Determinants of HIV Positive Infants Treatment Gaps in the Centre Region

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Abstract

Studies from sub-Saharan Africa have highlighted significant challenges in providing antiretroviral therapy (ART) to HIV positive Infants. In these studies, just 24% of HIV positive children are on treatment and in Cameroon Just 18% (UNAIDS, 2017), there are still gaps involved in treatment of these infants. This study aimed at evaluating the treatment gaps and identifying the health care system factors influencing the treatment gaps among HIV-positive infants in the Centre Region of Cameroon. The study was an observational study in which interviews were done in health facilities. Results obtained showed that the main factors that are influencing treatment gaps are occasional stock outs of ARVs and Patients who still find it difficult to accept their status. The factors influencing treatment gabs among HIV-infected infants did not show any difference between rural and urban areas (p=0.204). The main recommendation from this study is that health workers should be trained on Supply chain management.

List of abbreviations

HIV	Human Immunodeficiency Virus
PMTCT	Prevention of Mother to Child Transmission
PLWHIV	People Living With HIV
CD4	Clusters of Differentiation Cells
ARV	Antiretroviral
ART	Antiretroviral Therapy
MNCH	Maternal, Neonatal and Child Health
UNAIDS	United Nations Program On HIV/AIDS
WHO	World Health Organisation
EID	Early Infant Diagnosis
UNICEF	United Nations International Children's Emergency Fund
MAC	Mycobacterium Avium Complex
LIP	Lymphoid Interstitial Pneumonitis
HAART	Mother to Child Transmission
LPV/r	Lopinavir/Ritonavir
NVP	Nevirapine
NNRTI	Non-Nucleoside Reverse-Transcriptase Inhibitors
ASHE	American Society for Healthcare Engineering

Introduction

What Is HIV?

According to WHO definition, HIV is Human Immunodeficiency Virus which infects cells of the immune system, destroying or impairing their function. Infection with the virus results in progressive deterioration of the immune system, leading to "immune deficiency." The immune system is considered deficient when it can no longer fulfil its role of fighting infection and disease. Infections associated with severe immunodeficiency are known as "opportunistic infections", because they take advantage of a weakened immune system(WHO, 2017).

Epidemiology of HIV

Global epidemiology of HIV

According to Global AIDS statistics by UNAIDS, in 2017, there were 36.9 million people living with HIV. 35.1million were adults and 1.8 million children less than 15 years of age. 75% of all people living with HIV knew their HIV status. Leading to about 9.4 million people who did not know their status. 21.7 million People living with HIV were accessing antiretroviral therapy, an increase of 2.3 million since 2016 and up from 8 million in 2010. 59% of adults aged 15 years and older living with HIV had access to treatment, as did 52% of children aged 0–14 years. 65% of female adults aged 15 years and older had access to treatment however, just 53% of male adults aged 15 years and older had access. 80% of pregnant women living with HIV had access to antiretroviral medicines to prevent transmission of HIV to their babies. New HIV infections have been reduced by 47% since the peak in 1996. In 2017, there were 1.8 million new HIV infections, compared to 3.4 million in 1996. Since 2010, new HIV infections among adults have declined by an estimated 16%, from 1.9 million to 1.6 million in 2017. New HIV infections among children have declined by 35%, from 270 000 in 2010 to 180 000 in 2017. AIDS-related deaths have been reduced by more than 51% since the peak in 2004. In 2017, 940 000 people died from AIDS-related illnesses worldwide, compared to 1.9 million in 2004 and 1.4 million in 2010. The coverage of antiretroviral therapy (ART) among children living with HIV has also notably improved since 2010. Nevertheless, in 2016, only 24% of the estimated 2.1 million children in sub-Saharan Africa living with HIV were receiving ART (UNAIDS, 2017). This is in line with the study on pediatric treatment gaps in 7 east and southern countries in which just 41% had met the target of 81% coverage(Saito *et al*., 2018). Infants and younger children living with HIV have an exceptionally high mortality without access to HIV care and treatment, with a mortality of about 30% by the first year of life and 50% by their second year of life (WHO, 2017). Many of these HIV-related deaths could be avoided by identifying HIV infection early and initiating ART rapidly (WHO, 2017) In Cameroon, The National AIDS control committee is the main body for the fight against HIV. But there are partners also involved in technical support. They include CHAI, UNICEF, EGPAF and CBCHS. Most of these bodies have augmented effort to reduce the gap involved in the treatment of HIV positive Infants. In the Centre Region in particular, as from 2014, efforts have been made to reduce the high turnaround time from diagnosis to treatment of HIV positive infants, these strategies include: provision of bikers to health facilities to facilitate the transportation of samples for testing, training of health workers on early infant diagnosis and follow-up, and making sure that there is adequate supply of test kits and treatment regiments (Celine *et al*., 2011). In 2016, the pilote phase of Point of care diagnosis of HIV was introduced. Despite all these inputs there are still gaps in treatment of HIV positive infants. This study is designed to evaluate the treatment gaps among HIV-positive infants in the Centre Region of Cameroon, as well as identify the factors influencing the treatment gaps. The goal is to create awareness to the health personnel and decision makers on the need to identify this determinant and make proper decisions.

Problem statement

Despite the fact that considerable efforts have been made to reduce the time in which Infants tested positive for HIV are placed on treatment in the Center region of Cameroon, HIV treatment facilities still register treatment gaps. This gap may be as a result of stock out, long turnaround time of Early Infant Diagnosis (EID) result or lack of qualified human resources consequently putting the children at high risk of dying within the first two years of life.

Rationale of the study

Studies reporting treatment gab among HIV-positive infants in Cameroon are not readily available. To address this, we assess the treatment gabs and factors influencing the treatment gab among HIV-positive infants in the Center region of Cameroon. Finding from this study will help Decision makers to provide prompt action on the proper management of the HIV+ Infants.

Research question

- Are there treatment gabs among HIV-positive infants in the Center region of Cameroon?

- What are the factors influencing the treatment gabs of HIV-positive infants in the Center region of Cameroon?
- How does the treatment gap vary with geographical setting?

Objectives

General objective

To assess the treatment gaps among HIV-positive infants in the Centre region of Cameroon, as well as identify the factors contributing to the treatment gaps, in order to generate data that will improve the management of the target population.

Specific objectives

- To identify all the health facilities that have HIV positive infant's treatment Gaps.

Table 2. 1. Showing the districts and health facility in which, the study was carried out

DISTRICT	HEALTH FACILITY
District Ayos	CMA Kobdombo
District Bafia	CSI Urbain de Bafia
District Biyem Assi	Centre de Sante Marie Immaculee
District Cite Verte	CME Fondation Chantal Biya
District Cite Verte	CS Notre Dame de la Merci
District Djoungolo	Centre de Sante Integre D'Abom
District Djoungolo	Centre De Sante Notre Sante
District Djoungolo	Centre Hospitalier Essos CNPS
District Djoungolo	Centre Medical Marie Reine Etoudi
District Djoungolo	CMA ELIG ESSONO
District Djoungolo	CMA MVOG ADA
District Djoungolo	CSI EMANA
District Djoungolo	Dispensaire Catholique Etoudi
District Djoungolo	Hopes Services Clinic
District Djoungolo	Hopital Catholique Deo Gracias Afrique Future
District Djoungolo	Hopital de District Olembe
District Djoungolo	Hopital Général de Yaoundé
District Djoungolo	Hôpital EPC Djoungolo
District Djoungolo	Hôpital Gyneco-Obstetrique et Pédiatrique de Ydé (HGOPY)
District Djoungolo	JOSS
District Efoulan	HD Efoulan
District Mbalmayo	CENTRE MEDICAL CATHOLIQUE OBOUT
District Mbalmayo	CSI Ngallan
District Mbandjock	Centre Medico Churigical SOSUCAM II
District Mfou	Centre de sante Catholique Nkoabang
District Mfou	CS SAINTE CECILIA
District Mfou	CSI Nkolafamba
District Mfou	HD Mfou
District Ndikinimeki	Hôpital de District de Ndikinimeki
District Nkoldongo	CMA Nkomo
District Nkoldongo	CMA Odza
District Ntui	Centre de Sante Catholique Nyamanga II
District Ntui	CENTRE MEDICAL HEALTH ECOLOGY
District Ntui	CMA Mbangassina
District Ntui	HD de Ntui
District Obala	CSI Mt de Oliviers
District Obala	Hôpital Ad Lucem D'Efok
District Obala	Hôpital de District d'Obala

District Okola	HD Okola

- To determine the factors influencing the treatment gabs among HIV-positive infants in the Center region of Cameroon.
- To compare the factors influencing the treatment gabs between rural and urban areas.

Methodology

Study area

We used an observational study design. This study was carried out in the Centre region of Cameroon. This region encompasses the political Capital of Cameroon. This Region has an estimated population of 4 602 762 habitants (DHIS2 Minsante), 30 Districts, 287 Health Areas, 28 District Hospitals and 6 central Hospitals. There are 1281 health facilities and 96 HIV care and treatment centers (Fig 2. 1). This study was carried out in 39 health Facilities that recorded HIV positive infant Treatment Gaps generated from the District Health Information System (DHIS2 Cameroon). The Table 2.1 below shows the distribution of the Health Facilities.

Figure 2.1. Health map of the center region (source CIS Minsante)

Study design and duration

This was cross-sectional observational study conducted between 20th of January to the 8th of March 2019.

Study population

The target population was the head of health facilities, HIV Treatment Centre coordinators, PMTCT focal points and Psychosocial Workers.

Inclusion and exclusion criteria

In this study all Health facilities that reported at least 1 infant that was not placed on treatment was included. Health facilities that did not accept to respond to the survey were excluded.

Sampling method

Purposive sampling technique was used in this study. This is because it identified all the health facilities that reported at least one infant that was not placed on treatments in 2018.

Sample size

A total of 39 health facilities were assessed during this study. These 39 health facilities were those that met the criteria. That is all these health facilities had at least one infant that was not placed on treatment in 2018.

Data collection tools

Qualitative semi structured interviews with health workers were conducted to explore participants' views of why the infants were not placed on ART. Interviews consisted of open-ended questions to explore perceived barriers to ART initiation. Topics covered in the interview were the referral system, quality of care, HIV testing and treatment protocols, and pharmacy and laboratory facilities. Interviews were held with local physicians; questions were adapted if necessary, to ensure that they were appropriate for all participants.

Data were collected until the saturation point (Ritchie *et al.*, 2003) was reached; we are therefore confident that the findings presented are internally valid. Health workers—pediatricians, clinicians, nurses, counselors, and adherence officers—involved in pediatric HIV care were interviewed. Some interviews were conducted on phone due to distance to the health facility.

Data management

Data was analyzed using Excel and frequency distribution tables were used. The Pearson's chi-square test was used to compare factors influencing treatment gab between rural and urban areas. Statistical significance was set at $p<0.05$.

Results

Gaps per health facility

The Table 3.1 below shows distribution of gaps per Health Facility that was generated from the District Health Information Software (DHIS2) for HIV program. Out of the 165 infants tested positive just 102 were placed on treatment giving a gap of 38.18%.

Table 3. 1. Gaps per health facility

Org unit level 2	Organisation unit	Total HIV positive Infants	Total HIV positive infant on treatment	GAP
District Ayos	CMA Kobdombo	2	1	1
District Bafia	CSI Urbain de Bafia	1	0	1
District Biyem Assi	Centre de Sante Marie Immaculee	1	0	1
District Cite Verte	CME Fondation Chantal Biya	46	44	2
District Cite Verte	CS Notre Dame de la Merci	2	1	1
District Djoungolo	Centre de Sante Integre D'Abom	1	0	1
District Djoungolo	Centre De Sante Notre Sante	1	0	1
District	Centre Hospitalier Essos	11	8	3

Djoungolo	CNPS			
District Djoungolo	Centre Medical Marie Reine Etoudi	3	2	1
District Djoungolo	CMA ELIG ESSONO	2	1	1
District Djoungolo	CMA MVOG ADA	4	3	1
District Djoungolo	CSI EMANA	4	2	2
District Djoungolo	Dispensaire Catholique Etoudi	3	2	1
District Djoungolo	Hopes Services Clinic	5	0	5
District Djoungolo	Hopital Catholique Deo Gracias Afrique Future	2	1	1
District Djoungolo	Hopital de District Olembe	5	2	3
District Djoungolo	Hopital Général de Yaoundé	1	0	1
District Djoungolo	Hôpital EPC Djoungolo	11	3	8
District Djoungolo	Hôpital Gyneco-Obstetrique et Pédiatrique de Ydé (HGOPY)	11	7	4
District Djoungolo	JOSS	2	1	1
District Efoulan	HD Efoulan	8	7	1
District Mbalmayo	CENTRE MEDICAL CATHOLIQUE OBOUT	4	3	1
District Mbalmayo	CSI Ngallan	3	2	1
District Mbandjock	Centre Medico Churigical SOSUCAM II	2	0	2
District Mfou	Centre de sante Catholique Nkoabang	2	1	1
District Mfou	CS SAINTE CECILIA	1	0	1
District Mfou	CSI Nkolafamba	1	0	1
District Mfou	HD Mfou	1	0	1
District Ndikinimeki	Hôpital de District de Ndikinimeki	1	0	1
District Nkoldongo	CMA Nkomo	2	1	1
District Nkoldongo	CMA Odza	3	2	1
District Ntui	Centre de Sante Catholique Nyamanga II	1	0	1
District Ntui	CENTRE MEDICAL HEALTH ECOLOGY	1	0	1
District	CMA Mbangassina	1	0	1

Ntui				
District Ntui	HD de Ntui	8	7	1
District Obala	CSI Mt de Oliviers	1	0	1
District Obala	Hôpital Ad Lucem D'Efok	2	0	2
District Obala	Hôpital de District d'Obala	4	2	2
District Okola	HD Okola	1	0	1
TOTAL		165	103	62

Distribution of study area

The figure 3.1 below shows that 21 of the health facilities that recorded treatment gaps were at the urban centers were as 18 were rural centers.
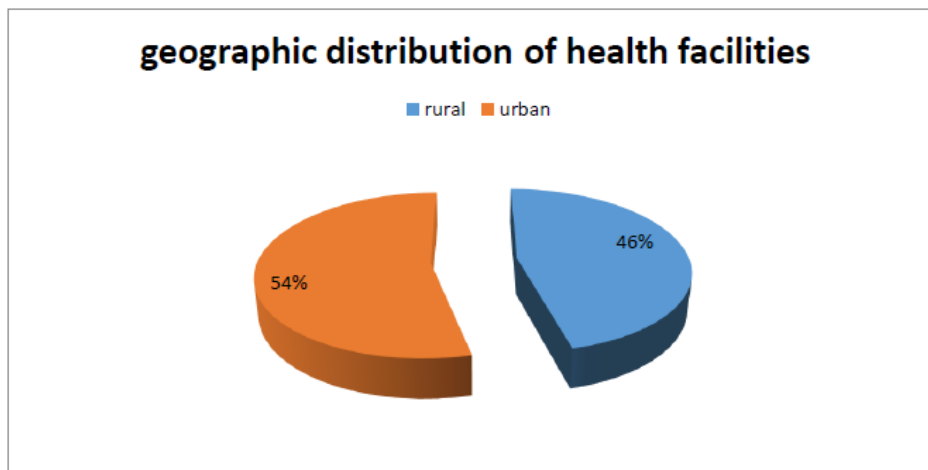
Figure 3. 1. Distribution of study area

Participant characteristics

Interviews were conducted with 39 health workers. The fig 3.2below shows a distribution of the various participants
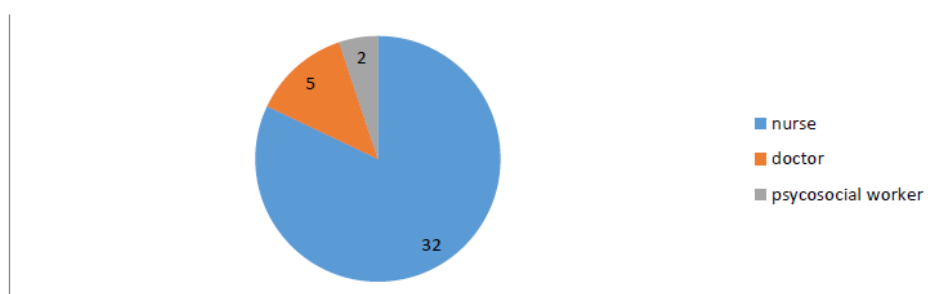
Figure 3. 2. Distribution of study participants

As the figure depicts out of the 39 participants 35 (89.7%) were Nurses (these included nurse aids, superior nurses and state registered nurses) 5 (12%) Doctors and 2 (5%) Psychosocial workers.

Factors that contribute to treatment gaps

Health system factors: resources and organization

According to the minimum package of activities, 26 of the total health facilities were care and treatment centres and 13 PMTCT centers (Fig 3.3). Therefore, all the health facilities had the capacity

of taking care of the HIV positive Infants. All sites have access to local laboratory facilities (including HIV-DNA PCR testing for infants <18 months of age), first- and second-line ARVs. According to the physician respondents, the clinic's capital and labor resources are sufficient to take care of all children attending the clinic. Based on the data collected, the main cause of treatment gaps was occasional stock-outs of ARVS and Inadequate training of Personnel as demonstrated by the figure 3.4 below.
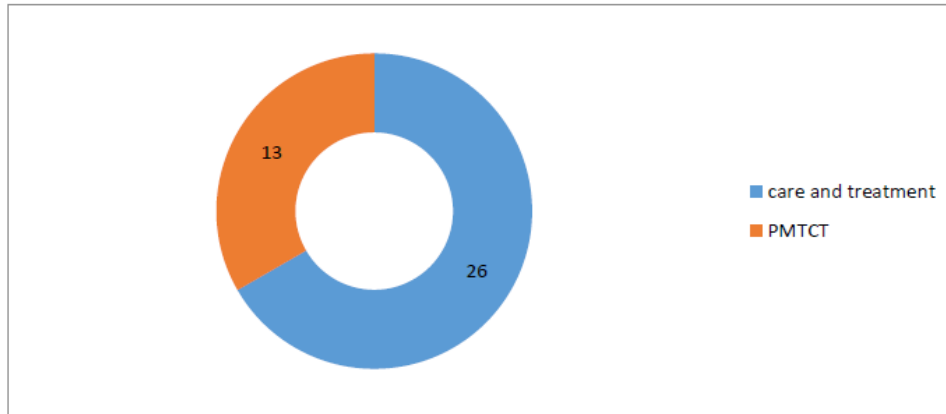

Figure 3. 2. distribution of types of Health facility in the HIV program
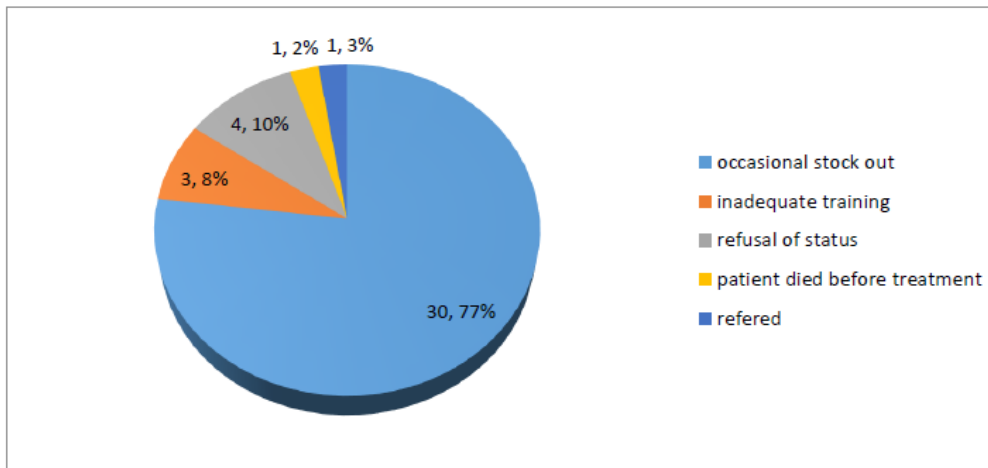
Figure 3. 4. Reasons for treatment gaps

All (100%) doctors were aware that ART should be initiated in infants below the age of two years, irrespective of CD4 count or clinical condition. The general consensus among health workers was that enough qualified personnel are available at the clinic, although the workload is high. There was often insufficient time for thorough counseling, which can result in longer waiting times for patients and caregivers attending the clinic.

Early infant diagnosis platform

Two Testing systems exist. There are those health facilities that depend on the Point of Care diagnostic technique while there are others that follow the conventional Dry blood spot system in which testing is centralized in a reference Laboratory and samples are either transported by bikers or mailed. Based on the Study sites, 18 dependents on POC and 21 on the conventional System.it is worth noting that all the health facilities had a Pharmacy and Laboratory services.

Population factors: knowledge, stigma, and fear

Health workers described that health-seeking behavior among caregivers can be delayed due to lack of knowledge or denial of HIV symptoms. Caregivers also reported that HIV is something some people do not think about or do not want to think about. They are often not ready to disclose their or their child's HIV status to others. Health workers recommended involving men more actively in ANC,

in order to improve the uptake of PMTCT measures and enrolment of HIV-exposed children in pediatric HIV care. In figure 3 above 4 of these patients actually refused to accept their status.

Men need more involvement, include men to PMTCT, now only very few come. They are the biggest decision makers in the home. This would strengthen adherence too.

Distribution of factors between facilities in rural and urban areas

The Fig 3.5 below shows the distribution of the factors associated with treatment gaps with respect to their geographical distribution. Apart from in adequately trained personnel, all the other factors were higher in the urban areas. However, statistical analysis revealed that the factors influencing gab did not differ between urban and rural areas (χ^2 = 5.938, p = 0.204).
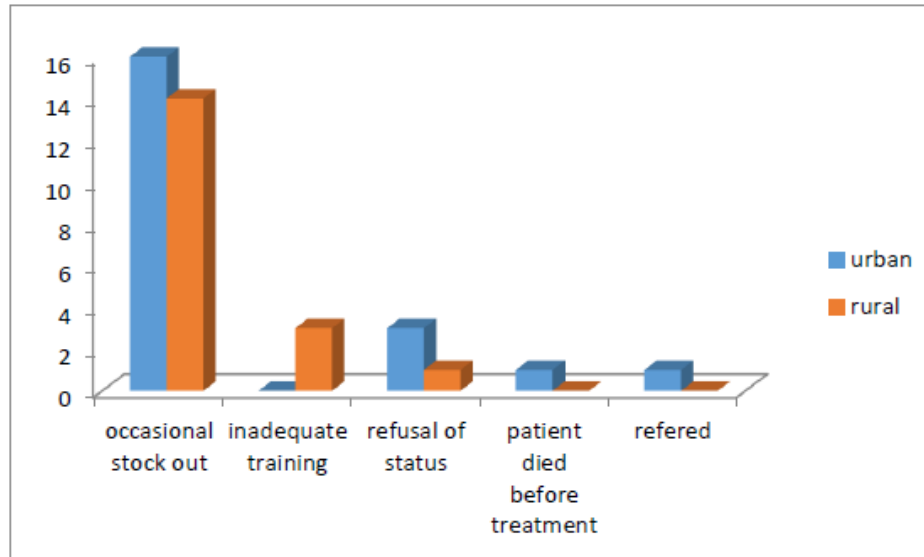
Figure 3. 5. Distribution of factors between facilities in rural and urban areas

Discussion

This observational study examined the various factors that were responsible for the treatment gaps recorded in 39 health facilities in the center region. It should be noted that this was purposive sampling. This is because all the health facilities that were chosen had recorded at least one infant that was tested positive and was not placed on treatment. This data was generated from the District Health Information Software which is the main Information system in Cameroon. During the discussion with the Health Facilities, the various factors came up

Treatment gaps

From our results we realized that out of the 165 infants that were tested positive for HIV, 102 were placed on treatment. This gave a gap of 38.18% which is in line with a study on paediatric treatment gaps in 7 easten and southern African countries (Saito *et al.*, 2018).

Health system factors

The main health system factor that came up is Occasional Stock out of ARVs. ARVs have been provided free of charge to all treatment clinics so that patients can access them. But some of the concerns raised are the fact that these workers were not properly train on the supply chain management. And so, by the time they were preparing their request for ARVs just few was left on sight and so the time to pass the request right up to the time the request was taken into consideration, they had already suffered from Stock out. This is in line with a study carried out in Uganda by Boender and friends(Boender *et al.*, 2012). It should be noted too that there was also stockout in the regional warehouse and so most sites that sent in their request on time could not be satisfied on time.

The second system barrier that was noticed was lack of trained personnel in 4 health Facilities. This was due to the fact that those that were originally trained left for greener pastures and since the feedback of collaborators was poor, the was a big problem training new comers and so these new

comers who do not have basic background knowledge will tend to refer the patients and there was no follow up to know if this patients were received at the mother hospital or not.

Although the turnaround time for the Early infant Diagnosis was not analysed, based on the Health personnel respond, the turnaround time for those that were enrolled into the Point of Care platform were far minimal than those of the conventional system. This is because most of the sites that were placed in the conventional system were in remote areas and so will need at least 2 to 3 days for samples to be sent to the Lab and results communicated back to the caregivers. By the time the results are sent back most of these care givers who were farmers and depend solely on it for survival will prefer to abandon the treatment and follow up till at a later date when the Child falls ill. Most of these clinics do not have nutrition centers that take care of malnourished children and so there was a case of death due to malnourishment before the child could be placed on treatment.

Population factors

The main population factor that was noticed was Refusal of status(Yeap *et al.*, 2010). It should be noted that these caregivers were known positives but they deliberately refused their status and the status of their child. The problem here was part inadequate counselling and another fear of disclosure to husbands. Therefore, there is still a lot of work to be done to be able to implicate the men in all the stages of Antenatal consultation

Study limitations

This study that has revealed the factors influencing the treatment gap among HIV-positive infants in the Center region is however limited in that the findings cannot be generalizable to the entire country. Secondly the sample size of treatment facilities in this study was quite low since only those reporting treatment gab in infants (0 to 2 years) were selected. Larger studies involving many more treatment facilities in different regions of Cameroon will be need to shed more light.

Conclusions

In conclusion, although first-line ART has become widely available for HIV-infected children in Cameroon, this alone does not ensure timely access. The problem of treatment Gaps still persist. Knowledge of these factors and their potential solutions is important in order to help health workers and ART program planners to create interventions to reach HIV-infected infants as early as possible and avoid preventable child mortality.

Salient recommendations

- Health personnel should be adequately trained on supply chain management
- Health personnel should be trained on care and treatment of HIV positive Infants
- There should be constant supply of ARVS

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