

Factors Associated with Low Accessibility to Diabetic Retinopathy Management Services in Cotonou, Benin



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Summary

Introduction: The authors studied the factors associated with the low accessibility of diabetic retinopathy care services in Cotonou in 2022.

Study method: This was a cross-sectional and descriptive observational study. It included professional diabetic patients and healthcare professionals. Data was collected using digital and face-to-face questionnaires. The analysis was carried out using Epi Info software.

Results: A total of 78 diabetics participated in the survey. The average age of the patients was 56.80 ± 1.90 years. The sex ratio was 0.95. The average annual cost of diabetes treatment was 217,586.22 ± 92,618 FCFA with extremes of 30,000 and 3,000,000 FCFA. Diabetic retinopathy care services were located more than 10 km from the place of residence for 53.85% of patients. Services are available in few places and for few patients in 51.16% of cases. Patients with personal means of transportation represented 39.74% of the study population. The management of DR was provided by ophthalmologists in 55.81% according to the health professionals interviewed. The main factors associated with low accessibility to diabetic retinopathy management services were low level of education, the overall annual cost of diabetes management and diabetic retinopathy.

Conclusion: This study highlights the major impact of the level of education, the costs of managing diabetes and diabetic retinopathy, as well as adherence to treatment, on the accessibility of patients to treatment services. In charge of this complication in Cotonou

Keywords: Accessibility; Care; Diabetic retinopathy; Cotonou; Benin

Introduction

Diabetes mellitus remains a global public health problem. According to the World Health Organization [1] in 2014, approximately 422 million people had diabetes worldwide [1]. In 2019, the International Diabetes Federation (IDF) estimated this number at 463 million [2]. In 2021, this prevalence exceeded 537 million, with a significant increase in Europe, where around 61 million people are affected. IDF also reported that around 4.5 million people were unknowingly diabetic in 2019, with 19 million cases in Africa. This number is expected to reach 29 million by 2030 and 47 million by 2045 if preventive measures are not taken [3]. Blindness is a formidable complication of diabetes in adults and

can have a devastating impact on quality of life. Classic symptoms of diabetes include polyuria, polydipsia, polyphagia, weight loss and fatigue. It can be revealed by recurrent skin infections, delays in wound healing, a history of complicated pregnancies, sexual dysfunction or by specific diagnostic criteria [4].

As a chronic disease, diabetes can cause many complications, especially in the absence of adequate glycemic control. These complications are divided into acute and chronic complications. Acute complications include diabetic ketoacidosis, hypoglycemia, hyperosmolar hyperglycemia syndrome and lactic acidosis, while chronic complications include diabetic foot, cardiovascular disease and diabetic retinopathy, which affects the blood vessels of

the retina and is one of the leading causes of blindness worldwide [5].

Indeed, diabetic retinopathy represents a major complication of diabetes, seriously threatening patients' vision [6]. It is the leading cause of blindness in adults under 50, particularly in developed countries, and is among the five leading causes of visual impairment in all age categories [7]. In Benin, studies carried out in different medical centers have revealed an increasing prevalence of diabetic retinopathy, with figures varying between 17% and 43.33% [8-10]. Despite the availability of ophthalmological services for the management of diabetic retinopathy in Cotonou, several obstacles still limit access to care. The objective of this study is to evaluate the factors associated with the low accessibility of diabetic retinopathy care services in Cotonou in 2022.

Study Method

This was a descriptive cross-sectional study carried out over a period of 3 months, from August 10 to November 17, 2022. Included were diabetic patients followed in the Endocrinology, Metabolism and Nutrition department of the CNHU-HKM, with a diabetic retinopathy confirmed by funduscopy examination less than 3 months old during the study period and having given informed consent. Sampling was non-probability by purposive choice. The dependent variable was the low accessibility of diabetic retinopathy management services and the independent variables included socio-demographic characteristics of patients,

factors related to diabetes and its treatment, socio-economic, geographic and cultural. Data were collected using a questionnaire administered face-to-face to patients. Data processing and analysis were carried out using Epi Info software version 7.2.1.0. Quantitative variables were presented as means and standard deviations, and qualitative variables as frequencies. The Chi2 test was used to analyze the factors influencing low accessibility with a significance threshold of 5%.

Results

Low Accessibility of Diabetic Retinopathy Care Services and Socio-Demographic Characteristics

Age and Sex

The average age of the patients was 56.80 ±1.90 years. The median age was 57 years with extremes of 40 and 77 years. The age group of 50 and 60 years old were the most represented, i.e. 46.15% (p=0.9).

The female gender was predominant at 0.95 with a sex ratio of 0.95 (p=0.6).

Educational Level

Table 1 presents the relationship between the low accessibility of diabetic retinopathy care services and the level of education. Educated diabetic patients accounted for 85.90%. The level of education was associated with low accessibility to diabetic retinopathy management services.

Table 1: Relationship between low accessibility of diabetic retinopathy care services and level of education.

Low Accessibility of DR Support Services					
	not	Yes	No	95% CI	p -value
Superior	33	25(75.76)	8(24,24)	1	
Secondary	24	21(87.50)	3(12.50)	1.15 [0.90 - 1.47]	0.2494
Primary	10	9(90.00)	1(10.00)	1.18 [0.89 - 1.57]	0.2324
Unschoolled	11	11(100.00)	-	1.32 [1.08 - 1.60]	0.0048

Low Accessibility of Diabetic Retinopathy Management Services and Diabetes-Related Factors

Type 2 diabetes was the most represented at 88.46% and 33.33% of patients had diabetes for more than 15 years. The average of the patients' last fasting blood sugar level was 1.48 ± 0.12 g/l with extremes of 0.56 and 4 g/l. Patients with glycated hemoglobin ≥ 7% represented 73.08% of the study population and those with fasting blood sugar greater than or equal to 2 g/l represented 16.66%. The majority of patients, 62.82%, were on a therapeutic regimen of oral antidiabetics. Untreated diabetics whose treatment combines insulin and oral antidiabetics influence the low accessibility of diabetic retinopathy management services.

Most diabetic patients stated that the treatment followed for their management of diabetic retinopathy was essentially drug treatment. No patient had benefited from laser photocoagulation (Table 2).

Low Accessibility of Diabetic Retinopathy Care Services and Geographic Factors

Diabetic retinopathy care services were located more than 10 km away for 53.85% of diabetic patients. Personal transportation was available for 39.7% of patients. Distance or means of transport did not influence the low accessibility of diabetic retinopathy care services (Table 3).

Low Accessibility of Diabetic Retinopathy Care Services and Economic Factors

the low accessibility of diabetic retinopathy management services in Cotonou. The various economic factors did not influence the low accessibility of diabetic retinopathy management services.

Table 4 shows the relationship between economic factors and

Table 2: Relationship between the low accessibility of diabetic retinopathy management services and diabetes-related factors.

Low Accessibility of DR Support Services					
	NOT	Yes	No	95% CI	p-value
Type of Diabetes					
Type 1	9	8(88.89)	1(11,11)	1.05 [0.82-1.36]	0.6648
Type 2	69	58(84.06)	11(15.94)	1	
Duration of Diabetes (in years)					
<5	17	15(88.24)	2(11.76)	1.09 [0.84-1.41]	0.4977
5 – 10	11	9(81.82)	2(18,18)	1.01 [0.72-1.41]	0.94
10 – 15	24	21(87.50)	3(12.50)	1.08 [0.85-1.37]	0.5149
> 15	26	21(80.77)	5(19,23)	1	
Antidiabetic Treatment					
None	1	1(100.00)	-	1.22 [1.02-1.46]	0.0256
Oral antidiabetics	49	41(83.67)	8(16.33)	1.02 [0.82-1.27]	0.8116
Hygiene and dietetic measures	27	22(81.48)	5(18.52)	1	
Insulin therapy	17	16(94.12)	1(5.88)	1.15 [0.93-1.43]	0.1899

Table 3: Shows the relationship between the low accessibility of diabetic retinopathy care services and the distance from the care service in kilometers.

Low Accessibility of DR Support Services					
	NOT	Yes	No	95% CI	p-value
Distance to Pick-Up Service in Kilometers					
<2	4	2(50.00)	2(50.00)	1	
[2 – 5[10	5(50.00)	5(50.00)	1.00 [0.31 - 3.18]	1
[5 – 10[12	7(58.33)	5(41.67)	1.16 [0.39 - 3.47]	0.7817
>10	52	52(100.00)	-	2.00 [0.75 - 5.32]	0.1657
Means of Transport					
Personal transportation	31	25(80.65)	6(19.35)	1	
Auto taxi	17	16(94.12)	1(5.88)	1.16 [0.94 - 1.43]	0.1483
Motorcycle taxi	21	19(90.48)	2(9.52)	1.12 [0.89 - 1.39]	0.3084

The average annual cost of diabetes treatment was 217,586.22 ± 92,618 FCFA . The median cost was 93,000 FCFA with extremes of 30,000 and 3,000,000 FCFA. The average annual overall cost of DR management in diabetic patients (consultation costs, fundus examination costs and drug treatment included) was 203,092.10 ± 58,749 FCFA . Its median value was 92,500 FCFA with extremes of 50,000 and 3,000,000 FCFA. The average overall cost of annual transport was 26,045.94 ± 160.10 FCFA . The median cost was

8,000 FCFA with extremes of 3,000 and 550,000 FCFA.

Low Accessibility of Diabetic Retinopathy Care Services and Cultural Factors

Table 5 shows the relationship between cultural factors and the low accessibility of diabetic retinopathy care services in Cotonou. The different cultural factors did not influence the low accessibility of diabetic retinopathy care services .

Table 4: Shows the relationship between economic factors and the low accessibility of diabetic retinopathy management services in Cotonou.

Low Accessibility of DR Support Services					
	Not	Yes	No	95% CI	p -value
Overall Annual Cost of Diabetes Care					
> 217,586	16	16(100.00)	-	1.27 [1.11 - 1.45]	0.0005
≤ 217,586	56	44(78.57)	12(21.43)	1	
Overall Annual Cost of Treating Diabetic Retinopathy					
≤ 203,092	61	49(80.33)	12(19.67)	1	
>203,092	15	15(100.00)	-	1.24 [1.09 - 1.40]	0.0005
Average cost of Transportation					
≤ 26,045	61	50(81.97)	11(18.03)	1	
> 26,045	17	16(94.12)	1(5.88)	1.14 [0.97 - 1.35]	0.1053
Availability of Health Insurance					
No	42	33(78.57)	9(21.43)	0.85 [0.71 - 1.03]	0.1045
Yes	36	33(91.67)	3(8.33)	1	

Table 5: Shows the relationship between cultural factors and the low accessibility of diabetic retinopathy care services in Cotonou.

	Yes	No	p -value	GOLD	IC95% [OR]
Knowledge About Diabetes					
No knowledge	22	5		1	
Vague knowledge	40	5	0.31	0.55	0.14 - 2.10
Precise knowledge	4	2		2.2	0.31 - 15.54
Knowledge About R&D					
No knowledge	43	10		1	
Vague knowledge	21	2	0.43	0.4	0.08 - 2.03
Precise knowledge	2	0		0.58	0.26 - 1.29
Existence of Prohibitions on the Management of R&D					
No	60	10	0.45	1	
Yes	6	2		1.93	0.34 - 10.96
Existence of Cultural Barriers					
No	54	10	0.86	1	
Yes	12	2		0.86	0.16 - 4.48

Discussion

Sociodemographic Factors

The mean age of the patients which was 56.80 ±1.90 years is comparable to that reported by Koki et al. [11] in Cameroon in 2015, which is 55.67 ± 8.40 years. This similarity can be explained by the predominant composition in our series of type 2 diabetic patients, whose prevalence generally increases with age, and by the often-asymptomatic nature of this condition. In contrast, a study conducted by Vonor et al. [12] in Lomé (Togo) in 2022 found that the most represented age group was 60 to

70 years old, accounting for 30.7% of cases. This discrepancy could reflect variations in the demographic composition of the study populations or differences in the clinical characteristics of diabetic patients in the study regions.

Concerning gender, we observed a female predominance, with 51.28% women in our sample and a sex ratio of 0.95. This trend is consistent with the findings of Verdet [13], who also reported a high proportion of diabetic women in his study, with a sex ratio of 0.7. These findings could be attributed to general demographics showing higher numbers of women than men, as well as gender-specific risk factors, such as physical inactivity, stress and obesity,

which are associated with increased increase prevalence of diabetes among women.

On the other hand, Vonor et al. [12] reported a male predominance in their study, with a sex ratio of 1.1. These variations observed across studies highlight the importance of considering regional and demographic differences when interpreting results and planning public health interventions to prevent and manage diabetic retinopathy.

Educational Level

The education level of patients plays a vital role in their ability to access health care. Uneducated patients may have more difficulty understanding the importance of screening and treatment for diabetic retinopathy, as well as navigating the healthcare system to obtain needed care. This highlights the need to implement appropriate educational programs to improve access to care, taking into account the different literacy levels of the population .

Factors Related to Diabetes

Diabetes and diabetic retinopathy are only followed in 17.85% and 26.92% of patients, respectively. Likewise Vonor et al [12] in Togo reported 36.7% for diabetic follow-up and consultation with the ophthalmologist. These figures demonstrate poor monitoring of diabetes and DR in our regions. Our study (62.87%) like that of Vonor [12] (67%) noted a predominance of the oral antidiabetic diet. For the management of diabetic retinopathy, most of the respondents stated that the treatment followed was essentially medicinal. This result could be explained by the unavailability of laser treatment in our health facilities requiring evacuation to neighboring countries. For Ballo [14] in Mali, 32% of patients had benefited from argon laser photocoagulation . This disparity could be explained by the unavailability of photocoagulation in Cotonou.

Geographic Factors

Diabetic retinopathy care services were located more than 10 km away for 53.85% of patients. The further away the diabetic patient's care center is, the more difficult it will be to access care, especially in our context of a developing country. In France in 2011 Vigneron et al [15] had found an unequal distribution of this medical specialty. Today, more than 2.3 million inhabitants had difficulty meeting liberal ophthalmologists.

This had the corollary of significant remoteness for part of the population, with access times likely to discourage recourse to eye care. Patients are more than an hour round trip from the nearest ophthalmologist.

Economic Factors

The average annual cost of treatment of uncomplicated diabetes which was 217,586.22 ± 92618 is close to that reported by Lissanon [16] in Benin in 2021 which is 293,911.8 FCFA. The estimate of the overall annual cost of supporting R&D varies from

one country to another depending on the technical platform. Indeed, nowadays the management of diabetic retinopathy has evolved with the advent of intravitreal injections of anti-angiogenics and corticosteroids in the complications of DR. In addition to repeated consultations, the high costs of products, the repetition of examinations and the performance of laser photocoagulation contribute to the increase in the overall annual cost of DR management. The cost of 203,092.10 ± 58,749 FCFA found in our study is higher than that of Lissanon [16] 15,875.86 FCFA which only took into account the costs of consultations and fundus examination.

Furthermore, Koki et al [11] in Cameroon reported the high cost of argon laser treatment. The average annual overall cost of transport of 26,045.94 ± 160.10 FCFA, was linked to the origin of the patients, but also to the supply of available technical platforms. Likewise, the socio-economic conditions of patients limited compliance with regular follow-up appointments. On the other hand, Lissanon [16] found an average cost of 2260± 471.92 FCFA . This could be explained by the fact that the majority of our patients were located more than 10km from DR care centers. Ankotche et al [17] in Ivory Coast found similar results in an adult diabetic population. More than half of the patients used direct payment and 46.15% of them benefited from payment by partial or total health insurance for the management of DR. As for the state's contribution in covering DR, it is limited to state civil servants who can benefit from care with partial coverage for care available in the public health sector.

Similarly, Koki et al [11] reported in Cameroon that the financing of photocoagulation was done by either the patients or their families. This requires an integrated approach involving governments, health professionals, community organizations and patients themselves. Ensuring that everyone who needs care can access it effectively and equitably is essential to prevent and manage diabetic retinopathy appropriately. Furthermore, the results of this study align with the observations of Vigneron et al. [16], highlighting an unequal distribution of medical specialists, which can contribute to difficulties in accessing care, as highlighted by Yoda [17]. Furthermore, the obstacles encountered by patients in carrying out ophthalmological consultations, such as waiting times, costs and lack of information, are consistent with the conclusions of Verdet [13] Dervan [18] and Bertholom [19].

Cultural Factors

The insufficient coverage of diabetic patients by screening for diabetic retinopathy could be explained by various parameters including patients and caregivers (treating physicians, ophthalmologists, endocrinologists) and by increasing difficulties in accessing an ophthalmologist linked to the evolution of medical demography.

According to an Irish study carried out by Dervan [18] who questioned patients on the reasons for not carrying out a fundus

examination, the factors retained were: lack of knowledge of the usefulness of a regular examination, the effects of mydriasis on driving, the absence of an appointment. Some authors [18,19], in the literature stated that 5% of patients refused ophthalmology consultation. The predominant reason for refusal was the lack of interest in this examination given the absence of visual symptoms (37%). Bertholom in his study in 2004 found that the other arguments put forward by patients were the material difficulties (cost, travel, time) to obtain this consultation (15%), the waiting time (20%) and the inconvenience caused by pupillary dilation (10%). Likewise, Verdet had found three main obstacles. The first obstacle mentioned by patients was the delay in obtaining a consultation with an ophthalmologist. In fact, three quarters of the patients surveyed took more than 3 months to obtain an appointment and the third more than 6 months. The second obstacle was the cost of the consultation which represented an obstacle to screening for 54% of patients. The importance of this obstacle was linked to the level of precariousness assessed by the EPICES score, in a statistically significant manner. The majority of patients in Verdet's study, i.e. 49% of patients, declared that the lack of information on screening for diabetic retinopathy and its risks represented an obstacle to their adherence to this screening.

References

- World Health Organization (WHO) (2016) World Diabetes Report. Geneva, Switzerland: World Health Organization.
- International Diabetes Federation (IDF) (2019) Diabetes Atlas. Brussels, Belgium: International Diabetes Federation.
- International Diabetes Federation (IDF) (2021) Diabetes Atlas. Brussels, Belgium: International Diabetes Federation.
- Picheral H (2001) Reasoned dictionary of health geography. New edition, Pp. 308.
- Massin P (2017) Eye and internal medicine: eye and diabetes. Ophthalmological realities. 240: 54-56.
- Guagnini AP, Snyers B (2007) Diabetic retinopathy. *Louvain Med* 126(3): 45-49.
- Pogorzalek N, Dubenard G, Khuc T, Proenca J, Offret H, et al. (2006) Diabetes and fundus. *Med* 2(3): 110-111.
- Assavado A, Codjo L, Alassani A, Adoukonou T, Codjo P, Monteiro S et al. (2016) Risk factors of retinopathy among diabetics patients in Benin in 2014. *J Ophthalmol Clin Res* 3(3): 1-5.
- Abouki C, Alamou S, Wanvoegbe A, Gbengnon G, Amoussou-guenou D, et al. (2016) Epidemiological aspects of diabetic retinopathy at the CHUD-OP of Porto Novo. *CBRST notebooks* 10: 80-88.
- Kerekou Hode A, Abouki C, Dedjan AH, Doutetien Djossou A, Aigbé N, et al. (2023) Risks Factors Associated with Diabetic Retinopathy at the National University Hospital Center Hubert Koutoukou Maga in Cotonou. *J Diabetes Mellitus* 13: 23-35.
- Koki G, Epée E, Helles G, Bilong Y, Dohvoma AV, et al. (2018) What cost for the treatment of diabetic retinopathy by argon laser in Yaoundé. *J Fr Ophthalmol* 41(4): 357-362.
- Vonor K, Kodjo K, Houndjafo K, Tété Y, Ayéna KD, et al. (2022) Knowledge, attitudes and practices of diabetics on the ocular complications of diabetes in Lomé (Togo). *J Soc Morocco Ophthalmol* 31(1): 197-210.
- Verdet C (2013) Study of obstacles to screening for diabetic retinopathy according to the level of precariousness: human medicine and pathology. Thesis: Medicine. Joseph Fourier University Faculty of Medicine of Grenoble.
- Ballo Y Memory (2021) Contribution of paraclinical assessment in diabetic retinopathy at CHU-IOTA. Specialization thesis: Medicine. University of Bamako: Faculty of Medicine and Odonto-Stomatology.
- Vigneron E (2013) Health inequalities in French territories. *The Health Tribunes* 1(38): 41-53.
- Dervan E, Lillis D, Flynn L, Staines A, O'Shea D (2008) Factors that influence the patient uptake of diabetic retinopathy screening. *Ir J Med Sci* 177(4): 303-308.
- Ankotche A, Binan Y, Leye A, Biekre AR, Adoueni V, et al. (2009) Serious consequences of the financial cost of diabetes on care beyond complications in sub-Saharan Africa: the example of Côte d'Ivoire. *Med Mal Metabol* 3(1): 100-105.
- Yoda A (2015) Aspects of diabetic retinopathy in diabetic patients followed at the Sourô University Hospital Center Sanou de Bobo-Dioulasso: about 246 cases. Thesis: Medicine. Technical University of Bobo-Dioulasso.
- Bertholom JL (2004) Implementation of screening for diabetic retinopathy at Rennes University Hospital. Thesis: medicine. University of Rouen.



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