



Geographical Distribution of HIV-patients with Respect to HIV-treatment Units in Cameroon: A Cross-sectional Study

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Abstract: The treatment of HIV-patients is a key component to HIV/aids control strategies. Since 2007, Cameroon is treating HIV-patients for free within decentralized treatment units created in functional health districts. This study aimed to map the geographical distribution of HIV-patients with respect to that of treatment units in Cameroon. We conducted a cross-sectional study in which functional health districts with HIV-treatment units were exhaustively sampled to map the local access to antiretroviral care in the Cameroon West region. Patients from these units were randomly selected and recruited during their monthly period of receiving antiretroviral drugs. Four hundred and seventy-two patients were included. The mean age of participants was 42 (\pm 10) years with a sex ratio male/female of 1/3. Fourteen units were distributed in 09 health districts (45% coverage) and 11/20 districts had no Treatment unit. Sixty two percent (294/472) of participants resided in the health district of their screening and 65% (308/472) were follow up in the health district of residence. Nine of ten patients resided in their treatment health region. Less than 10% of patients travel from health districts with no HIV-treatment unit. Close to 1/5 (74/382) patient migrated from local health district with treatment unit to another local health district for follow up. Second line treatment was not available except in one public and one private treatment unit. The distribution of HIV-treatment units is strongly linked to the geographical distribution of HIV-patients across health districts. We therefore believe that the creation of treatment units in health districts still lacking them can significantly increase screening and treatment of patients in this region.

Keywords: Distribution, Residence, HIV-treatment Unit, Health District, West-Cameroon

1. Background

The human immunodeficiency virus is a high public health concern today in the world. Considerable clinical and operational findings have been made and are still ongoing to better understand and fight the disease. Among these

findings, effective medication using HIV-antiretroviral molecules in appropriate protocols is known to be successful both for the treatment of HIV-infected individuals and the prevention of the disease [1]. Given these clinical

achievements, these drugs are widely recommended by the United Nations together with the global health challenges as key control strategy to fight against HIV/AIDS [2]. To appropriate and meet these challenges, countries develop, adopt, support and fund various actions together with WHO recommendations to scale-up sustainable access to HIV-treatments for targeted persons locally [3-5]. To do this, low and middle income countries (LMICs) especially with limited resource health systems, implement the decentralization of ART (HIV-antiretroviral treatment) for HIV-infected patients [6].

WHO reported that more than 14.9 million of people living with HIV were under antiretroviral therapy worldwide, including 13.5 million (more than 90%) in low- and middle-income countries and this was only 40% of people living with HIV [7]. In the other hand, the availability of therapeutic protocols in Africa remains the lowest meanwhile this part of the world shelters more than 90% of the ART (Antiretroviral treatment) needs [8, 9]. Like many countries, Cameroon adopted this system as one of the strategic axes of its national policy to control HIV through the creation and extension of care units since access to ART was made free in 2007 [10, 11]. This strategy was in direct line with that of the international community to effectively treat 90% of diagnosed persons in order to make the viral load undetectable and thus control the transmission of the virus [12, 13], that is why Cameroon national strategic plan for fight against HIV through its first objective aligns with the document "Vision 2035" adopted efficient medical care to PLHIV as main challenge [11, 14]. The national decentralized policy for the therapeutic follow up of HIV patients has at the central level a National AIDS Control Committee which is in charge of planning, partnership and resources mobilization, and hospitals Reference for the therapeutic follow-up of patients. In regions, we have Regional Technical Groups responsible for technical coordination and support to district, but also provided with specialized treatment centers. At Health District, we find treatment units (TU) that receive newly diagnosed patients and provide them with first-line antiretroviral treatment. Generally, this TU is under the responsibility of a general practitioner with nurses involved in the overall follow-up of the patients.

In Cameroon, as in many sub-Saharan countries, the prevalence of HIV is still high (4.3% in 2011) as the number of new infections keep increasing (6 new infections per hour) [15, 16]. Sexual activity remains as important as the fertility index among PLHIV. multi-sexual partnership and the desire of having a child which is a warning signal for rapid and precise intervention are

also important [15]. In the other hand all regions of the country are affected by the pandemic with prevalence that varies from region to region; but more, the country had an inequitable distribution of care units from one region to another as well as care offer varies with the health pyramid, which can highly cause patients to migrate and face resultant difficulties.

In the last decade, the number of care units created has considerably increased over time to catch up on the increasing number of HIV cases in the country. 163 treatment units (61% coverage of health districts) were functional throughout the country and the active line was estimated to 13,147 patients in the beginning of 2015 for the study area. The health system is weak and resources are still limited; This has serious implications on health programs despite developed policies and strategies [16]. As evidence, all HIV-screened patients do not have access to treatment because of limited resources. There is then much to evaluate as far as quality, availability of care and accessibility to reference structures are concerned [17, 18]. We believe that due to inadequate global care, many patient do not take their treatment where they live for one reason or the other and they move from one health district to another causing an increase of lost to follow up patients. What is the proportion of patients taking treatment to the nearest treatment unit to their residence? The objective of this study was to describe the distribution of PLHIV with respect to their treatment unit.

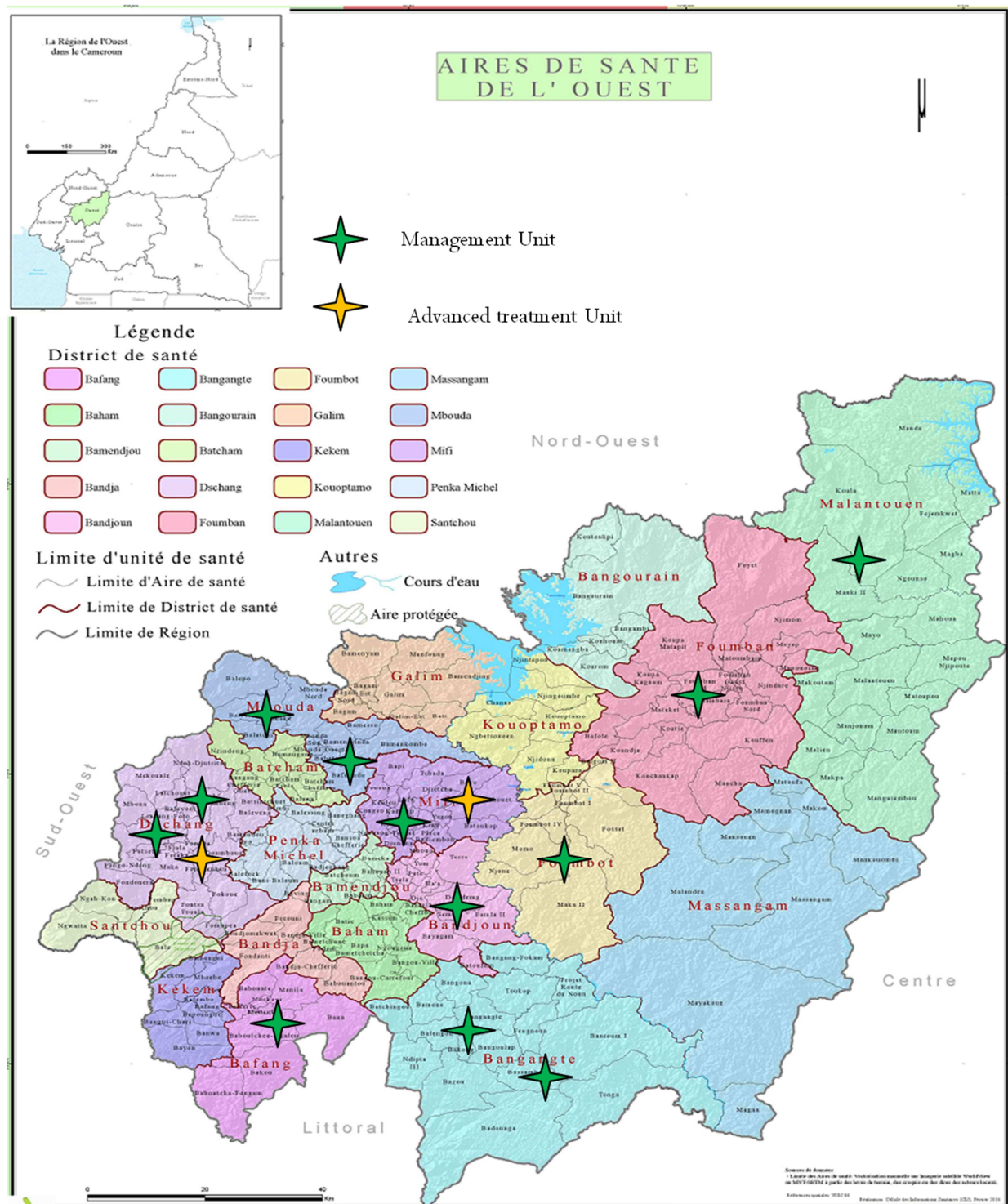
2. Materials and Methods

2.1. Study Design

We conducted a cross-sectional descriptive study from June 2015 to February 2016. Functional health districts with HIV-treatment units were exhaustively sampled for the mapping of the local access to antiretroviral care in the region. Consenting patients of these units were randomly selected, and submitted to a face to face interview in order to describe their geographical distribution around care units. They were recruited during their monthly period of receiving antiretroviral drugs.

2.2. Study Site

The Cameroon West region was our study area. The epidemiological profile as in Figure 1 showed a general HIV prevalence of 2.8% from the recent national health demographic survey, with considerable number of female sex workers. Curiously, this prevalence was 3 times lower than those of the three surrounding and had better access to healthcare [19, 20].



2.3. Sampling and Sample Size

All functional health districts in the region with at least one unit offering care to people living with HIV were targeted. Public and private units were exhaustively selected. The study population was HIV patients follow up in any of the regional treatment units. Eligible patients had to be registered in the active line of the health facility for therapeutic follow-up for at least 06 consecutive months with

an officially opened file on his/her behalf in the care unit. Participants were randomly selected in targeted units from the patient records and missing or absent respondents were replaced. The sample size was estimated from the table 1. a formula of the WHO Practical Manual of Sample Size determination in Health Studies [21]. We considered the following parameters: the regional HIV prevalence ($p=2.8\%$), a 95% level of significance ($z=1.96$), a precision $d=0.05$ and a non-response rate of 10%. The minimum sample size

required for the study was 419 participants and the number of patients sampled in each unit was estimated proportionally to its size in the total active line of the region.

2.4. Data Collection

Data were collected only from consenting patients. This was done using a questionnaire administered in face to face interview in a secret box room arranged for this purpose. Data included demographic, patients' residence and the treatment centre related information.

2.5. Data Analysis

Data were keyed and analyzed using software Epi-info (version 7.1) to estimate proportions. MS Excel and MS Word 2007 were used for graphs and tables.

3. Results

3.1. Characteristics of the Study Population

Four hundred and seventy-two patients from 08 functional treatment units participated to this survey. The estimated active line was 13.147 patients for the whole region. The mean age of participants was 42 (32-52) years with a sex ratio male/female of 1/3. About 51.9% (245/472) of patients had at least attained high school and 69.1% (326/472) were Christians, compared with 20.1% (95/472) of Muslim religion. Even if 40% (189/472) of this sample is married to the monogamy regime, 25.2% (119) is made of widowers. We found a median fertility rate of 03 children per patient. Figure 2 tells more about the ethnographic origins of participants.

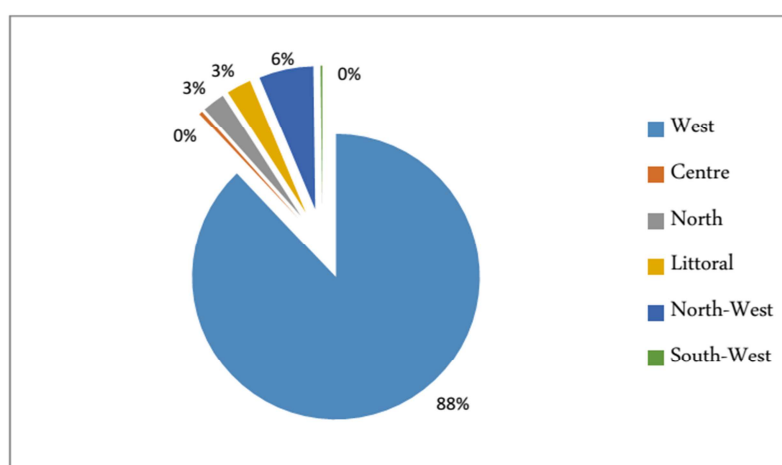


Figure 2. Ethnographic distribution of participants.

3.2. Operation of HIV Treatment Unit in West Region

The local management of HIV patients stands on a 3 levels system. The peripheral level is implemented in district-hospital-like health facilities which are provided with treatment unit (TU) and staff. These are operational units for the first level of reference in the system. Nine of the 20 health districts (45% coverage) were provided with at least a TU for a total of 14 TU. The Bafoussam regional hospital (public) and the DREAM private centre (Dschang) go with intermediate level for patient observation, references, specialized care to patients. These are Advanced Treatment Centres (ATCs). Though first line patients are here follow up, these centers had as mission to manage treatment failures and cases of resistance to first line antiretroviral treatments. The government regional staff had also to supervise attached Treatment units and update them with new skills. At the top, the central level with Ministry of Public Health was for supervision and health strategies and policy statements. The eligibility of patients to HIV therapy respected to the national guideline. Some entered in the active line through screening, some through transfer and medical reference. Patients received their drugs after check up by the medical practitioner.

Many antiretroviral molecules were used for patient

treatment in this region. For the first line, 04 protocols including 2 NRTI + 1NNTI (nucleotide reverse transcriptase inhibitor and non-nucleotide reverse transcriptase inhibitor), the IP reserved for the ATC only. In adults and adolescents, first-line ART includes Zidovudine, Lamivudine, Efavirenz, Nevirapine and Stavudine. The second line treatment was accessible only in the Bafoussam ATC and the Dschang *St Vincent de Paul* Hospital on medical reference. As regards to lab tests, CD4 count, Viral load were available only in ATCs. Other routine examinations (BC, ASAT, ALAT, Creatine, Amylasemia, Triglycerides, Cholesterol, fasting glucose, etc) were available in district hospitals.

3.3. Access to Antiretroviral Care for Patients in Cameroon Western Region

From the twenty (20) functional health districts of this region 09 (45% coverage) were provided with at least one TU as mapped in Figure 3. One health district hosted three TUs, 03 had two TUs and 05 had one. A total of 14 units were functional to deliver HIV care to patients, thus 1 TU for 939 patients. Four of the 14 (28.6%) were logged in private health facilities. Table 1 summarizes the distribution of patients in health facilities and their proportions in the total active line of the region.

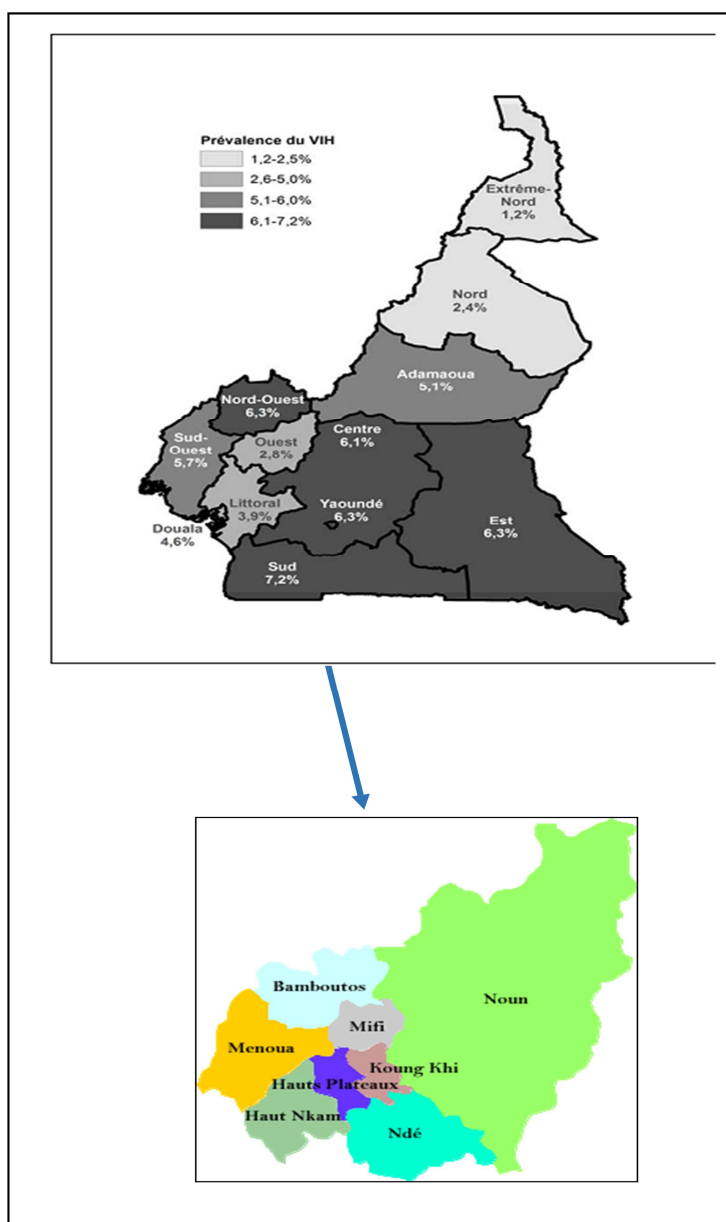


Figure 3. West regional health map and geographical distribution of treatment units.

Table 1. General distribution of HIV patients in health districts.

N°	Health District	ATC/TU location	Type of HF	AL 2015	Proportion in the total AL (%)
01	BAFANG	ALDH Bafang	Privat	1012	7.7
02	BANDJOUN	Bandjoun DH	Public	70	0.5
03	BANGANGTE	Bangante DH	Public	323	2.5
		Bangoua	Confessionnal	423	3.3
04	DSCHANG	Dschang DH	Public	899	6.9
		DREAM Centre	Confessionnal	1116	8.5
		UTC University	School	35	0.2
05	FOUMBAN	Foumban DH	Public	1820	13.8
06	FOUMBOT	Foumbot DH	Public	1120	8.5
07	MALANTOUEN	Malantouen DH	Public	257	2
08	MBOUDA	Mbouda DH	Public	1243	9.4
		ALDH Mbouda	Privat	261	2
09	MIFI	Police MC	Public	222	1.6
		Bafoussam RH	Public	4346	33.1
Total				13147	100

UTC= University Treatment Centre, DH= District Hospital, RH= Regional Hospital

3.4. Geographical Distribution of Patient Around Treatment Units

Close to 23% (107/472) of patients were diagnosed out of the study region. Health districts with at least one TU diagnosed 73% (345/472) of patients under treatment. Bafoussam (regional capital) diagnosed 134 (28%) patients and 37% (40/107) of those who were screened out of the region came from Douala. Sixty two percent (294/472) resided in the health district of screening. See Figure 4 for distribution per health district. About 97% (460/472) of participants were diagnosed in a health facility and the

remaining 3% in mobile caravan and at home.

With respect to treatment units, 65% (308/472) of sample patients were follow up in their health district of residence. See Figure 3 for distribution per health district. 81% (382/472) were residing in the study region with at least one treatment unit in their health district of residence. Close to 1/5 (74/382) patient migrated from local health district with treatment unit to another local health district for follow up as in Figure 4 and Figure 5. Overall, 8% (40/472) resided in surrounding regions but were normally follow up in the study region.

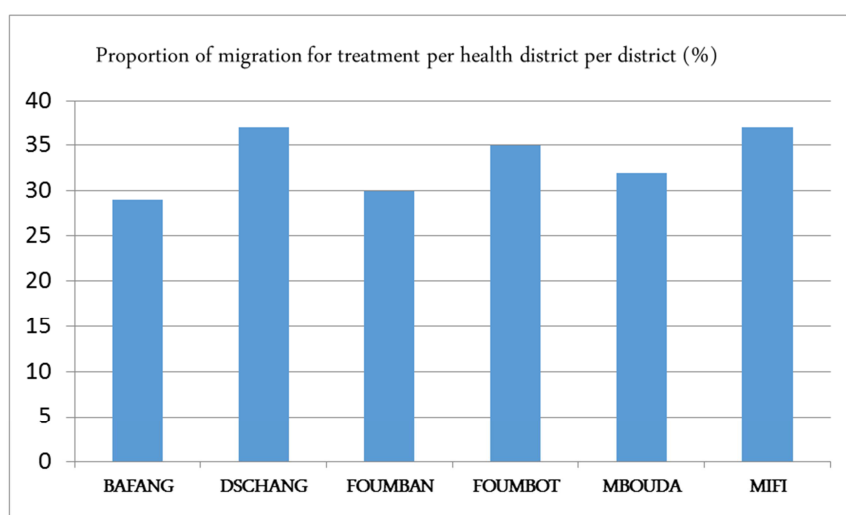


Figure 4. Proportion of migrations for treatment sake per health district with care units.

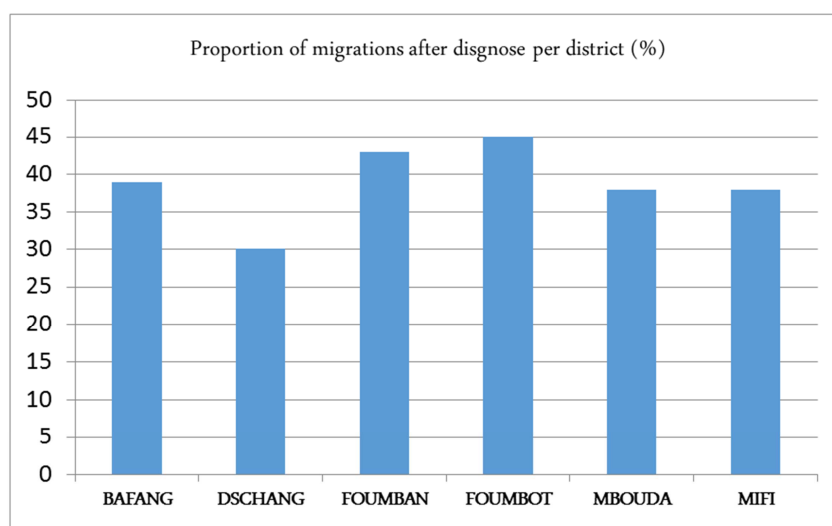


Figure 5. Proportion of migrations per health district after patient is diagnosed.

4. Discussion

This paper attempts to describe the access to ART and the geographical distribution of HIV infected patients under treatment with respect to treatment units, thus to better understand the influence of TU in a given health area.

The West is the smallest of the 10 regions of Cameroon

and it counted at the time of this study 20 functional health districts of which only 09 had at least one functional TU (45% coverage). Sixty two percent (294/472) of participants resided in the health district of their screening. With respect to TUs, 65% (308/472) of sample patients are follow up in their health district of residence. Close to 1/5 (74/382) patient migrated from local health district with treatment unit to

another local health district for follow up. About 72% (274/382) of participants were follow up in the diagnose health districts. This tells us how limited is access ART in this area of the country and how it does not yet meet with WHO standards on decentralization of ART to HIV patients [22]. Disparities are recorded at all levels, both between regions, urban and rural areas. Resources are limited to insure better care to patients meanwhile health facilities are the main gate for HIV patient recruitment and detection. Regardless to the quality of patient management, the low coverage of TU in Cameroon West region does not match at all with the generalization of the pandemic. Eleven of the 20 health districts had no one treatment centre and they were even less represented in the active line. We can then assume that, given the population of this region that year, about 28% of them were supposed not to have direct access to ART care from their residing health districts; not considering the fact that only divisional head cities were provided with a care unit in districts with access to ART. It is therefore not surprising that from this study, recruited patients were most of them inhabitants of the region and they resided mostly in health districts with at least one care unit. The presence of a TU for care delivery to HIV patients in a health district determines the recruitment rate of HIV subjects in the active line since 65% of them are follow up in their districts of residence. After they are diagnosed, they are committed to take their first treatments where they are diagnosed if there be a care unit; otherwise, they can be exposed to long distance displacements which can later become a serious limitation factor to access to adequate early treatment. Regardless to the therapeutic histories and difficulties in accessing treatment in units, patient distribution throughout the region is highly dependent on the distance between the patient residence and the follow-up unit [23, 24]. Even for the local health system, it is clearly known that the more health care is closer to populations the better improved is their access, especially the most vulnerable. The context of poverty and developing countries does not promote greater integration and adherence of remote populations to health interventions, yet they also carry the burden of current health problems and cannot achieve results as good as those of urban areas [25, 26]. The decentralization of access to antiretroviral treatment through the creation of TU in Cameroon health districts made it possible to state that this health policy is an increasing factor for the detection, recruitment and control of HIV patients in the study region [23, 25].

It is necessary to go toward remote populations with healthcare to break the silence of the districts weakly or not represented; otherwise, the epidemic will silently continue to spread and efforts made so far will be in vain meanwhile the results would have been better even in a context of limited resources [27-29]. HIV has also become a concern in rural areas, the best interventions should also target these sometimes ignorant populations. The integration approach would allow the primary health care system of the public sector to test more HIV patients, place more patients on ARVs faster and more efficiently, thereby reducing the

number of patients lost to follow-up and achieving greater geographical coverage of care versus vertical model [28, 30, 31]. It is therefore clear that the low representation of other districts in the region can be explained by the low level of recruitment of PLHIV and the geographical inaccessibility of these populations to ART [23, 32]. Creating more care units in these districts would not only facilitate easier access to ART, but also a large recruitment of PLHIV with as immediate consequence the control of this target population and even a reduction in long-term of health expenditure [23, 27, 28].

Migrating patients should certainly be either those coming from distant districts and who could not overcome the distance barrier and because of limited resources finally returned to their residence districts for ART care, those under second-line treatment (effective only to the ATC of Bafoussam and Dschang), those having enough resources to be follow up by specialists in the biggest cities of the country or finally those looking for discretion as stipulated by many studies [31, 33, 34]. Districts without any Treatment units are less represented in the active line than surrounding region, surely because most of them (72%) are follow up where they are diagnosed. The representativeness of Littoral, Adamawa, Centre and Northwest regions in our study is surely linked to the fact that this region shares its geographical borders with them, thus a simplified access to West units as compared to the main units in their regions [23, 25]. A stronger representativeness of patients from Littoral region can be explained by the overloaded Treatment units found in this region of the country compared to their insufficient supply of ART, added to difficulties these patients encounter to obtain their treatment and to ensure a better therapeutic monitoring [31, 32, 35-37]. That is why there is a considerable proportion of non residence in health districts like MIFI and Dschang, immediately connected to Littoral with highway routes. In these large metropolises, medical promiscuity gives way to poor patient follow-up, coupled with other factors such as drug shortages, the cost of certain services supposedly free, stigmatization and non-respect of patient confidentiality [35, 38, 39].

It is no longer necessary to demonstrate that the presence of a unit providing care to HIV persons guarantees the accessibility to indigenous PLHIV and thus could considerably lead to a better control of PLHIV and somehow reduce loss sight to follow up patients in the Cameroon western region [23, 26, 28, 30, 31].

The shortcomings of this research project include the fact that HIV children were not involved given the fact they are managed by another program which is the Prevention of mother-to-child Transmission of HIV (PMTCT). Their geographical distribution within health districts could influence that of adults follow up in classic Treatment units. Another limit is that missing patients to the random selection were simply replaced, so we think that high personalities living with HIV could not be interviewed even when they could be randomly selected from the list of the active line. This is because it is difficult and even impossible to find

them lining with others routinely and during this survey. Notwithstanding, regarding the study design and the quality of data collected, data source and trained surveyors to collect these data, we believe that the results of this study can be exploited and even inferred to the whole region.

5. Conclusion

The distribution of ART units strongly influence the geographical distribution of HIV patients across health districts in the Cameroon West region. The national policy of the decentralization of access to antiretroviral therapy can seriously improve the recruitment of patients and empower the control of the active line. Access to antiretroviral therapy is very limited in the western region of Cameroon. However, the distribution described in this study targets screened patients only; it is therefore necessary to look into "silent" districts to understand how HIV patients are managed especially in a context of high prevalence. Health authorities are urgently challenged to strengthen strategies to expand the supply of adequate care to patients living with HIV.

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Ethics Approval and Consent to Participate

Ethical clearance was obtained from the Cameroon National Research Ethical Committee before the implementation of the study (N° 2014/12/666/CE/CNERSH/SP). All participants were well informed and they consented with their signature to participate. For minor (Age < 21), the consent was given by their guardians and the assent given by the participant.

Competing Interests

The authors declare that they have no competing interests.

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Author's Contribution

APG contributed in conceiving the study and design,

organized and coordinated data collection, keyed, cleaned and analyzed data, drafted the manuscript and coordinated its review.

JA contributed in the study conception and design, drafted the manuscript and coordinated its review.

PEL contributed data entry.

APG, JA, MNY, BAC, PEL, and ACB contributed in revising the manuscript.

All authors read and approved the final manuscript

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