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Refractive errors and the uniform patient fee scheme at a public hospital in South Africa

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Background: Uniform Patient Fee Scheme (UPFS) refers to the healthcare subsidy levels provided by public hospitals in South Africa. Such subsidies indirectly reflect socio-economic factors and thus potentially might impact upon distributions of refractive error.

Aim: To investigate refractive errors based on the UPFS-classified records of patients consulted at an Optometry Clinic between January 2018 and December 2019. This will provide frequencies and other measures, possibly providing preliminary estimates of prevalences for the wider population for the region concerned.

Setting: The study was conducted at Sekororo Hospital in Limpopo province.

Methods: Data for UPFS and refractive errors (via subjective refraction) were collected retrospectively based on the archived clinical records. Statistics and Data Analysis (Stata) software was used to analyse data.

Results: For H0 in the right eyes means (± s.d.) for myopia, hyperopia, and astigmatism were −2.04 ± 2.60, 1.38 ± 1.72, and −1.07 ± 0.64, respectively. For H0 (left eyes): Myopia (−2.04 ± 2.09), hyperopia (1.47 ± 1.73), and astigmatism (−1.04 ± 0.64). For H1 (right eyes): Myopia (−1.79 ± 1.50), hyperopia (1.06 ± 0.72), and astigmatism (−1.14 ± 0.81). For H1 (left eyes): myopia (−1.71 ± 1.46), hyperopia (1.24 ± 0.91), and astigmatism (−1.71 ± 0.74). (No records were found for H2, H3, or private patients.)

Conclusion: Hyperopia and astigmatism were the most common in H0 records while myopia was the most common in H1.

Contribution: Various authorities and others in South Africa might use this data and results for National Health Insurance planning policies and implementation purposes.

Keywords: uniform patient fee scheme; uncorrected refractive error; vision impairment; subsidisation; distribution.

Introduction

The Uniform Patient Fee Scheme (UPFS) is one of the billing systems used by all public hospitals at the secondary, tertiary, and national levels of care in South Africa (SA) to determine how much individuals should pay for healthcare services including optometric care and assistive devices in the form of spectacles and others.[1,2,3,4,5,6] The UPFS classifications include eligibility for free healthcare services with 100% state subsidy including the provision for free assistive devices[7] and to determine those who must pay for healthcare services and assistive devices such as spectacles.[1,2,4] However, this scheme does not apply to primary healthcare (PHC) in community clinics and healthcare centres.

The UPFS classification codes include H0, H1, H2, H3, and private patients covered by healthcare insurance or medical aid schemes.[1,2,3,4,5] Those classified as H0 patients have 100% state subsidy and receive free healthcare and assistive devices.[4] Those patients classified as H1 have annual income below R27 001 for single patients or household annual income of R31 001, sometimes called combined spousal annual income for married patients and assets worth less than R54 001 for a single patient and household assets less than R81 001 for married patients would receive 70% subsidy when consulting any public hospital in SA.[1,2,3] Those patients classified as H2 have income between R35 000 and R81 001 per annum for a single patient or household income between R27 001 and R52 000 per annum for married patients, and assets worth between R54 001 and R105 000 for a single patient between R81 001 and R155 000 would receive 30% subsidy when consulting a public hospital in SA.[1,2,3]

In contrast, the patients classified as H3 have annual income above R35 000 for a single patient or annual income household above R52 000 and assets worth more than R105 000 for a single patient or household assets worth more than R155 000, including foreign nationals receive no subsidy for healthcare and assistive devices such as spectacles and are all classified as full-paying patients. Other categories of full-paying patients without government subsidy include those covered by medical aid schemes, private healthcare insurance, or compensation funds such as the Road Accident Fund (RAF), and those compensated for occupational injuries or diseases via the Department of Employment and Labour (SA).[1,2,3,4,5] All South Africans including foreign nationals are equally entitled to free emergency medical care in all public hospitals.[4]

Other regions or countries such as the United States of America (USA), and the United Kingdom (UK) use other means to provide free (to patients) healthcare services including eye care or optometry care for people aged 65 or older including under-aged children preferably 16 years or younger.[8,9,10,11] In the UK, the National Health Scheme (NHS) introduced free eye care services for older persons, including free optical vouchers provided by opticians or optometrists practising all over the streets in the country.[8] In the USA, the American Academy of Ophthalmology (AAO) established a foundation for free eye care services called Eyecare America provided by all its members.[9,10]

Refractive errors (or ametropia) of the eye such as myopia, hyperopia, and astigmatism are the prevalent eye disorders affecting people of all age groups worldwide.[12,13,14,15,16,17,18,19] Myopia, hyperopia, and astigmatism are related to second-order aberrations of the eye that occur because of the inability of the optical system to properly focus images on the retina, leading to blurred vision, which in the absence of optical or surgical compensation leads to vision impairment (VI).[13,14,15] If severe, such VI can create unnecessary personal, social, and economic disadvantage, particularly in the less developed world including areas such as the sub-Saharan African (SSA) region; after cataracts, presbyopia is the second leading cause of near VI.[16] Presbyopia is a vision condition that typically affects people aged 40 years or older, and it has a prevalence rate of over 80% in Africa because of unaddressed challenges in providing sufficient budget to increase spectacle coverage.[16] (Those aged 35 years to 39 years can sometimes be affected by early presbyopia.) To reduce the prevalence of presbyopia, the World Health Organization (WHO) recommends that member states increase spectacle coverage and provide state subsidisation, such as the use of UPFS classifications, which are used by public hospitals in SA.[1,2,3,4,5,6,7,12] The patients aged 60 years or older receive free pairs of spectacles when consulting any level of public hospital in SA.[1,2,3,4,5,6,7] Those who are younger than this age group and not on the Social Security payroll under the Department of Social Development, receive state subsidy ranging from 30% for H2 patients to 70% for H1 patients depending on the means tests used to determine how individuals should pay for healthcare services including spectacles, but H3 and private patients receive no subsidy because of their income or assets above the minimum threshold.[1,2,3,4,5,6,7]

A study conducted by Erasmus et al.[20] shows that all the public hospitals in SA use a similar approach to implement equity policies such as the UPFS classifications and other related policies. The study[20] aimed to investigate equity in the implementation of UPFS classifications in two district hospitals in SA. However, the study in that article does not explore equity implementation in the refractive errors and UPFS classifications. As a result, there is a lack of scientific data on the refractive errors (including VI) and UPFS classifications about equity implementation.

This is the first study of its kind in SA to investigate the frequencies or sample prevalence of refractive errors in a public hospital setting using corresponding UPFS-classified records from a rural Optometry Clinic. The results of this article are expected to increase the knowledge of other researchers, particularly in optometry, ophthalmology, and related fields. Furthermore, the study's findings will provide a foundation for future research. As there are no previous studies published on the topic of refractive errors or VI and UPFS-classified records, it may be challenging to compare the study results with previous research. However, the Department of Health (SA) and other authorities may find some of the scientific findings useful for making policy decisions related to refractive errors and state subsidies. Factors such as poverty or malnutrition in underdeveloped regions may affect both the refractive state and the likelihood of VI. This study indirectly considers the possible relationships between such variables and more particularly refractive error using UPFS.

Research methods and design

Study design

This observational, quantitative, analytical, and cross-sectional retrospective study collected secondary source data from the selected district hospital's clinical archive in the Records Management Unit. Refractive error data measured by an incumbent optometrist (with >20 years of clinical experience) via retinoscopy and criterion-standard subjective refraction were collected retrospectively from the clinical archive of a rural Optometric Clinic based at the Sekororo District Hospital in the Mopani District of Limpopo province in SA for patients who were seen over two years from 01 January 2018 to 31 December 2019. (The data for 2020 were excluded from this study because of the coronavirus disease 2019 [COVID-19] pandemic.)

Sampling

The clinical records were randomly selected using a probability random sampling method with the aid of a random function: f_x = rand (*num*) of an Excel spreadsheet (Microsoft 365) for Windows 11, where *num* is the patient records number (or the hospital file number). The required minimum sample size for the whole sample of the study was calculated using the statistical formula of Cochrane shown in Equation 1:

$$n = \frac{Z^2 P(1-P)}{e^2} = \frac{(1.96)^2\, 0.50(1-0.50)}{(0.05)^2} = 384 \qquad \text{[Eqn 1]}$$

where n = the required minimum sample size, p = 0.5 the percentage occurrence at 50% of the refractive error condition, and e = the margin of error which is the risk the researcher is willing to accept, which could be because of factors such as missing or incomplete clinical records in this study and Z = 1.96, the probability value at a significant level of 0.05 corresponding to a level of confidence required (95% here). Thus, the required minimum sample size (n) for this study is 384 records. After the exclusion of records with incomplete information, 313 records were sampled. Another 200 records were added to the 313 records to compensate for the excluded records because of incomplete information and to further increase the study's statistical power. The final sample of the 513 records was collected and analysed.

Determination of refractive errors and uniform patient fee scheme

Sample prevalence or frequencies for myopia, hyperopia, and presbyopia were determined using the spherical equivalent refractive (SER) power of ≤ −0.25 D, ≥ +0.50 D, and ≥ +1.00 D, respectively. In contrast, the occurrence of astigmatism was determined using the cylindrical equivalent refractive power of ≤ 0.25 D.[20] The UPFS classifications were determined by personnel in the Record Management Unit of the district hospital concerned prior to this study. The classifications were based on H0, H1, H2, and H3 codes, where H0 indicated a 100% state subsidy received by all patients consulted at the Optometry Clinic including the provision of a pair of spectacles, H1 indicated a 70% subsidy, H2 indicated a 30% subsidy, and H3 indicated no subsidy. It is important to observe that patients with medical aid schemes or private healthcare insurance, including foreign nationals were not eligible for any state subsidies when consulting at the public hospital concerned and were therefore classified as full-paying patients.[1,2,3,4,5,6,7]

Statistical analysis

The quantitative data were captured in an MS Excel spreadsheet (Microsoft 365), then imported into Statistics and Data Analysis (Stata) software special edition 15 (Stata Corporation, College Station, 77845 Texas, USA) for descriptive statistical analysis to summarise demographics and refractive errors of the patients consulted at the Optometry Clinic over two years starting from January 2018 to December 2019.

Ethical considerations

Ethical approval (REC-1170-2021**)** was obtained from the Research Ethics Committee (REC) in the Faculty of Health Sciences at the University of Johannesburg (SA). Permission to conduct the study at the selected district hospital was granted by the Provincial Health Research and Ethics Committee (PHREC) in the Limpopo Department of Health, the Senior Clinical Manager, and the Chief Executive Officer (CEO) of Sekororo District Hospital.

Results

Over the two years, 513 clinical records (cases) were sampled and analysed. The sample consisted of records for patients of African descent who visited a rural Optometry Clinic. The mean age and standard deviation (s.d.) of the sample were 47.4 ± 20.6 years. Table 1 shows a summary of the demographic profiles of patients seen at the clinic based on the UPFS classified records at the district hospital. Female records accounted for a larger percentage than male records, with 37.6% for H1 and 30% for H0. There were no observations for other categories such as H2, H3, or private patients covered by the medical aid schemes or healthcare insurance. The largest proportion of H0 sampled records were 165 (32.2%) for patients in the age group 61 years to 90 years. The smallest proportion of H0 sampled records was 10 (2.0%) for patients in the age group 31 years to 60 years. For H1 records, the largest proportion was 216 (42.1%) in the age group 31 years to 60 years, and there were no observations in the age group 61 years to 90 years.

Table 2 shows the means, s.d.'s, and the sample prevalence of myopia, hyperopia, and astigmatism, including emmetropia based on the UPFS classifications with 95% confidence intervals (CIs) of the 513 right and 513 left eyes. The mean values of myopia observed in the H0 records display similarity, however, the s.d. values reveal a slight difference. Notably, the left eyes exhibit marginally higher values of myopia than the right eyes. This observation suggests that the myopia cases in the right eyes were closer to the central mean value, whereas those in the left eyes were spread out over a wider range. It is worth mentioning that the means and s.d.'s for hyperopia and astigmatism also showed slight variations when compared to myopia. For the H1 records, the means and s.d.'s displayed similar slight differences as found in the H0 records.

TABLE 1: Demographic profiles of patients consulted at the optometry clinic from January 2018 to December 2019.

Observed UPFS classifications	Variables	Groups	*n*	%
Demographic profiles (*N* = 513)				
H0	Sex	Females	154	30.02
		Males	75	14.62
	Age (years)	≤ 30	54	10.53
		31–60	10	1.95
		61–90	165	32.16
H1	Sex	Females	193	37.62
		Males	91	17.74
	Age (years)	≤ 30	68	13.26
		31–60	216	42.11
		61–90	0	0.00

Note: The table shows the sample sizes (*n*), sex, and age group in 30-year intervals.
Abbreviations: H0, for non-paying patients with 100% state subsidy; H1, patients receiving 70% state of the total tariff; UPFS, Uniform Patient Fee Scheme.

TABLE 2: Sample prevalence (%) of myopia, hyperopia, and astigmatism based on the uniform patient fee scheme classification.

UPFS	Variables		Right eyes (N = 513)					Left eyes (N = 513)				
Codes	Refractive errors	Equivalent power	*n*	Mean (D)	s.d. (D)	%	95% CI	*n*	Mean (D)	s.d. (D)	%	95% CI
H0	Emmetropia	0 D	74	0	0	33.33	27.42–39.82	65	0	0	31.16	25.30–37.69
	Myopia	≤ -0.25 D	27	-2.04	2.60	44.23	31.31–57.98	40	−2.04	2.09	45.59	34.10–57.57
	Hyperopia	≥ +0.50 D	20	1.38	1.72	65.71	48.51–79.58	25	1.47	1.73	64.71	47.27–78.95
	Astigmatism	≥ -0.25 D	108	-1.07	0.64	53.43	46.53–60.20	99	−1.04	0.64	55.61	48.56–62.45
H1	Emmetropia	0 D	150	0	0	66.67	60.18–72.58	147	0	0	68.83	62.30–74.70
	Myopia	≤ -0.25 D	32	-1.79	1.50	55.77	42.01–68.69	46	−1.71	1.46	54.41	42.43–65.90
	Hyperopia	≥ +0.50 D	10	1.06	0.72	34.29	20.42–51.48	15	1.24	0.91	35.29	21.05–52.73
	Astigmatism	≥ -0.25 D	92	-1.14	0.81	46.57	39.80–53.47	76	−1.17	0.74	44.39	37.55–51.44

Abbreviations: H0, for non-paying patients with 100% state subsidy; H1, patients receiving 70% state of the total tariff; UPFS, Uniform Patient Fee Scheme; *n*, number of observations; s.d., standard deviation; CI, confidence interval; D, dioptres.

TABLE 3: Sample prevalence (%) of myopia, hyperopia, and astigmatism based on gender.

Sample	Variables		Right eyes (N = 513)		Left eyes (N = 513)	
Sex	Refractive errors	Equivalent power	%	95% CI	%	95% CI
Females	Emmetropia	0 D	59.01	52.39–65.32	58.14	51.41–64.58
	Myopia	≤ -0.25 D	71.15	57.33–81.91	73.53	61.72–82.72
	Hyperopia	≥ +0.50 D	74.29	57.20–86.20	76.47	59.20–87.92
	Astigmatism	≥ -0.25 D	75.00	68.57–80.49	74.49	67.89–80.13
Males	Emmetropia	0 D	40.99	34.68–47.61	41.86	35.42–48.59
	Myopia	≤ -0.25 D	28.84	18.09–42.66	26.47	17.28–38.28
	Hyperopia	≥ +0.50 D	25.71	13.80–42.80	23.53	12.08–40.80
	Astigmatism	≥ -0.25 D	25.00	19.51–31.42	25.51	19.87–32.11

Abbreviations: CI, confidence interval; D, dioptres.

TABLE 4: Sample prevalence (%) of myopia, hyperopia, and astigmatism based on age group.

Sample	Age	Emmetropia (0 D)		Myopia (≤ −0.25 D)		Hyperopia (≥ +0.50 D)		Astigmatism (≥ −0.25 D)	
Eyes	Years	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Right (*n* = 513)	≤ 30	32.88	27.00–39.36	11.54	5.23–23.58	28.57	15.95–45.75	16.18	11.72–21.91
	31–60	50.90	44.32–57.45	51.92	38.38–65.19	31.43	18.15–48.64	36.76	30.40–43.63
	61–90	16.22	11.91–21.69	36.54	24.54–50.48	40.00	25.10–57.01	47.06	40.27–53.95
Left (*n* = 513)	≤ 30	33.95	27.91–40.57	14.71	8.05–25.35	26.47	14.22–43.87	15.31	10.89–21.08
	31–60	51.63	44.93–58.27	48.53	36.84–60.84	32.35	18.72–49.84	36.22	29.77–43.22
	61–90	14.41	10.30–19.80	36.76	26.11–48.89	41.18	25.89–58.38	48.47	41.51–55.48

Abbreviations: CI, confidence interval; D, dioptres.

The H0 classified records had a higher frequency of hyperopia ranging from 64.7% (95% CI: 47.3–79.0) to 65.7% (95% CI: 48.5–79.5) for the left and right eyes. Emmetropia had the lowest frequency ranging from 31.2% (95% CI: 25.3–37.7) to 33.3% (95% CI: 27.4–39.8) for the left and right eyes, respectively. The H1 records had a high frequency of emmetropia ranging from 66.7% (95% CI: 60.2–72.6) to 68.8% (95% CI: 62.3–74.7) for the right and left eyes, respectively. The least frequent refractive error in the H1 records was hyperopia with the sample prevalence ranging from 34.3% (95% CI: 20.4–51.5) to 35.3% (95% CI: 21.1–52.7) for the right and left eyes, respectively.

Table 3 shows the sample (513 right eyes and 513 left eyes) prevalence or frequencies for myopia, hyperopia, and astigmatism including emmetropia based on patient gender with 95% CI. Females in the H0 records had a large frequency of astigmatism ranging from 74.5% (95% CI: 67.9–80.1) to 75.0% (95% CI: 68.6–80.5) for left and right eyes, respectively. Males had a larger frequency of emmetropia, ranging from 41.0% (34.7–47.6) to 41.9% (35.4–48.6) for the right and left eyes respectively, followed by myopia with frequencies ranging from 26.5% (17.3–38.3) to 28.8% (95% CI: 18.1–42.7) for the left and right eyes, respectively.

The results for myopia, hyperopia, astigmatism, and emmetropia, based on the age group of patients who visited the Optometry Clinic, are presented in Table 4. The sample prevalence of myopia in the right eyes was highest in the 31 years to 60 years age group, at 51.9% (95% CI: 38.4–65.2), followed by emmetropia at 50.9% (95% CI: 44.3–57.5). In the left eyes, emmetropia was prevalent at 51.6% (95% CI: 44.9–58.3), followed by myopia at 48.5% (95% CI: 36.8–60.8). The lowest prevalence of emmetropia was observed in the left eyes in the 61 years to 90 years age group, at 14.4% (95% CI: 10.3–19.8).

The data presented in Figure 1 illustrate the occurrence of presbyopia in patients' left and right eyes, as classified in the 513 UPFS records of the Optometry Clinic between 2018 and 2019. The records belonging to H0 indicate a higher frequency of presbyopia (60.5%) in both eyes compared to H1 records, which show a frequency of 39.5%. On the other hand, H1 records show a greater number of non-presbyopia cases than H0 records.

Discussion

This study investigated the sample prevalence or frequencies of refractive errors based upon the UPFS classifications as

used by all public hospitals in SA to determine the level of state subsidy towards the provision of healthcare services including optometry care. This study is unique as it presents the results of refractive errors based on the UPFS classifications that could relate to several important variables such as socio-economic status, poverty possible malnutrition or even diseases that might be more frequent in poorer communities such as tuberculosis or HIV-AIDS. This study in the Optometry Clinic did not include any records of H2, H3, or privately insured patients with medical aid schemes or private healthcare insurance, possibly because of its location in a rural and relatively underdeveloped area. Table 2 displays the quantified refractive errors (myopia, hyperopia, and astigmatism) for the left and right eyes, along with their respective means and s.d.'s. Additionally, the frequencies or sample prevalence for myopia, hyperopia, and astigmatism including presbyopia are presented based on UPFS-classified records of patients who visited the clinic between January 2018 and December 2019. For the purposes of this study, the sample prevalence (%) of these common refractive errors observed on the UPFS classified records will demonstrate their occurrence or frequencies.

The occurrence or sample prevalence of refractive errors, such as myopia, hyperopia, and astigmatism, in both right and left eyes, in this study, is comparable to that found in previous studies in different parts of the African continent including SA,[21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39] The sample size (n = 513) of this study is larger than that for previous studies where the sample sizes ranged from 216 to 464,[24,25,27,31,33,34,39] but smaller than that of some previous studies where sample sizes ranged from 529 to 2829.[21,23,26,27,28,29,30,35,36,38] This difference in the sample sizes relate to factors including geographic populations (e.g., larger or smaller than for SA) and sampling techniques used to select the participants.

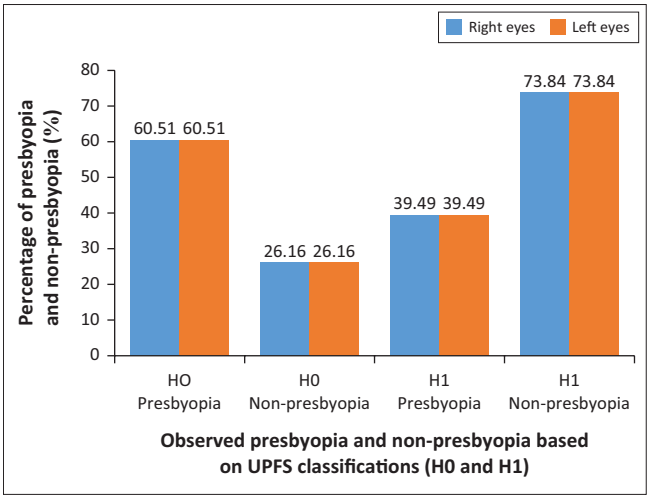
The sample prevalence of myopia in this study differs from that of previous studies. For the right eyes and left eyes occurrences were 44.2% and 45.6%, respectively (thus, an average of ≈ 44.9%). This study has a smaller frequency of myopia, as compared to a previous study with a prevalence of 76.5%,[23] but a larger sample prevalence than other previous studies ranging from 1.9% to 24.9%.[22,24,25,26,27,28,29,30,31,32,33,34,35,36] For the H1 classified records, the sample prevalence for myopia ranges from 54.4% to 55.8%. The variation across studies in the sample prevalence of myopia could relate to differences in research designs, populations (age ranges, gender distributions, geographic or ethnic factors), sampling or data collection methods (type and instrumentation used), sample sizes, settings (rural and urban), environmental conditions such as temperature in different geographic regions, and possibly even analytical methods for analysis (e.g., use of spherical equivalents for refractive errors *versus* multivariate or matrix methods for classifying refractive state).

The sample prevalence for hyperopia in the H0 records for the right and left eyes in this study ranges from 64.7% to 65.7% and is not consistent with that of previous studies (albeit not using UPFS). The prevalence of hyperopia in the H0 records is larger than that for previous studies conducted in other parts of the African continent where prevalence ranges from 0.1% to 21.5%.[22,23,24,25,26,27,28,29,30,32,33,34,35,36] The H1 records have sample prevalence for hyperopia in the right and left eyes ranging from 34.3% to 35.3% and this is larger than that of previous studies.[22,23,24,25,26,27,28,29,30,32,33,34,35,36]

The sample prevalence of astigmatism in the H0 records for the right and left eyes ranges from 53.4% to 55.6% and does not agree with that of previous studies. The occurrence of astigmatism in the H0 records is smaller than that of previous studies with a prevalence range of 64.8% – 68.1%,[26,29] but larger than that of other studies where prevalence ranges from 1.8% to 46.4%.[22,23,24,25,27,28,29,32,33,34,35,36,37,38,39] The H1 records have a sample prevalence of astigmatism for the right and left eyes ranging from 44.4% to 46.6% and this is not consistent with that of previous studies. Mostly, the prevalence of astigmatism in the H1 records is larger than that for previous studies in various parts of Africa including SA.[22,23,24,25,26,28,29,32,33,34,35,36,37,38,39]

The occurrence of presbyopia in the H0 records is similar at 60.5% for the right and left eyes of the present study (see Figure 1) and does not agree with that of previous studies. However, the occurrence of presbyopia in the H1 records at 39.5% is similar to other studies. The sample prevalence of presbyopia in both H0 records for this study is larger than that of other studies with prevalence of 30.4% and 59%,[37,38] but for the H1 records is smaller than that of another previous study where the prevalence of presbyopia is 59%.[37]

The UPFS classification in SA is an important step towards achieving national and universal health coverage, as recommended by the WHO for all member states.[11] Patients classified as H0 are entitled to free pairs of spectacles to correct myopia, hyperopia, astigmatism, and presbyopia, while those classified as H1 receive a 70% state subsidy, including unemployed patients.[1,2,3,4,5,6,7] In some countries such as the USA[9] and the UK,[8] there are similar eye care programmes



Abbreviations: H0, for non-paying patients with 100% state subsidy; H1, patients receiving 70% state of the total tariff.

FIGURE 1: Sample prevalence (%) for presbyopia and non-presbyopia (or pre-presbyopia).

that are meant to provide specific citizens with a subsided eye care via optical aid vouchers for the pair of spectacles and other optical aids based on the age of the person, preferably the elderly persons aged 65 years or older, as well as, minor children aged 16 years or younger, but these subsidies in the USA and UK are through non-governmental organisations (NGOs) such as the AAO foundation called 'Eyecare America' rendered by the memberships of AAO in the USA.[9,10]

Another similar programme for 'free' eye care is offered by the NHS[8] programme in the UK provided by private opticians or optometrists practising along the cities' streets.[8,9,10] Based on this background, the UPFS classification codes (namely, H0–H3 depending upon the level of state subsidy, that is, from 100% for H0 patients to zero for H3 patients) in SA share similar characteristics as other eye care programmes in the USA and the UK.[7,8,9] However, unlike in SA, subsidised eye care programmes in the USA and the UK do not necessarily cover other distressed groups within their societies such as unemployed persons, and those living with some form of physical disabilities.

No clinical records for H2, H3 and private patients covered by medical aid schemes or private healthcare insurance were found in the archive unit of the district hospital concerned, possibly because of the location of the Optometry Clinic in a rural and somewhat underdeveloped region.

Limitations and strengths

The study analysed historical records extracted from the clinical archive of a district hospital for patients who visited a rural Optometry Clinic from 01 January 2018 to 31 December 2019. The study was not designed to establish the causality of refractive errors as determined using standard subjective refractions. The absence of cycloplegia might have impacted the results in some cases. The method of refraction only involved subjective refractions and this could be a limiting factor. All measurements of refractive state were obtained from a single optometrist in one rural district hospital. The probability simple random sampling method was used to select records from the larger populations that utilised the optometric refractive services at the clinic but the data are clinically biased and thus might not truly reflect population prevalence of the refractive errors and presbyopia in the region concerned. However, the results do provide some preliminary and rough estimates for such prevalences, with the necessary caveats or limitations in mind. This study provides results for refractive errors for African eyes based on the UPFS and such methods have not been used previously in relation to UPFS or refractive error.

Recommendations

The authors recommend that the South African government should ideally increase the number of optometrists in public healthcare sectors or consider a public–private partnership to provide optometry care, including the provision of subsidised spectacles, to reduce the backlog. The findings presented in this study for UPFS and uncorrected refractive errors are important or relevant as they can be used to improve optometry care, particularly in rural clinics in SA and elsewhere. These results should be considered when planning the National Health Insurance project. The authors recommend further research to be conducted in other public hospitals across SA, as well as in hospitals with advanced or higher levels of care, such as in regional, provincial, and national hospitals.

Conclusion

Although many people had normal or nearly normal eyesight, the most common refractive errors (such as myopia, hyperopia, and astigmatism) including presbyopia were present in both the H0 and H1 records of patients consulted at an Optometry Clinic over two years (from 01 January 2018 to 31 December 2019). The UPFS-classified records showed that the frequencies or sample prevalence ranged from approximately 34.3% to 68.8%. Myopia was found to be more prevalent in the H1 records than in the H0 records. Hyperopia was more prevalent in the H0 records than in the H1 records. Astigmatism was more prevalent in the H0 records than in the H1 records. This article does not cover presbyopia in detail. However, presbyopia was found to be more prevalent in the H0 records than in the H1 records, which is more significant for many patients visiting the rural clinic. As mentioned, there were no records for H2, H3, or for private patients covered by medical aid schemes or private healthcare insurance.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

K.D.M., N.H. and A.R. contributed equally to the conceptualisation and planning process, formal analysis, validation, writing and editing of this research paper. K.D.M. was the principal investigator for this study and was part of a master study with the supervision of N.H. and A.R.

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Data availability

Data can be made available on reasonable request to the corresponding author, K.D.M.

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