, individuals with higher levels of education might have jobs or services that require more visual tasks, leading to a greater need for spectacle lenses.

Conclusion

Generally, the study showed that spectacle lens remained the most popular method of correcting refractive errors; as it is cost effective, simple, non-invasive and most widely acceptable due to its high success rate in terms of visual acuity, and improved quality of life. The result also revealed that the female gender utilises spectacle lens more than their male counterpart. Education plays significant role towards spectacle utilisation as shown by the respondents with secondary and tertiary educational qualifications. However, the most significant barrier to spectacle lens utilisation was high cost and misconceptions that it prevents the normalisation of vision, and stigmatisation. And to reduce the socioeconomic burden of visual impairment secondary to refractive errors, adequate enlightenment by eye care professional on the benefits spectacle lens offers should be paramount to improve utilisation.

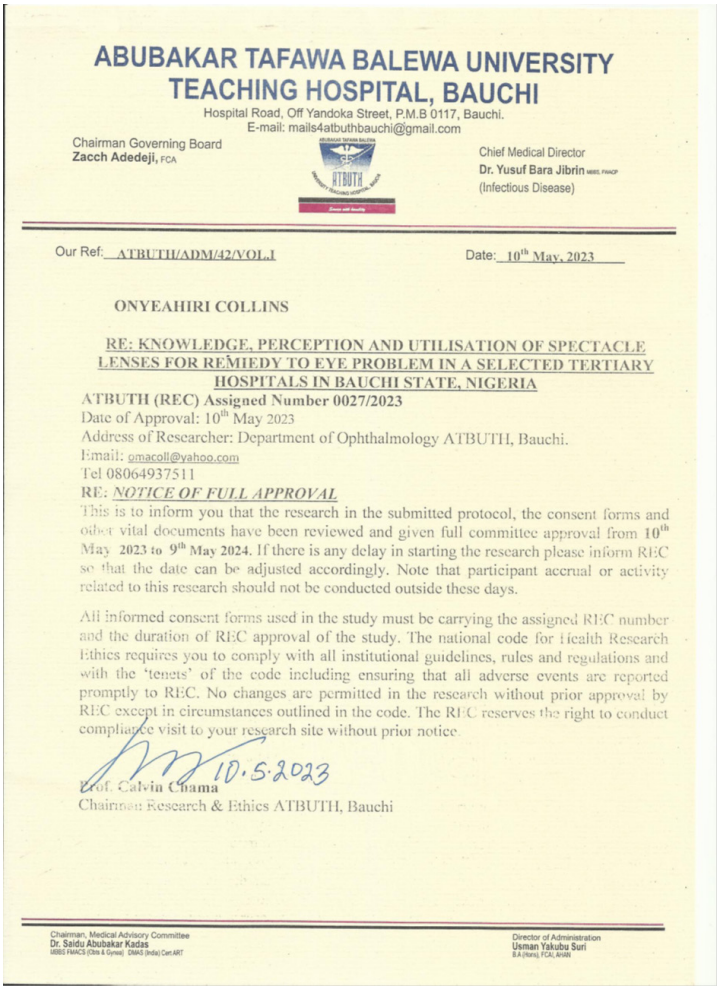
Recommendations

- Regular eye check-up at government approved eye clinics should be prioritised by the masses for early detection and management of avoidable visual impairment secondary to refractive errors.
- All patients accessing refractive eye care services in the eye clinics should be counselled on the benefits spectacle lens offer, in refractive errors management. This would help to eliminate false information, negative perceptions and deep rooted taboos regarding spectacle lens usage.

Strength and Limitations of the Study

The following limitations should be taken into consideration in analysing the results of this study. The descriptive survey design nature of the study makes it impractical to generalise the outcomes to all patients or the general masses in Bauchi State. Besides, difficulties may arise in accessing some of the sources due to sites upgrades or maintenance. Furthermore, since the study only included patients accessing refraction test, and age range of 18 years and above, opinions of those below 18years were not included; therefore, may be different. Further limitation to the study is that it was not designed longitudinally, which would have given room for longer observation of respondents and the understanding of various refractive errors' management methods and implementation of the most efficient option. One of the strengths of this study was that it was comprised of males and females' respondents from all walks of life (That's is young and elderly, of different educational, economic, professional and social background), and their ever willingness in partaking in the study.

Appendix 1: Ethical clearance from ATBUTH, Bauchi.



ABUBAKAR TAFAWA BALEWA UNIVERSITY
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Chairman Governing Board
Zacch Adedeji, FCA

Chief Medical Director
Dr. Yusuf Bara Jibrin MBBS, FWACP
(Infectious Disease)

Our Ref: ATBUTH/ADM/42/VOL.I

Date: 10th May, 2023

ONYEAHIRI COLLINS

RE: KNOWLEDGE, PERCEPTION AND UTILISATION OF SPECTACLE LENSES FOR REMIEDY TO EYE PROBLEM IN A SELECTED TERTIARY HOSPITALS IN BAUCHI STATE, NIGERIA

ATBUTH (REC) Assigned Number 0027/2023
Date of Approval: 10th May 2023
Address of Researcher: Department of Ophthalmology ATBUTH, Bauchi.
Email: gmacoll@yahoo.com
Tel 08064937511

RE: *NOTICE OF FULL APPROVAL*

This is to inform you that the research in the submitted protocol, the consent forms and other vital documents have been reviewed and given full committee approval from 10th May 2023 to 9th May 2024. If there is any delay in starting the research please inform REC so that the date can be adjusted accordingly. Note that participant accrual or activity related to this research should not be conducted outside these days.

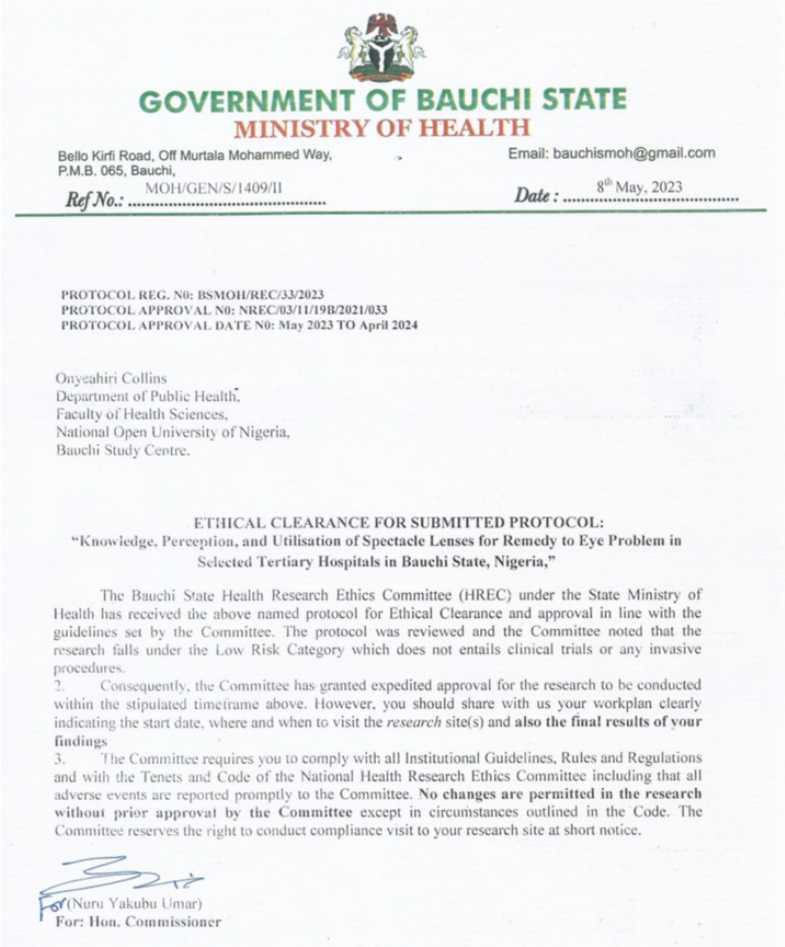
All informed consent forms used in the study must be carrying the assigned REC number and the duration of REC approval of the study. The national code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the 'tenets' of the code including ensuring that all adverse events are reported promptly to REC. No changes are permitted in the research without prior approval by REC except in circumstances outlined in the code. The REC reserves the right to conduct compliance visit to your research site without prior notice.

10.5.2023
Prof. Calvin Chama
Chairman Research & Ethics ATBUTH, Bauchi

Chairman, Medical Advisory Committee
Dr. Saidu Abubakar Kadas
MBBS FMACS (Obs & Gynae) DMAS (India) Cert ART

Director of Administration
Usman Yakubu Suri
B.A (Hons), FCAI, AHAN

Appendix 2: Ethical clearncance from Bauchi State Ministry of Health, in respect of Specialist Hospital, Bauchi.



GOVERNMENT OF BAUCHI STATE
MINISTRY OF HEALTH

Bello Kirfi Road, Off Murtala Mohammed Way,
P.M.B. 065, Bauchi,
Email: bauchismoh@gmail.com

Ref No.: MOH/GEN/S/1409/II
Date : 8th May, 2023

PROTOCOL REG. N0: BSMOH/REC/33/2023
PROTOCOL APPROVAL N0: NREC/03/11/19B/2021/033
PROTOCOL APPROVAL DATE N0: May 2023 TO April 2024

Onyeahiri Collins
Department of Public Health,
Faculty of Health Sciences,
National Open University of Nigeria,
Bauchi Study Centre.

ETHICAL CLEARANCE FOR SUBMITTED PROTOCOL:
"Knowledge, Perception, and Utilisation of Spectacle Lenses for Remedy to Eye Problem in Selected Tertiary Hospitals in Bauchi State, Nigeria,"

The Bauchi State Health Research Ethics Committee (HREC) under the State Ministry of Health has received the above named protocol for Ethical Clearance and approval in line with the guidelines set by the Committee. The protocol was reviewed and the Committee noted that the research falls under the Low Risk Category which does not entails clinical trials or any invasive procedures.

2. Consequently, the Committee has granted expedited approval for the research to be conducted within the stipulated timeframe above. However, you should share with us your workplan clearly indicating the start date, where and when to visit the *research* site(s) and **also the final results of your findings**

3. The Committee requires you to comply with all Institutional Guidelines, Rules and Regulations and with the Tenets and Code of the National Health Research Ethics Committee including that all adverse events are reported promptly to the Committee. **No changes are permitted in the research without prior approval by the Committee** except in circumstances outlined in the Code. The Committee reserves the right to conduct compliance visit to your research site at short notice.

For (Nuru Yakubu Umar)
For: Hon. Commissioner

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