

Assessing The Availability And Readiness Of Diabetes Healthcare Service In The West Region Of Cameroon

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Abstract Background: the survival of diabetic patient depends on the capacity of the health facilities to offer an adequate minimum package of healthcare. The availability of the necessary resources conditions the quality healthcare offered by a health facility. **Objective:** to assess the readiness of diabetes healthcare service in the health facilities in the west region of cameroon materials and methods: we carried out a cross sectional descriptive survey in the west region of cameroon targeting health facilities. These were selected by stratified random sampling from may to july 2016. An observation checklist was filled with the help of the head of the health facility to assess the readiness of diabetes healthcare service. We estimate the proportions of health facilities that had laboratory equipment, basic equipment, diabetic medications/commodities and trained staff on diabetes management at 95% confident interval. **Results:** of 608 exiting health facilities in the region, 100 were selected, reached and included in the study. Of these, 91 (91% [ci±4.9%]) had glucometer, 26 (26% [ci ±8.26%]) had urine dip stick-glucose. 20 (20% [ci±3.53%]) had diabetes register, 27 (27% [c±8.47%]) of the hf had diabetes clinical guidelines and 53 (53% [ci±10.20]) had at least one oral anti diabetic drug, 49 (49% [ci±10.14%]) had insulin. Out of the 774 health personnel identified in the 100 health facilities, only 79 (10.2%) were trained on diabetes management with the majority from the district hospital. **Conclusion:** the general healthcare service readiness is inadequate for proper management of diabetes. Corrective measures should include the provision of adequate laboratory equipment, clinical guidelines and trained staff for early diagnosis and management of cases.

Key words: Diabetes healthcare, resources, diabetic patients, Africa.

1. INTRODUCTION

Diabetes is a serious, common, and costly chronic disease that affects about 422 million adults aged over 18 years in 2014. About 1.9 million new cases are diagnosed annually[1]. Diabetes complications can subsequently result in higher rates of disability, increases in the use of healthcare services; decrease in household income due to lost days from work, unemployment; and premature death[2]. In most countries, commitments made through

the Sustainable Development Goals to reduce premature NCD mortality by 1/3 by 2030, and to achieve universal health coverage will require focused attention on diabetes prevention and management. Diabetic patient should be followed according to International diabetes federation (IDF) and WHO guidelines [2], [3]. This implies that the Populations most at risk for diabetes need to have access to treatment and that diabetic patient should have access to adequate treatment, monitoring of complications and education about the disease. To achieve this goal, it is

recommended that each health system has a minimum qualify personnel available in communities and at each level of care. With regards to materials and laboratory equipment; all the primary health facility should have: Diabetes treatment guide, urine strips for glucose, cetonic bodies, protein; Glucometer with strips; sphygmomanometer; Scales; Measuring tape[4] Monofilament. The secondary level of care should have all the above mention equipment plus Diapason; reflex hammer; Ophthalmoscopy; Biochemistry for glucose, lipids, renal function tests and glycosylated haemoglobin[4]. The tertiary level of care should have all the above + fundoscopy, Retinal laser treatment unit, Cardiovascular investigation equipment, Hemodialysis / Peritoneal dialysis / renal transplantation[4]. The implementation of the IDF and WHO primary health care in low-resource settings management guidelines was reported to be under-utilized in most low-income countries [5]. In Cameroon, the prevalence of diabetes was estimated in 2015 at 5,50% % and that of retinopathies which is one of the diabetic complications at about 38% [1], [6]. In other African neighbouring countries with the same level of development, this prevalence is lower. Knowing that the quality of care to diabetic patients determines the prevalence of its complications, this study was conducted to question the availability of resource needed to provide minimum care to diabetic patients at the primary and secondary level of care in Cameroon.

2. MATERIALS AND METHOD

2.1. Study design

We carried out a cross-sectional descriptive study in the West Region of Cameroon from May to July 2016. A grid of observation was filled with help of the health facility responsible to assess the availability of resources in the health facility for the management of diabetes. We estimate the proportions of health facilities that have treatment guidelines, laboratory equipment, material resources, and trained health personnel on diabetes management.

2.2. Study Area

This study was carried in the West Region of Cameroon. In 2015, it has a total of 608 health facilities, among which 6 Para-publics, 80 private confessionals, 137 privates, and 385 public structures spotted in 20 health districts. The 608 health facilities are made of 542 integrated health centres (IHC), 44 medicalized sub-divisional health centres (SMHC), 21 district hospitals (DH), and 1 Regional hospital.

2.3. Study population:

The study targeted all types and categories of health facilities officially registered in any of health districts selected for the study. We excluded health facilities that have been operating for less than two years and those who refuse to participate in the survey.

2.3.1. Sample size:

The sample size calculation was done using the measurement of a re-variance[7] at 95% confidence interval, a relative variance of 0.0225, design effect of 1.2 and diabetes prevalence (p) in Cameroon of 0.7 [1]. This

gives a minimum sample size of 88 health facilities, a sample size of 100 health facilities was adopted to anticipate for non-respondents.

2.3.2. Sampling

A total of 12 districts were randomly selected by stratified sampling from 20 health districts present in the West Region. The 12 health districts were stratified into 03 zones based on population density that is urban, semi-urban and rural districts. The number of health facilities selected from each health district was allocated proportionally to the number of health facilities in each health district and also based on the category (DH, SMHC, and IHC) and type(public, private, and confessionnal) health facility present in that district. Included health facilities were selected in each stratum by simple random sampling.

2.4. Data collection

Data were collected using a checklist which was filled with the help of the Head of a health facility or his/her representative to assess the availability of laboratory equipment, basic equipment, and trained personnel on diabetes management. The checklist was built from the IDF-Africa recommendations, National Diabetes Education Program and Access to Medicines and Supplies for People with Diabetes(7,10–12), reviewed by the research team and pretested in a health facility which was not part of the study population.

2.5. Variables

Service availability: physical presence of items in the different zones of intervention, categories, and types of the health facility.

Service readiness: include the following 4 indicators;

laboratory capacity: percentage of HF with 8 items (blood glucose, urine dip stick-glucose, creatinine, cholesterol, serum uric acid test, electrocardiogram, ionogram and full blood count);

Basic equipment: percentage of HF with 8 items (meter tape, reflex harmer, adult scale, height gauge, stethoscope, register, guidelines and educative materials)

Medications/commodities: percentage of health facilities with 2 items (insulin of any categories and oral anti-diabetic drug of any class)

Staff capacity: percentage of healthcare workers who have received training in diabetes management.

- **Trained staff:** any health personnel who have received a training, seminar/workshop or short course on diabetes management after graduating from school.

- **Zones of intervention:** health districts were stratified according to zones of interventions based on population density ie. Rural district 500 – 1000 inhabitants, semi-urban 1000 – 2000 inhabitants and urban district above 2000 inhabitants.

2.6. Statistical Analysis

Data were doubled entered in Epi info 7.2.0 and cross-checked and differences corrected using a paper grid.

Analyses were done using the same software and excel 2007 to bring out the proportions of health facilities that have laboratory equipment, basic equipment, and trained health personnel at 95% confidence interval.

3. ETHICAL CONSIDERATION

Ethical clearance for this study was obtained from the Cameroon National Ethics Committee for human research (N°2016/11/830/CE/CNERSH/SP). Each Head of the health facility was well informed and consented before information collected.

4. RESULTS

4.6. Characteristics of health facilities

A total of 12 (60%) out of 20 health districts were surveyed, in which 100 health facilities participated. Among which 12(12%) were district hospitals (DH), 15

(15%) sub-divisional medical centres (SMHC) and 73 (73%) were integrated health centres (IHC). 54(54%) were public, 38 (38%) private and 8 (8%) were confessional health facilities. Among the 100 health facilities, 44 (44%) were from urban districts, (26%) from semi-urban and 30 (30%) from rural district.

4.7. Laboratory capacity:

Here we assess the proportion of health facilities with 8 laboratory items (blood glucose, urine dipstick- glucose, Ionography, full blood count, uric acid, electrocardiogram, cholesterol, and creatinine). Health facilities from the public sectors are more likely to have laboratory equipment than the health facilities in the private sectors (see table 1). We also note that district hospital has more equipment compare to the medicalized sub-divisional health centre (SMHC) and integrated health centre (IHC) (see table 2). The least commonly available laboratory equipment was Electrocardiogram and Ionogra

Table 1: Repartition of laboratory equipment in the different types of HF

Laboratory equipment	Frequency (%)	IHC N=73 (%)	MHC N=15 (%)	DH N=12 (%)	LCL (%)	UCL (%)
Blood glucose	91 (91.0)	65 (89.0)	15 (100.0)	11 (91.7)	83.6	95.8
Creatinine	33 (33.0)	13 (17.8)	9 (60.0)	11 (91.7)	23.9	43.1
Cholesterol	15 (15.0)	5 (6.9)	3 (20.0)	7 (58.3)	8.7	23.5
Uric acid	20 (20.0)	7 (9.6)	4 (26.7)	9 (75.0)	12.7	29.2
Ionography	12 (12.0)	5 (6.9)	1 (6.7)	6 (40.0)	6.	20.0
Urine dip stick-glucose	26 (26.)	13 (17.8)	9 (60.0)	4 (33.3)	17.7	35.7
Full blood count	45 (45.0)	24 (32.9)	11 (73.3)	10 (83.3)	35.0	55.3
Electrocardiogram	7 (7.0)	2 (2.7)	2 (13.3)	3 (25.0)	2.9	13.9

Table 2: Repartition of laboratory equipment in the different categories of HF

Laboratory test	Frequency (%)	Private N= 38 (%)	Confessional N=8 (%)	Public N=54 (%)	LCL	UCL
Blood glucose	91 (91.0)	36 (94.7)	7 (87.5)	48 (88.9)	83.6	95.8
Creatinine	33 (33.0)	14 (36.8)	3 (37.5)	16 (29.6)	23.9	43.1
Cholesterol	15 (15.0)	4 (10.5)	2 (5.3)	9 (16.7)	8.7	23.5
Uric acid	20 (20.0)	7 (18.4)	2 (5.3)	11 (20.4)	12.7	29.2
Ionogram	12 (12.0)	5 (13.2)	1 (12.5)	6 (11.1)	6.	20.0
urine dipstick- glucose	26 (26.0)	12 (31.6)	0 (0.0)	14 (25.9)	17.7	35.7
FBC	45 (45.0)	20 (52.6)	3 (37.5)	22 (40.5)	35.0	55.3
ECG	7 (7.0)	3 (7.9)	0 (0.0)	4 (7.4)	2.9	13.9

4.8. Availability Basic equipment for diabetic care

This study assessed the availability of basic materials resources needed to provide a minimum care to diabetic patients using 8 basic equipment; meter tape, reflex harmer, adult scale, stethoscope, height gauge, guidelines, register and educative materials. A significant number of

health facilities more than 50% lack material such as diabetic register, reflex harmer and diabetes clinical guidelines. Diabetic register and guideline were the least available material with integrated health centres and Medicalized sub-divisional health centres registering the least that is 9.6% and 15.1% respectively (see table 4)

Table 3: Repartition of Basic equipment in the different types of HF

Material Resources	Frequency (%)	Private N= 38 (%)	Confessional N=8 (%)	Public N=54 (%)	LCL	UCL
Mater tape	85 (85.0)	33 (86.8)	7 (87.5)	45 (83.3)	76.5	91.4
Reflex harmer	41 (41.0)	20 (52.6)	2 (25.0)	19 (35.2)	31.3	51.3
Adult scale	91 (91.0)	35 (92.1)	7 (87.5)	49 (90.7)	83.6	95.8
Height gauge	66 (66.0)	26 (68.4)	4 (50.0)	36 (66.7)	55.9	75.2
Education tools	55 (55.0)	23 (60.5)	3 (37.5)	29 (53.7)	44.7	65.0
Stethoscope	91 (91.0)	33 (86.8)	8 (100)	50 (92.6)	83.6	95.8
Diabetic register	20 (20.0)	4 (10.5)	3 (37.5)	13 (24.1)	8.7	23.5
Guidelines	27 (27.0)	12 (31.6)	3 (37.5)	12 (22.2)	18.8	37.2

Table 4: Repartition of Basic equipment in the different categories of HF

Materials	Frequency (%)	IHC N=73(%)	MHC N=15(%)	DH N=12 (%)	LCL	UCL
Mater tape	85 (85.0)	63 (86.3)	11 (73.3)	11 (91.7)	76.5	91.4
Reflex harmer	41 (41.0)	24 (32.9)	11 (73.3)	6 (40.0)	31.3	51.3
Adult scale	91 (91.0)	65 (89.0)	15 (100)	11 (91.7)	83.6	95.8
Height gauge	66 (66.0)	44 (60.3)	14 (93.3)	85 (53.3)	55.9	75.2
Educative tools	55 (55.0)	36 (49.3)	12 (80.0)	7 (46.7)	44.7	65.0
Stethoscope	91 (91.0)	67 (91.2)	13 (86.7)	11 (91.7)	83.6	95.8
Diabetic register	20 (20.0)	7 (9.6)	4 (26.7)	9 (60.0)	8.7	23.5
Guidelines	27 (27.0)	11 (15.1)	7 (46.7)	9 (60.0)	18.8	37.2

4.4. Diabetes Medication

Diabetes medications here consist of oral anti-diabetic drugs of any class and insulin of any categories. Insulin of any categories was present in 44.7% and 50.0% of private and public HF. We also observed that 62.5% of confessional private HF had oral anti-diabetic medication of any class (table 5). The majority (83.3%) of districts hospitals had oral anti-diabetic drugs of any categories while integrated health centres recorded the lowest proportion of oral anti-diabetic drugs and insulin in their HF that is 39.7% and 37.0% respectively (see table 6).

Table 5: Availability of Diabetes Medication in the different types of health facilities

Materials	Freq (%)	Private N=38 (%)	Confessional N=8 (%)	Public N=54 (%)	LCL	UCL
Oral Anti-diabetic drugs	50 (50.0)	18 (47.4)	5 (62.5)	27 (50.0)	42.8	63.1
Insulin	49 (49.0)	17 (44.7)	5 (62.5)	27 (50.0)	38.9	59.2

Table 6: Availability of DM Medication in the different categories of health facilities

Materials	Freq (%)	IHC N=73 (%)	MHC N=15 (%)	DH N=12 (%)	LCL	UCL
Oral Anti-diabetic drugs	50 (50.0)	29 (39.7)	11 (73.3)	10 (83.3)	42.8	63.1
Insulin	49 (49.0)	27 (37.0)	12 (80.0)	10 (83.3)	38.9	59.2

4.5. Trained staff

774 health personnel we identify in the 100 health facilities included in this study among which 79(10.2%) acknowledge haven been trained on diabetes management. The majority of health personnel from the district hospital were trained (14.1%) while integrated health centre and private confessional had the least trained personnel that is 26(7.3%) and 2(3.6%) respectively (see table 7 and 8).

Table 7: availability of health personnel in the different categories of health facilities

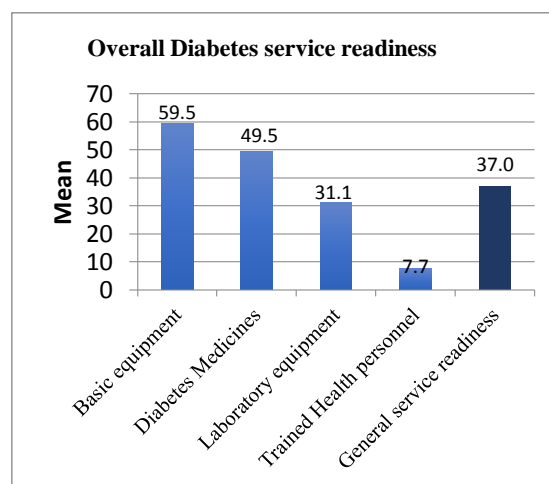
Categories of Health facilities	Number of HP present in the HF	HP trained on diabetes management N (%)	Trained HP who practice diabetes care N (%)
DH (N=9)	263	37(14.1)	45(17.1)
SMHC(N=13)	154	16(10.4)	34(22.1)
IHC (N=71)	357	26(7.3)	75(21.0)

Table 8: availability of health personnel in the different types of health facilities

Types of Health facilities	Number of HP present in the HF	HP trained on diabetes management (%)	Trained HP who practice diabetes care N (%)
Public (n=49)	493	45(9.1)	96(19.5)
Private(n=37)	226	32(14.2)	54(23.9)
Confessional(n=7)	55	2(3.6)	4(7.1)

Overall diabetes service readiness

Readiness to deliver adequate healthcare services depends on the availability of the trained staff, guideline, equipment/suppliers, diagnostics and medicines/commodities. The mean overall service readiness for diabetes management was 37.0, with the lowest readiness in the number of trained staff (7.7) and laboratory equipment (31.1) (see figure 1).



5. DISCUSSION

It was a descriptive cross-sectional study carried out in the west region of Cameroon aimed at assessing the readiness and availability of diabetes service in the health facilities. Findings from this study suggest that the general diabetes service readiness and availability is inadequate to provide a minimum care for patients suffering from diabetes (37.0%). 31.1% of health facilities had laboratory equipment these include; (blood glucose 91 (91.0%), creatinine 33 (33.0%), cholesterol 15 (15.0%), iconography 12 (12.0%), urinary dip stick-glucose 26 (26%), full blood count 45 (45.0%), electrocardiogram 7 (7.0%) and uric acid test 20 (20.0%). 59.5% of the health facilities had basic equipment such as; guidelines (27.0%), register 20 (20.0%), stethoscope 91 (91.0%), Adult scale 91 (91.0%), reflex harmer 41 (41.0%), meter tape 85 (85.0%), height gauge 66 (66.0%) and educative tools 55 (55.0%). Diabetes medication was found

in 49.5% of health facilities. However, very limited number of health personnel were trained on diabetes management 7.7%. Majority of patients suffering from diabetes remains undiagnosed despite the considerable effort put in place. However, identification of patients suffering from diabetes and those who are at risk is the key element in reducing the disease burden in the population [9]. Early detection and initiation of treatment can prevent or delay the onset of diabetes and hence reduce diabetes-related complications such as chronic kidney disease, heart failure, retinopathy and neuropathy [9], [10]. Health facilities need to be well equipped with laboratory equipment to permit early diagnosis and monitoring of diabetes and its related complications. Findings from this study show that majority of health facilities had blood glucose machine, meter tape, stethoscope and scales. This can be explained by the fact that they are easy to manipulate and are readily available at a cheaper price as compare to other equipment. This makes it suitable for a less economically developed setting like Cameroon where access to material resources and trained personnel is inadequate [1], [2]. These tests sufficiently present in the health facilities can diagnose diabetes, and some of its risk factors but the disadvantage is that it lacks precision and can't be used for proper follow up of patients. The other tests such as electrocardiogram [11], serum uric acid, reflex hammer, urine dip stick-glucose, are equally necessary for the follow up of diabetes patients [10], [12], [13]. Proper management of diabetes requires a comprehensive health system infrastructure such as guidelines for diabetes management in primary health care, availability of essential laboratory equipment for diagnosis and management of diabetes. According to national evidence-based guidelines, protocols and standards for the management of essential medicines, and referral systems and treatment for complications; and diabetes are important tools for improving care [2]. From our results, it is evident that health facilities do not possess adequate basic equipment such as diabetes clinical guidelines, educative tools and diabetes register for proper management, follow up and documentation of diabetic patients in the health facilities, which is far less than proportion gotten from diabetes guiding principles which reported that (46%) of low-income countries fully or partially implementing diabetes management guidelines. The implementation of this directive can assure a better management of diabetes even if the health personnel are not properly trained in diabetes management. In accordance with international diabetes federation, all the clinics need to have diabetes management guidelines [4]. In this like we recommend the provision of standard clinical guideline and diabetes registers to the health facilities in the Region. Adequate control of hyperglycemia is imperative to optimize patient outcomes. When lifestyle modification and dietary intervention fail to produce appropriate glycemic control, pharmacological therapy is indicated. Insulin and oral anti-diabetic medication are used to control hyperglycemia when dietary intervention fails. Metformin and gliclazide are oral antidiabetics are both present in the World Health Organization list of essential medicines [1], [2], [6]. Insulin is used to treat patients who have failed or are not responding properly to oral anti-diabetic drugs. They should both be available and accessible to all people with type 2 diabetes worldwide, according to need [1], [4]. The results of this study show that 49 (49.0%) and 50 (50%) respectively of health facilities possess Insulin of diverse categories and

oral antidiabetic drugs of the diverse class which is consistent with world health organization report 2016 [2] and IDF report [14] which reports the same proportion. The state is responsible for the Provision of insulin metformin in only 20% in the less economically developed countries [14], this explains the frequent stock out and inexistence of these medicines in the majority of health facilities. This is a clear indication that diabetes medications remains an obstacle in the fights against diabetes in the less economically developed countries including Cameroon and should be addressed as fast as possible. A range of health professionals is required for the care and treatment of diabetes, including physicians, nurses, dieticians and specialists such as obstetricians, ophthalmologists, vascular surgeons and physiotherapists [4]. But in many settings like in Cameroon, access to even the most basic health professionals with appropriate training in diabetes management is not available. While more and better-trained health professionals could rectify this problem. There are examples of innovative solutions, including up-skilling available health professionals to deliver diabetes care [2]. Results of this study show that only 79(10.2%) of health personnel in the health facilities surveyed were trained on diabetes management. And the least proportion registered at the level of the integrated health centre. These proportions are inadequate with regards to the strength of diabetes in the country [15] and it is also not consistent with the Africa declaration on diabetes, which state that all the consulting health personnel in the health facilities should be trained by 2015 [4]. We note here that the majority of health personnel who offered diabetes healthcare were not trained. These show a clear indication that the health facilities in the west region of Cameroon have not adhered to the international diabetes federation recommendations. This study presents the following limitations, the questionnaire and scoring were developed by authors, more so, this study cannot be generalized in the entire Cameroon health facilities as it recruits only health facilities in the West region of the country, and they may have differed in a larger context. Nonetheless, this is one of the few if not the first study conducted on this site devoted to evaluating the readiness of service for proper management of diabetes in the region. Further studies need to be done with a large sample to elucidate the impact of the price of equipment, medications/commodities, and consumables on the diabetes service readiness.

6. CONCLUSION

Diabetes services availability and readiness in the west region of Cameroon is poor especially in terms of qualified trained personnel, availability of laboratory equipment, and diabetes medications/commodities. Corrective measures should include the provision of adequate laboratory equipment, clinical guidelines and trained staff for early diagnosis and management of cases. A similar study should be under taken in the health facilities in the other regions to better understand the overall diabetes service availability and readiness in Cameroon. Furthermore, studies need to be done with a large sample to elucidate the impact of the price of equipment, medications/commodities, and consumables on the diabetes service readiness.

7. DECLARATIONS

7.1. Acknowledgments

We sincerely thank all the District Medical Officers (DMO) in the West Region of Cameroon, and all the Head of Health facilities who accepted to participate in this study.

7.2. Competing interests

The authors declare that they have no competing interests.

7.3. Ethical approval and consent to participate

The ethical clearance for the study was obtained from Cameroon National Ethics Committee for human research (N°2016/11/830/CE/CNERSH/SP). Participants were well informed and they consented before interviewed. Confidentiality was respected.

7.4. Authors' contributions

Study conception and design MMA, JA, data collection MMA, Data analysis and interpretation MMA, JA, drafting of manuscript MMA manuscript critical revision MMA, JA, VAT, and PW. All the authors read and approved the final version of the manuscript.

LIST OF ABBREVIATION

- **DH:** District hospital
- **DM:** Diabetes mellitus
- **IHC:** Integrated health center
- **HF:** Health facility
- **HP:** Health personnel
- **IDF:** International diabetes federation
- **NCD:** Non communicable disease
- **MHC:** Sub-divisional medical health center
- **WHO:** World Health Organization

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