Out of the

Department of Infectious Diseases and Tropical Medicine

The Active Search for Pediatric HIV/AIDS (ASPA) Study: Assessing the acceptability, feasibility and effectiveness of targeted versus blanket provider-initiated-testing and counselling (PITC) among children and adolescents in Cameroon

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Dedication

To All Children and Adolescents Living with HIV/AIDS in the World

My earnest desire is to see this work make a change in your well-being.
You deserve to grow and achieve your full potential in life.

Acknowledgments

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LIST OF ABBREVIATIONS

ACT	Acceleration Children Treatment
ANC	Antenatal Consultations
ART	Antiretroviral therapy
ARV	Antiretroviral Drugs
ASPA	Active Search for Pediatric HIV/AIDS
bPITC	Blanket provider-initiated testing and counselling
CD4	Cluster of differentiation 4
CI	Confidence Interval
CIFF	Children's Investment Fund Foundation
DBS	Dot blot spot
DNA	Deoxyribonucleic acid
EID	Early Infant Diagnosis
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
LRH	Limbe Regional Hospital
MTCT	Mother to Child Transmission of HIV
NDH	Ndop District Hospital
OPD	Outpatient Department
PCR	Polymerase chain reaction
PEPFAR	President’s Emergency Plan for AIDS Relief
PITC	Provider-initiated testing and counselling
PLHIV	People Living with HIV/AIDS
PMTCT	Prevention of Mother to Child Transmission of HIV
R4D	Research for Development International
RT1	Rapid test 1
RT2	Rapid test 2
tPITC	Targeted provider- initiated testing and counselling
U.S	The United States
UNAIDS	The Joint United Nations Programme on HIV and AIDS
UNICEF	The United Nations Children's Fund
WHO	The World Health Organization

ABSTRACT

Background: Identification of children and adolescents living with HIV/AIDS remains a major challenge to the expansion of antiretroviral therapy among this subpopulation. This study assesses and compares the acceptability, feasibility and effectiveness of the targeted and the blanket provider-initiated-testing and counselling (PITC) for HIV among children and adolescents in Cameroon.

Methods: During a 6-month period, we invited in 3 hospitals in Cameroon, HIV positive parents to have their biological children (6 weeks-19 years) tested for HIV (targeted PITC or tPITC). During that same period and in the same hospitals, we routinely offered HIV testing to all sick children seen at outpatient consultations (blanket PITC or bPITC). Children of consenting parents were enrolled and HIV tested according to the national guidelines. The study outcomes were assessed and compared using descriptive and inferential statistics at 5% significant level.

Results: We enrolled 1240 and 2459 eligible parents respectively in the tPITC and bPITC group and among them and in the same order 99.7% (1236/1240) and 98.8% (2430/2459) accepted to have their children tested for HIV. Through these parents, 4719 children including 1990 in the tPITC and 2729 in the bPITC group were eligible for HIV testing and in the same order, 56.7% (1129/1990) and 90.3% (2465/2729) of them were finally tested for HIV (p<0. 0001). The HIV case detection among children was 3.5% (95%CI: 2.3-4.4) versus 1.6% (95%CI: 1.1-2.1) (p=0.0008, RR=2.1) respectively in tPITC and bPITC group and to identify one new case, 29 and 62 children have to be tested in the same order.

Conclusion: The HIV testing acceptance for children was high among parents with both strategies and the HIV case detection was twice as high with tPITC as with bPITC. However, the low HIV testing uptake renders tPITC less feasible and addressing this challenge is required for the optimal outcome of this higher yield approach.

Key words: Identification, HIV, pediatric, adolescents, targeted PITC, blanket PITC

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CHAPTER I: INTRODUCTION

I.1. Background

According to UNAIDS, 36.9 million [34.3 million–41.4million] people were living with HIV/AIDS in the world in 2014 and among this number, 15,8 million were on ART (1) indicating that the world was ahead of time in reaching the 15 million by 2015 target set by the United Nations General Assembly in 2011(2) . However, despite this significant achievement in meeting the global ART target, HIV infected children under the age of 15 years had a significantly lower ART coverage as only 32% [30%-34%] of children eligible were on treatment against 41% [38%-46%] of adults (1).

Cameroon is a country in Central Africa, bordered by Nigeria to the west; Chad to the northeast; the Central African Republic to the east; and the Republic of the Congo and Gabon to the south. This country covers an area of 475 650 square kilometers and has a population of 19 406 100 inhabitants (3). French and English are the country's official languages, with French being the predominant language. The population of Cameroon is young with 44% being under 15 years old. The population is growing at a rate of 2.6% and life expectancy at birth was approximately 55.93 years in 2015. The health system is organized into three levels: the operational/service delivery level, corresponding to the district health services; the intermediate level (regional delegations), responsible for technical support; and the central level (ministry of health), responsible for health policy/development strategies. The health system still suffers from weak governance system, a quantitative and qualitative shortage of human resources, insufficient technical and managerial expertise and weak health information system (4). This country has a generalized HIV/AIDS epidemic with a prevalence of 4,3% in the general population (5). In 2014, pediatric ART coverage in this country was 10.4 % as against 28% in adults (6). This shows that the gap in pediatric ART coverage in Cameroon is even wider and points out the need for a new dynamic to identify HIV infected children and enroll them into care in order to fast track universal coverage of HIV care and treatment among children in this country.

In 2011, the international community adopted the Global Plan towards achieving an AIDS-free generation by 2015, meaning a generation in which all children are born free of HIV and those already infected have access to treatment, care and support they need to remain alive and well (7). This implies that achieving an AIDS-free generation requires an adequate coverage of mother to child transmission (MTCT) services targeting both prevention of new infections among children and treatment of those living with

HIV/AIDS. Worldwide, 73% [68%-79%] of pregnant women living with HIV had access to antiretroviral medicines to prevent transmission of HIV to their babies in 2014 and new HIV infections among children had declined by 58% since 2000. Though 220 000 [190 000–260 000] children became newly infected with HIV in 2014, this represents a significant drop from the 520 000 [470 000–580 000] new infections among children in 2000 (1). This is an indication that the world is doing better in preventing new HIV infections among children, but that more efforts are still needed in order to bridge the lingering gap in pediatric HIV treatment (1).

In line with this concern, on August 6th 2014, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), in partnership with the Children's Investment Fund Foundation (CIFF), launched the *"Accelerating Children's HIV/AIDS Treatment (ACT)"* initiative. ACT is an ambitious $200 million initiative to double the number of children receiving life-saving antiretroviral therapy (ART) across ten priority African countries including Cameroon over the next two years (8). During the launching of the ACT, Ambassador Deborah L. Birx, U.S. Global AIDS Coordinator said *"Together, we must act swiftly, and with a focus on impact and geographic efficiency, to hasten the day when no child dies of AIDS. PEPFAR is committed to helping achieve an AIDS-free generation, and ACT is a bold step in that direction"* and Jamie Cooper-Hohn, co-founder of CIFF, a London-based philanthropic foundation said "*We must close the alarming treatment disparity between adults and children, it is immoral not to act especially when we now know that with treatment children with HIV can aspire to full and healthy lives"*(9).These declarations and commitment clearly show that as from August 2014, pediatric HIV care and treatment priority was highest in the international agenda.

I.2. Rational of the study

The Cameroon Ministry of Public Health with support from global initiatives including UNITAID, Clinton Health Access Initiative, the Global Fund to fight AIDS, Tuberculosis and Malaria and the President's Emergency Fund for AIDS Relief (PEPFAR) is providing HIV testing and antiretroviral drugs free of charge for children under the age of 15 years. Yet, as it is the case at the global level, children are still lagging behind in accessing pediatric HIV care and treatment in this country. Though multiple factors may account for the current low uptake of pediatric ART in Cameroon, the lack of the implementation of

an adequate strategy for early identification of HIV infected children and linkage to care is the main barrier for the HIV treatment gap for children in this country.

Actually, if there are some visible efforts in promoting the early infant diagnosis (EID)-PCR testing as the standard strategy for identification of children below the age of 18 months, the implementation of a clear strategy to identify HIV infected children older than 18 months (older children) and link them into care is lacking in the field. The subpopulation of HIV infected children below the age of 18 months in Cameroon represents only 15% of the total population of children living with HIV/AIDS in the country (10). This implies that focusing mainly on EID-PCR strategy, 85% of children living with HIV/AIDS may not be identified early for timely enrolment in HIV care and treatment. Hence, in addition to the EID-PCR strategy, there is need for a robust strategy to identify older children as well as adolescents living with HIV/AIDS and link them to HIV care and treatment services. In this regards, the World Health Organization (WHO) recommended in 2007, the provider-initiated-testing and counseling (PITC) as the standard strategy for identification of HIV infected children and adolescents and with enrollment of positive cases in care (11). The PITC guidelines state that health care providers should systematically propose HIV testing to all children seen in a health facility irrespective of the presenting complaints (11). For the purpose of this study, we will name this PITC approach "*blanket PITC (bPITC)*" in the sense that all children seen in the hospital are supposed to be tested for HIV. The current low pediatric ART coverage suggests that bPITC is not achieving the desired results and this gap prompts the need to strengthen the implementation of this strategy but most importantly to investigate more effective HIV testing approaches for children in Cameroon.

To further guide case identification of pediatric HIV/AIDS, WHO and UNICEF jointly released in 2010 a policy brief recommending to heath care providers to emphasize HIV testing and counseling for all infants born to HIV-positive women as well as for children from families where another sibling or parent has already been diagnosed with HIV (12) as a routine component of follow-up care for HIV-exposed children, . For the purpose of this study, we will call this PITC approach "*targeted PITC (tPITC)*" in the sense that this approach requires care providers to systematically offer HIV testing to children of parents living with HIV/AIDS. So far, there is a dearth of literature in the implementation of tPITC among children and adolescents, suggesting an implementation gap of this PITC approach globally and in Cameroon in particular. Most importantly, there is lack of

knowledge on the comparative advantages of tPITC over bPITC in terms of acceptability, feasibility and effectiveness .

I.3. Goal of the study

This study aimed at bridging the knowledge gap on implementation outcomes of both targeted and blanket PITC in order to provide evidence needed by policy-makers for programming more effective pediatric and adolescents HIV treatment services in Cameroon.

I.4. Objectives of the study

I.4.1. Primary objective

To assess the effectiveness of targeted PITC (tPITC) in comparison to blanket PITC (bPITC) in the identification and linkage to antiretroviral therapy (ART) of infants, children and adolescents in Cameroon.

1.4.2. Secondary objectives

i) To assess the acceptability of tPITC in comparison to bPITC among parents accessing health care services in 3 health facilities in Cameroon;

ii) To assess the feasibility of tPITC in comparison to bPITC in 3 health facilities in Cameroon;

iii) To assess barriers and enablers to HIV testing and treatment for children and adolescents in 3 health facilities in Cameroon

iv) To assess the combined effect of the implementation of both tPITC and bPITC in the uptake of pediatric HIV services (HIV testing, newly diagnosed HIV cases and ART enrolment) in 3 health facilities in Cameroon

I.5. Significance of the Study

This study will inform on the effectiveness of both tPITC and bPITC strategies in case identification and linkage of HIV infected children and adolescents in HIV treatment services in Cameroon. Most importantly, it will determine the incremental number of HIV positive children and adolescents the tPITC can identify and link to treatment in comparison to the commonly used bPITC approach.

The knowledge generated by this study will complement the existing evidence on the effectiveness of PITC and further guide how best this strategy should be implemented in a most effective manner in order to achieve an AIDS –free generation in a shortest possible time in Cameroon.

CHAPTER II: LITERATURE REVIEW

II.1. Service delivery of pediatric HIV care and treatment

The provision of effective pediatric HIV care and treatment requires that HIV infected children are i) identified early enough, ii) linked to care, iii) initiated on ART, iv) retained in care and v) monitored to achieve viral suppression necessary to control HIV infection. The completion of this cascade is required for a pediatric HIV treatment program to be effective. However, in resource limited settings, HIV testing in infants, children and adolescents is performed most often when these children are already presenting with clinical manifestations of HIV/AIDS.

The antenatal clinics (ANC) is an important entry point for HIV testing for pregnant woman but also for identification of pediatric HIV cases through HIV positive mothers diagnosed during ANC. However, despite an ANC attendance coverage of 82.8% in Cameroon, the HIV testing uptake among pregnant woman is 56,4% (13). This is due to numerous challenges affecting the prevention of mother to child transmission of HIV (PMTCT) program including large proportions of home deliveries, fear of the cultural implications of a positive HIV test result, such as the lack of male partner support and even violence [(14), (15), (16)]. Consequently, children are started on ART at an advanced stage of the disease, where ART outcome is already compromised.

Marston et al. found that among older African children with perinatally acquired HIV infection; most already suffer severe symptoms at the time of diagnosis, including profound growth retardation (17). Conversely, most HIV infected children in resource-rich countries are diagnosed and treated early with ART [(18), (14), (15)]. This has dramatically modified the course of HIV infection in children in these countries, reducing mortality by fivefold or more and resulting in high survival rates (> 90%) into adulthood ((20),(21)). For example, in the United Kingdom, the average age of children infected peri-natality with HIV is estimated at 13.2 years (22) while in New York City (United States) 76% of these children are between the ages of 13 and 24 years (23). Newell at al. reported that in the absence of HIV testing and timely ART initiation, one third of infants living with HIV die before their first birthday, half die before the age of 2 years and about 75% will not reach their fifth birth day (24). The current low pediatric ART coverage in Cameroon suggests that many infants, children and adolescents are dying in the community without appropriate care.

II.2. Overview of HIV testing and counseling strategies among children and adolescents

The WHO recommended provider-initiated-testing and counseling (PITC) is the standard strategy for identification and linkage of HIV positive children into care and treatment. The implementation modalities of PITC include: the blanket PITC (bPITC) approach where all children seen in a health facility are offered an HIV test irrespective of the presenting complaint (11) and the targeted PITC (tPITC) where HIV testing and counseling is systematically offered to children from families where a parent or another sibling has already been diagnosed with HIV. Moreover, the US President's Emergency Fund for AIDS Relief (PEPFAR) recommends an aggressive HIV testing targets among HIV affected children using the family centered approach for HIV testing and counseling (25). The current gap in pediatric ART coverage globally and in Cameroon in particular prompts the need to investigate the barriers impeding the effective implementation of these strategies.

II.3. Implementation outcomes of provider-initiated-testing and counseling among children

In Cameroon, literature on PITC (both targeted and blanket) implementation outcomes among children is scanty. Nevertheless, the Batibo District Hospital located in rural North West Region of Cameroon, piloted the tPITC in 2006 through the "Active Search for Pediatric HIV/AIDS" (ASPA) project that was designed to promote HIV testing among children born to HIV infected parents diagnosed with HIV or receiving HIV services in the hospital. The ASPA project screened 198 children, 36 (18,2%) were found HIV positive and 24 (67.9%) were linked to care, resulting to a substantial increase in pediatric ART coverage in that hospital (26). This is an indication that tPITC is feasible even in rural health care settings and can contribute in bridging the current gap in pediatric ART coverage in Cameroon.

Furthermore, the association of PITC (blanket) with increased enrollment of children in care and treatment has been demonstrated in many Sub-Saharan countries (21). Torbunde et al. reported among 18 months to 18 years old children accessing health care in 18 health facilities in Nigeria, an overall 37.8% increase in new enrollments in care, and 86% increase in new enrollments on ART in the 12 months after, compared to the 12 months preceding PITC training and implementation. This study found a high client

acceptance proportion for PITC at 99.4% and 8.4% of tests were positive. The most common reported reasons for PITC non or poor implementation in this study were the lack of rapid test kits, the poor commitment from facility leadership and the lack of funds (22). Kranzer et al. in a study assessing PITC implementation among children aged 6-15 years old in 6 primary health care clinics in Harare, Zimbabwe found that among 2831 eligible children, 2151 (76%) were offered PITC, of whom 1534 (54.2%) consented to HIV testing, 82 (5.3%) children tested HIV-positive, with 95% linking to care (29). Most importantly, this study revealed that more than 90% of children who tested HIV-positive had had previous contact with health services, indicating the potential impact of consistent implementation of PITC in reducing missed opportunities to identify and linked children into care. Moreover, parents/guardians consent was reported as the key barrier to PITC as 29% of children eligible were not tested because parents did not provide consent for testing their kids. Other barriers to PITC (blanket) identified by this study included the lack of staff training in PITC as well as the lack of HIV testing kits.

The above evidence indicates that PITC is effective in increasing enrollment of HIV infected children into care. However, the implementation of this strategy is challenged by factors such as lack of staff training, stock out of HIV testing kits, poor commitment from facility leadership and lack of parental consent for HIV testing of children. According to Davies MA and Kalk E, barriers to implementation of this strategy are multifactorial, operating at the level of the individual, health care facility, community, and national legal framework (30). These barriers may also be contextual, indicating the need to investigate the pattern in Cameroon to inform policy.

II.4. Effectiveness of Provider-initiated-testing and counselling

The evidence on the effectiveness of PITC in identifying and linking children in HIV care is compelling as demonstrated in section 2.3 above. However, there is need to identify the best approach to deliver PITC in a cost-effective manner. To the best of our knowledge, a part from the ASPA project reported by Yumo et al. (26) , the PITC implementation approach published in the literature is the “blanket PITC” whereby children are tested for HIV at a given medical encounter irrespective of the presenting complaints [(27),(28),(29)]. This blanket PITC (bPITC) approach requires a lot of resources in terms of testing kits and supplies in addition to the increased work load on the already overburdened health personnel. In contrast, the targeted PITC (tPITC) approach used in the ASPA project whereby children born to HIV infected parents and

those with clinical signs and symptoms of HIV infection are targeted for testing seems cost-effective. In Cameroon, the ASPA project found 36 HIV infected children out of 198 tested in one rural health facility (26). This result is in sharp contrast with the outcome of the bPITC approach reported by Kranzer et al. from Zimbabwe where in 6 health facilities, 1534 children were tested for 82 (5.3%) children tested HIV-positive (29). Considering that the HIV prevalence in the adult population in Zimbabwe is almost three times higher than that of Cameroon (19% vs 4,3%) but that ARV prophylaxis coverage to prevent mother to children transmission (PMTCT) is almost twice in Zimbabwe as compared to Cameroon (56% vs 32,7%) (1), it is not possible to conclude on the effectiveness of one testing approach over the other. Though the ASPA approach seems more effective, additional data comparing these 2 models are needed to draw a valid conclusion and better inform pediatric HIV services design and implementation. Moreover, the implementation of both tPITC and bPITC in a hospital should have a meaningful impact in the uptake of pediatric HIV services in this health facility. There is a knowledge gap on the outcome of the combined effect of both tPITC and tPITC in the uptake of HIV services among children and adolescents.

II.5. Linkage to care of HIV infected children and adolescents

The functions of PITC include diagnosis, linkages and access to HIV-related services (12). Hence, linkage to care is an important step before retention. If data on retention and factors associated with attrition in pediatric HIV programs in Sub-Saharan African countries have been published [(31), (32), (33),(34), (35), (36)] information on linkage to care after HIV testing are scarce, even for adults HIV program (37). Most importantly there is a scientific gap on the outcome of linkage in tPITC and bPITC. To optimize HIV care in children in Cameroon, there is need to assess the outcome of linkage to care in different PITC implementation approaches (tPITC and bPITC).

II.6. Outcome of provider-initiated testing and counseling

PITC is an effective strategy in increasing enrollment of children in HIV care and treatment if the aforementioned implementation barriers are addressed accordingly. However, it is still not clear how best PITC should be delivered in a cost-effective and a more sustainable way. The sustainability of the blanket PITC approach might be compromised by the associated high cost.

On the contrary, we believe that the targeted PITC (tPITC) is more effective as compared to the blanket PITC (bPITC) which is widely published [(27),(29)]. Actually, more than 90% (38) of pediatric and 72% (39) of adolescents HIV infections are from vertical transmission, therefore we hypothesize that identifying HIV infected children through known HIV infected parents or siblings is a plausible high yield strategy.

Moreover, to ensure that children who are identified and linked to care remain in care, there is need to evaluate factors associated with retention into care in the context of Cameroon. Furthermore, it is of paramount interest to assess the barriers to implementation of both targeted and blanket PITC in the context of Cameroon. This information is needed to optimize HIV testing uptake, care and treatment among children and adolescents in this country.

CHAPTER III: MATERIALS AND METHODS

III.1. Study type

We conducted a cross sectional study assessing and comparing the outcomes of tPITC versus bPITC in identifying and linking HIV infected children in care and treatment. Also, we assessed barriers and enablers to HIV testing and treatment for children and adolescents by evaluating the knowledge, attitudes and practices of people living with HIV/AIDS and health personnel regarding HIV testing and treatment for children. In addition, the study assessed the combined effectiveness of tPITC and bPITC through a retro-prospective analysis of routine data.

III.2. Study setting

The study was conducted in 3 health facilities in Cameroon namely: the Limbe Regional Hospital (LRH) in the South West Region of Cameroon, the Ndop District Hospital in the North-West Region of Cameroon and the Abong-Mbang District Hospital in the East Region of Cameroon.

III.2.1. Limbe Regional Hospital

The LRH is the main 2nd referral level public health facility serving a population of 1 384 286 disseminated in the South West Region of Cameroon (3). It has a capacity of 200 beds and provides comprehensive and continued health care services including the management of tuberculosis and HIV/AIDS. In 2013, this hospital had a monthly average of 1248 new patients (outpatient consultations) including 224 children (<15 years) and 1024 adults (≥15 years). This same year, there were also in this hospital 3021 patients on antiretroviral therapy (ART) amongst whom 76 where children below the age of 15 years.

III.2.2. Ndop District Hospital

The Ndop District Hospital (NDH) is the 1st referral government health facility serving a population of 195 000 inhabitants. This hospital is located in a rural area in the North West Region of Cameroon and has 3 medical doctors, 22 nurses and 7 laboratory technicians. It has a capacity of 87 beds and provides comprehensive and continued health care services including the management of tuberculosis and HIV/AIDS. In 2013, this hospital had a monthly average of 1500 new patients (outpatient consultations) including 270 children (<15 years) and 1230 adults (≥15 years). This same

year, there were 2 464 patients on antiretroviral therapy (ART) amongst whom 118 where children below the age of 15 years enrolled in HIV care in this hospital.

III.2.3. Abong Mbang District Hospital

The Abong-Mbang District Hospital is the 1st referral government health facility serving a population of 69 712 inhabitants. This hospital is located in a rural area in the East Region of Cameroon and has 3 medical doctors, 35 nurses and 3 laboratory technicians. It has a capacity of 60 beds and provides comprehensive and continued health care services including the management of tuberculosis and HIV/AIDS. In 2014, this hospital had a monthly average of 380 new patients (outpatient consultations) including 78 children (<15 years) and 302 adults (≥15 years). This same year, there were 1133 patients on antiretroviral therapy (ART) amongst whom 50 where children below the age of 15 years enrolled in HIV care in this hospital.

III.3. Study period

The ASPA study was conducted from July 2015 to November 2016. Data were collected during a 6-month enrollment period from July 2015-December 2015 in the Limbe Regional Hospital and from June 2016-November 2016 in Abong-Mbang and Ndop District Hospitals. This enrolment period corresponds to the time where parents and children were invited to participate in the study.

III.4. Study population

The study participants were: i) parents/guardians accessing HIV services or accompanying their children for consultations at the outpatient department of respective hospitals; ii) children of HIV infected parents accessing HIV care in the hospital, iii) children consulting at the outpatient department for any reason; iv) health personnel involved in children's consultations.

III.5. Selection Criteria

III.5.1. Inclusion criteria

i). HIV infected parents: Parents diagnosed with HIV infection or receiving HIV services in the hospital and consenting to participate will be eligible for enrollment in the study.

ii). Parents/guardians seeking care for their children in the hospital: Parents/guardians presenting at the hospital with sick children will be enrolled in the study irrespective of the motive of consultations for their children.

iii). Children of HIV infected parents: Children of HIV infected parents aged between 6 weeks to 19 years old will be eligible for enrollment in the study. Parents/guardians consent will be required as well as assent of older children.

iv). Children consulting in the hospital: Children aged 6 weeks to 19 years old consulting in the hospital for any reason will be eligible to participate in the study. Parents/guardians consent will be required as well as assent of older children.

vi). Health personnel: Health care providers involved in HIV testing and treatment for children and consenting to participate were enrolled in the study.

III.5.2. Exclusion criteria

i)HIV status: children with known HIV positive status were excluded from the study.

ii) *Age: c*hildren below the age of 6 weeks or above 19 years were excluded in the study.

iii) *Health conditions:* children or parents who were critically ill were excluded from the study.

III.6. Study context, site preparation and implementation strategies

The study was conducted within the Active Search for Pediatric HIV/AIDS (ASPA) project, an initiative of R4D International Foundation, a Cameroon-based global health research non-governmental organization. The ASPA project aimed at promoting pediatric HIV services delivery in Cameroon and this through a range of activities including: capacity building of health personnel, services delivery both at facility and community level, nutritional support, monitoring and evaluation.

Prior to the implementation of the study, the inputs and supports provided by the project to respective hospitals included the following: staff training on both bPITC and tPITC implementation, provision of HIV testing kits and sites monitoring. In addition, the study provided to each hospital 3 dedicated staff (2 data collectors and 1 data manager) to support the implementation of the project as follows: one staff was posted at the HIV treatment center to ensure that all parents receiving HIV care are counselled and enrolled in the study, and that their children are tested and positive cases linked to care accordingly. The 2nd staff was posted at the outpatient department (OPD) of the hospital to ensure that all children consulting are counselled, enrolled, tested and positive cases are linked to care as well. The 3rd staff was responsible for the overall coordination of site activities, ensuring compliance of the study protocol and quality in the data collection and management process in both groups. In addition, in both groups, community health workers (hospital staff) were involved in counselling, follow up, reminder calls and home-based testing when applicable.

It should be noted that in Abong-Mbang and Ndop District Hospitals, the ASPA project provided transport reimbursement to parents in the tPITC group to bring their children to the hospital for HIV testing, and nutritional kits (sugar, oil, milk and rice) to HIV positive children in care. These supports were not available in Limbe Regional Hospital during the study period.

III.7. Sampling, recruitment of participants and study procedures

i) Sampling: Parents and children eligible for the study were enrolled consecutively till completion of the 6 months enrolment period in respective site.

ii) Recruitment of participants: Participants (parents and children) in the study were recruited for a period of 6 months in respective group as follows:

- **Blanket PITC (bPITC):** All parents/guardians accompanying sick children and adolescents aged 6 weeks to 19 years for consultations at the Outpatient Department of Hospital (OPD) were counselled and invited by a trained counsellor to have their children tested for HIV irrespective of the presenting complaint. After the consent of parents, assent to participate was requested for children above 11 years prior to enrolment in the study. Consenting parents and assenting children when applicable were all enrolled in the study.

- **Targeted PITC (tPITC):** All parents living with HIV/AIDS accessing HIV services in the hospital were counselled and invited by a trained counsellor to have their children aged 6 weeks to 19 years of unknown HIV status tested for HIV. These parents were approached for enrolment during their contact with the HIV treatment center for ARVs drugs initiation or monthly refill. After the consent of parents, assent to participate was requested from children above 11 years prior to enrolment in the study. Consenting parents and assenting children when applicable were all enrolled in the study. In this group, parents were given the opportunity to bring their children in the hospital for testing and to have their children tested at home by community home workers. For parents who opted to have their children tested in the hospital, they were asked to bring children to the hospital for testing during their next visit at the HIV treatment center, most often the next month following enrolment. For parents who opted to have children tested at home, they made an appointment with a community health worker on the day and time for the home visit **(Figure 3.1).**

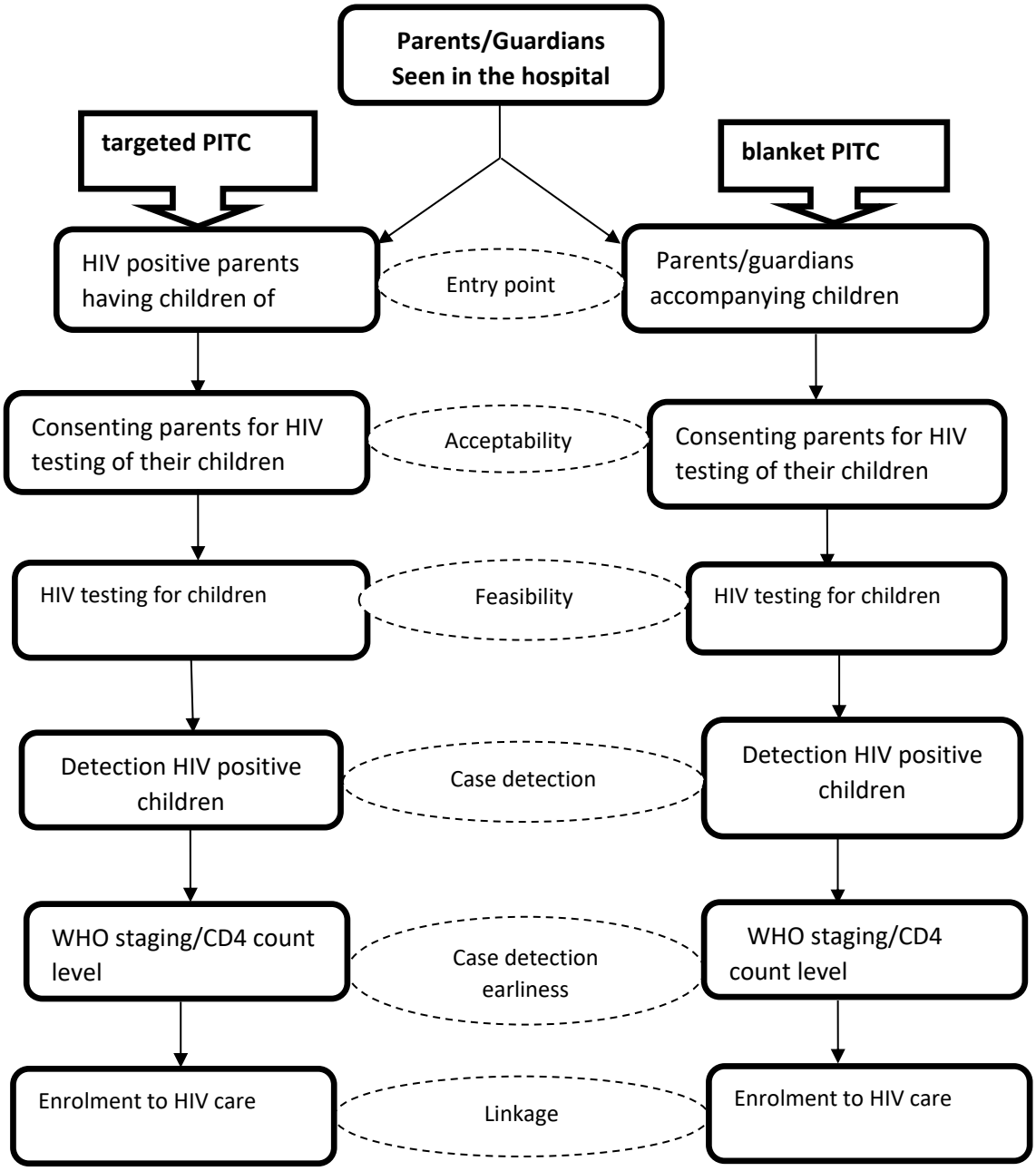

Figure 3.1: ASPA study flow

iii) HIV testing and counselling procedures

The HIV testing was conducted following the Cameroon's national algorithm for HIV testing and counseling in children described below. In particular, pre and post counseling were done to parents/children before and after the test. In the targeted PITC arm, children were tested for HIV either in the health facility or at home and this at the convenience of the parents. The community HIV testing was done by trained community health workers.

- **6 weeks ≤ children < 18 months old:** In this subgroup, trained laboratory technicians or community health workers used dried blot spot (DBS) to collect blood specimen that was shipped to the national reference laboratory (NRL) for HIV testing using polymerase chain reaction-deoxyribonucleic acid (DNA-PCR) molecular techniques. The shipment of specimens was done using the national routine DBS-PCR transportation system of the Ministry of Public Health. Actually, the DBS were shipped to the nearest NRL to the collection sites as follows: i) the Cameroon Baptist Convention Mutenguene Laboratory for specimen from the the Limbe Regional Hospital, ii) The Fondation Chantal Biya Laboratory for specimen from the Abong District Hospital and iii) the Bamenda Regional Hospital Laboratory for specimen from the Ndop District Hospital. The HIV testing was done using the PCR procedures of respective laboratory and the results were send to respective hospitals through the routine mail channel.
- **18 months ≤ children ≤ 19 years old**: In this subgroup, HIV testing was done using 2 rapid tests: the rapid test 1 (RT1) was more sensitive while the rapid test 2 (RT2) was more specific. We used Alere Determine HIV-1/2 (Paul Hartman, AG Germany) for RT1 and Oraquick (Alere Medical Co Ltd, Japan) for RT2. The HIV testing was done by trained laboratory technicians or community health workers. The child was declared HIV negative if he/she was tested negative on RT1. The child was declared HIV positive if he/she was tested positive for both RT1 and RT2 **(Figure 3.2).** For community HIV testing, only RT1 was used for screening (finger prick). Children found positive on RT1 at community level was invited to come to the hospital where RT2 was done for confirmatory. If a child was positive on RT1 and negative on RT2, he/she was declared indeterminate. In such cases, the child was test with PCR-DNA when feasible. If not, the test (RT1+RT2) was repeated after 3 months. The results of the test was declared to the parents

and also to the children by trained counselors. In particular, HIV positive results were declared to children with the parents' consent, and this depending on the age (above 11 years) of the child as well as the psychological readiness as determined by the counselors.

iv) Linkage to care

Children and adolescents tested HIV positive were assessed according to national guidelines for ART eligibility. This assessment will include WHO clinical staging and baseline biological analysis including the following blood tests: CD4 count, full blood count and transaminases (ALAT/ASAT).

ART initiation and clinical monitoring of HIV positive children was done according to the Cameroon national guidelines. These guidelines were in line with WHO 2013 guidelines: HIV infected children less than 5 years irrespective of CD4 count level and children above 5 years with CD4 count < 500 cells/mm3 were initiated on ART (40). The national guidelines were later revised to align with the WHO 2015 guidelines. With these new guidelines, all HIV infected children were initiated on ART irrespective of the CD4 count level and the age (41). Regarding clinical monitoring after initiation, children were reassessed clinically after 3 months; thereafter clinical and biologically (Full blood count, CD4 count,…) monitoring were done every 6 months.

The HIV testing and ART enrolment procedures are summarized in the figure 3.2 below.

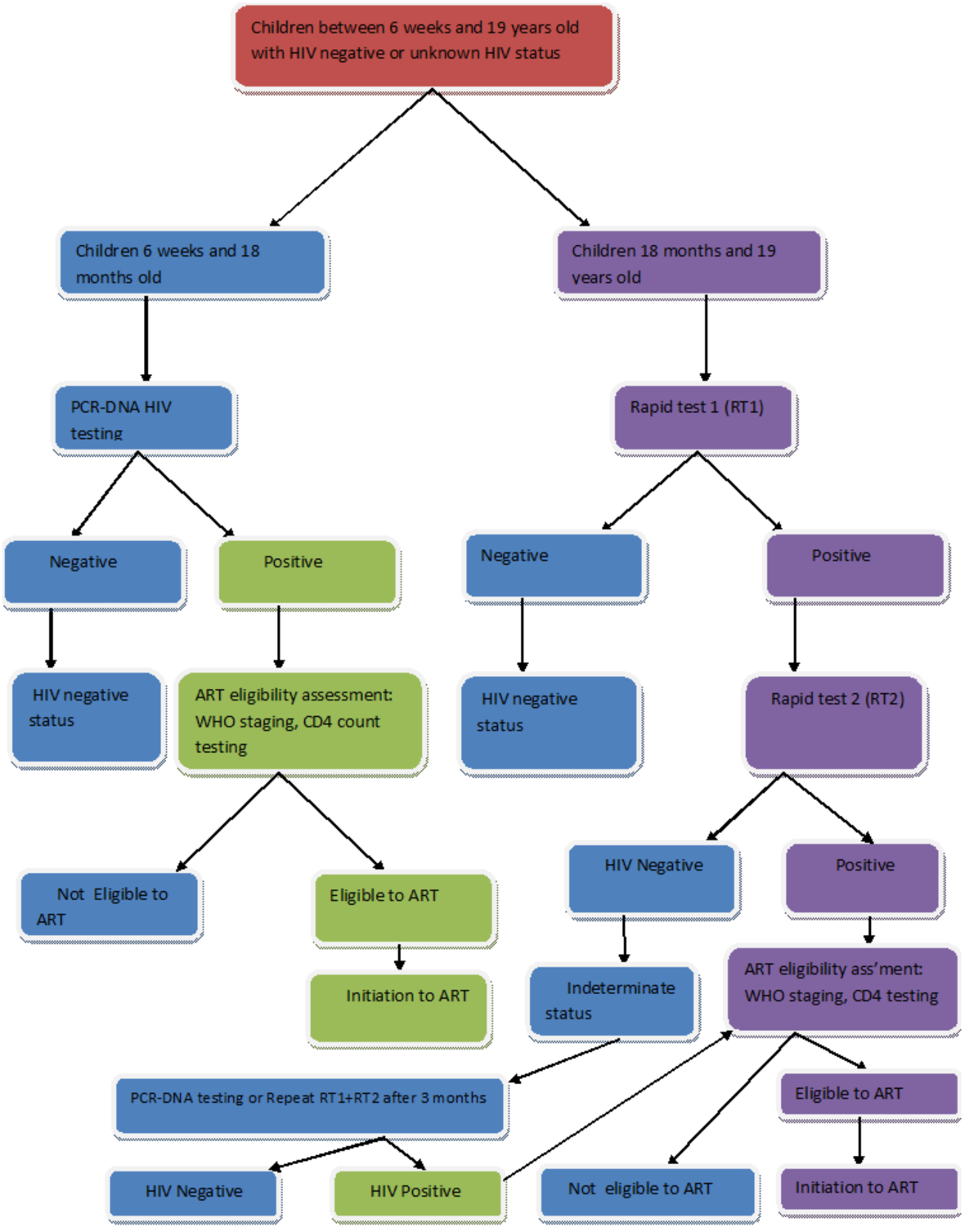

Figure 3.2: HIV testing algorithm, ASPA Study

III.8. Data collection and management

III.8.1. Data collection tools

Data were collected using structured and standardized pre-tested questionnaires described as follows:

Questionnaire No 1: This questionnaire was used to collected information of parents living with HIV/AIDS and receiving HIV services in the hospital. Among others, the following socio-demographic information were collected: name, contact details, age, sex, residence, profession, education level, marital status, ARVs drugs status, number of children less than 19 years, number of children less than 19 years with unknown HIV status, willingness to test children with unknown HIV status, preferred site to test children of unknown HIV status **(Annex 4**). Information generated by this questionnaire were used to assess the HIV testing acceptance proportion among parents regarding tPITC. This HIV testing acceptance proportion was used as the measurement of acceptability of targeted PITC among parents in the study site.

Questionnaire No 2: This questionnaire was used to collected information of parents/guardians accompanying their children to the hospital. Among others, the following socio-demographic information were collected: name, contact details, age, sex, residence, profession, education level, marital status, HIV status, number of children brought to the hospital, willingness to test child (ren) for HIV **(Annex 5).** Information generated by this questionnaire were used to assess the HIV testing acceptance among parents regarding bPITC. This HIV testing acceptance was used as the measurement of acceptability of the blanket PITC among parents in the study site.

Questionnaire No 3: Children Enrolment form tPITC. This questionnaire was used to collect information of children born to parents living with HIV/AIDS. Among others, the following information were collected: Age, sex, education level, identified for HIV testing through, HIV testing status, HIV status, mother and father occupation, mother and father living status, site for HIV testing, HIV testing result, ART clinical and biological assessment results (WHO clinical stage, CD4 count) for HIV positive children **(Annex 6).**

Information generated by this questionnaire was used to assess the number of children tested for HIV (feasibility), the number of children newly diagnosed with HIV (case detection or yield), the number diagnosed with HIV per WHO staging (case detection earliness) and linkage to care) in the targeted PITC. These 4 indicators were

used to determine the HIV testing uptake (feasibility), yield (or case detection), case detection earliness and linkage to care in the targeted PITC strategy.

Questionnaire No 4: Children enrolment form bPITC. This questionnaire was used to collect information of sick children consulting at the outpatient department (OPD). Among others, the following information were collected: age, sex, education level, brought to the hospital by, HIV testing status, HIV status, mother and father occupation, mother and father living status, HIV testing result, ART clinical and biological assessment results (WHO clinical stage, CD4 count) for HIV positive children **(Annex 7).**

Routine data forms: This form was used to collect in respective health facility the following information: number of consultations of children and adolescents (6 weeks to 19 years) at the outpatient department, number of children tested for HIV, number of HIV cases identified among children, number of HIV positive children enrolled on ART **(Annex 8).** This information was extracted from consultations, laboratory, and ART registers and this retrospectively and prospectively at least 6 months before and after the implementation of the study in respective hospital. This data was used to assess the effect of the implementation of PITC (both targeted and blanket approaches) in HIV testing uptake, newly diagnosed cases and ART enrolment among children and adolescents in the study site. The information was also used to assess the combined effect of the implementation of both tPITC and bPITC in respective hospitals.

*Parents living with HIV/AIDS survey form***:** In each site, we interviewed participants among a subgroup of people living with HIV/AIDS (PLHIV) who do not return with their children to the hospital for testing and this in order to find the reasons of not respecting the appointment (reasons for non-return). The information collected in this form were: travel distance to the hospital, reasons for not returning to the hospital with the child for HIV testing, willingness to have community health workers test the child at home, HIV disclosure to the partner/spouse **(Annex 9).**

Health personnel survey form: In each site, we also interviewed health care providers involved in clinical care for children and this to assess their knowledge, attitudes and practices regarding HIV testing, counseling and treatment for children and adolescents in their respective health facilities. The information collected in this form were: last time to consult a child, HIV testing requested to the last child consulted, reasons for not requesting HIV testing to children all the time, last training on pediatric HIV testing and counselling **(Annex 10).**

III.8.2. Data management

Following data collection, completed questionnaires were stored in a secured cupboard with lockers. The questionnaires were later di-identified by removing all information (name and contact details) that can link the participants with the data. Only the study code was left on the questionnaires that were entered in a database developed for data entry using Access 2016 (Microsoft®). Data entry were done progressively in a database by a trained data clerks and this using a laptop. To enhance data quality and accuracy, the copy of the database was transferred to the data manager together with the questionnaires. The data manager conducted a double entry verification on a sample (30%) of questionnaires and this to correct any discrepancies observed and clean inaccurate data. Once data entering was validated, questionnaires were safeguarded in a cupboard. The database was also safeguarded in an external hard drive.

III.8.3. Data analysis

The results were reported using both descriptive and analytical statistics. The study population characteristics were determined by generating frequency distributions in 2x2 tables per study site and groups (tPITC or bPITC). Univariate analysis was used to compare variables between groups. Chi-square test (X2) was used to determine the association of population characteristics or outcome measures per study group. The confidence interval and/or statistical significance were calculated at 5% level. Data analysis were done using STATA 2013 (College Station, TX: StataCorp LP).

III.9. Definitions of terms and outcome measures

The outcome measures were defined and calculated as described in the table below **(Table 3.1).**

Table 3.1: Definition of terms and calculation of outcome measures

Outcome		Numerator	Denominator	Programmatic definition
Effectiveness: This is a composite outcome measured by 3 sub-outcomes: i) case detection, ii) case detection earliness and iii) linkage to care	Case detection (yield/prevalence)	Number of children tested HIV positive	Number of children enrolled in the study and having a conclusive HIV test result (HIV positive or negative)	The case detection assesses the likelihood of the strategy (tPITC or bPITC) to detect a new case
	Case detection earliness	Number of children tested HIV positive at WHO stage 1 (per study group)	Number of children tested HIV positive in each group (tPITC or bPITC)	The case detection earliness assesses the likelihood of the strategy to detect cases earlier
	Linkage	Number of HIV positive children enrolled on ART	Number of children diagnosed HIV positive	The linkage assesses the likelihood of linking a case to care in each study group (tPITC or bPITC)

Acceptability: This outcome measures the readiness or willingness of parents to accept having their children tested for HIV. Studies on acceptability of HIV testing strategies have been widely published (38).	Acceptance	Number of parents counselled for HIV testing of their children	Number of parents who accepted to have their children tested for HIV	The acceptability assesses the attitude of parents/caregivers to opt in for HIV testing for their children.
Feasibility: This outcome assesses the practicability of the strategy or the potential to test eligible children. Studies on acceptability of HIV testing strategies have been widely published (39),(40),(41).	HIV testing uptake	Number of children tested for HIV	Number of eligible children identified in respective study group	The feasibility outcome assesses the capacity of the health facility to routinely test all eligible children

Combined effectiveness **of tPITC and bPITC:** This is a composite outcome measuring the cumulative impact of both tPITC and bPITC in terms of HIV testing uptake, case detection and linkage and this before and after the implementation of the study	Cumulative HIV testing uptake	Number of children tested in the hospital over a period of time	Number of children who consulted at the hospital over the same period of time	The cumulative HIV testing uptake assesses the impact of the implementation of both tPITC and bPITC in the same hospital. It informs on the relevance of implementation of both strategies at the same time in order to improve HIV testing uptake.
Barriers to pediatric HIV testing, counselling and treatment	The analysis of the survey amongst people living with HIV/AIDS and health personnel regarding their attitudes and practices towards PITC will determine the barriers or the enablers to PITC. This information will inform policy for better planning of pediatric HIV services			

III.10. Ethical considerations

III.10.1. Informed consent and assent

Participation in the study was voluntary. Informed consent **(Annex 11)** was obtained from the parents/guardians as well as health personnel prior to the enrolment of their children into the study. In addition to the parents' consent, older children more

than 11 years (adolescents) had to provide assent **(Annex 12)** prior to enrolment into the study.

The ASPA study received ethical approval from the Cameroon National Ethics Committee**,** the Ludwig-Maximilians-Universität, Munich (Germany) and the Albert Einstein College of Medicine (NY, US)**.** In addition, the study received an administrative authorization from the Cameroon Minister of Public Health**.**

III.10.2. Potential risks

i) Confidentiality: The study participants were exposed to breach of confidentially (e.g: HIV positive status). To minimize this risk, project staff were sensitized on confidentially norms and signed a confidentially agreement form prior to the start of the study. In addition, a logbook was used to create study code for each participant. The study code was used for data entry and analysis. Hence, personal identifiers such as names, addresses, phone numbers or other information that can lead to participants' identification during or after the study were not entered into the database. However, regarding the quantitative part of the study, dedicated health care providers alone and this for follow up purpose, will be able to query the logbook study code and linked the study code and patient's medical files.

ii) Venipuncture: Children were exposed to the risk of venipuncture notably pains, excessive bleeding, hematoma (blood accumulating under the skin), infection and multiple punctures to locate the veins. These risks were minimal and similar to those encountered in standard practices. However, to minimize them, venipuncture was performed only by trained staff. In addition, we planned to provide free treatment to children in case of injuries due to venipuncture. Fortunately, we did not have such a case.

III.10.3. Risks in relation to benefits

Participants benefited early access to HIV diagnosis, early enrolment in care and/or treatment for children with HIV-infection, information on HIV infection and adherence. In addition, the knowledge generated by this study will be used to strengthen the pediatric HIV program with the aim to reduce HIV/AIDS related morbidity and mortality in the community. Hence, the study benefits outweigh the risks.

III.11. Study coordination team

The ASPA study was implemented under the leadership and coordination of Dr Yumo Habakkuk (Principal Investigator) who was supervised by Dr Marcus Beissner and Prof Thomas Loescher from Ludwig Maximillian University of Munich, Germany and Prof Christopher Kuaban of the University of Bamenda, Cameroon. The coordination team of the project was based at Research for Development International Foundation (R4D International Foundation), Yaoundé (Cameroon) and the implementation was supported by field staff as described in the chart below **(Figure 3.3).**

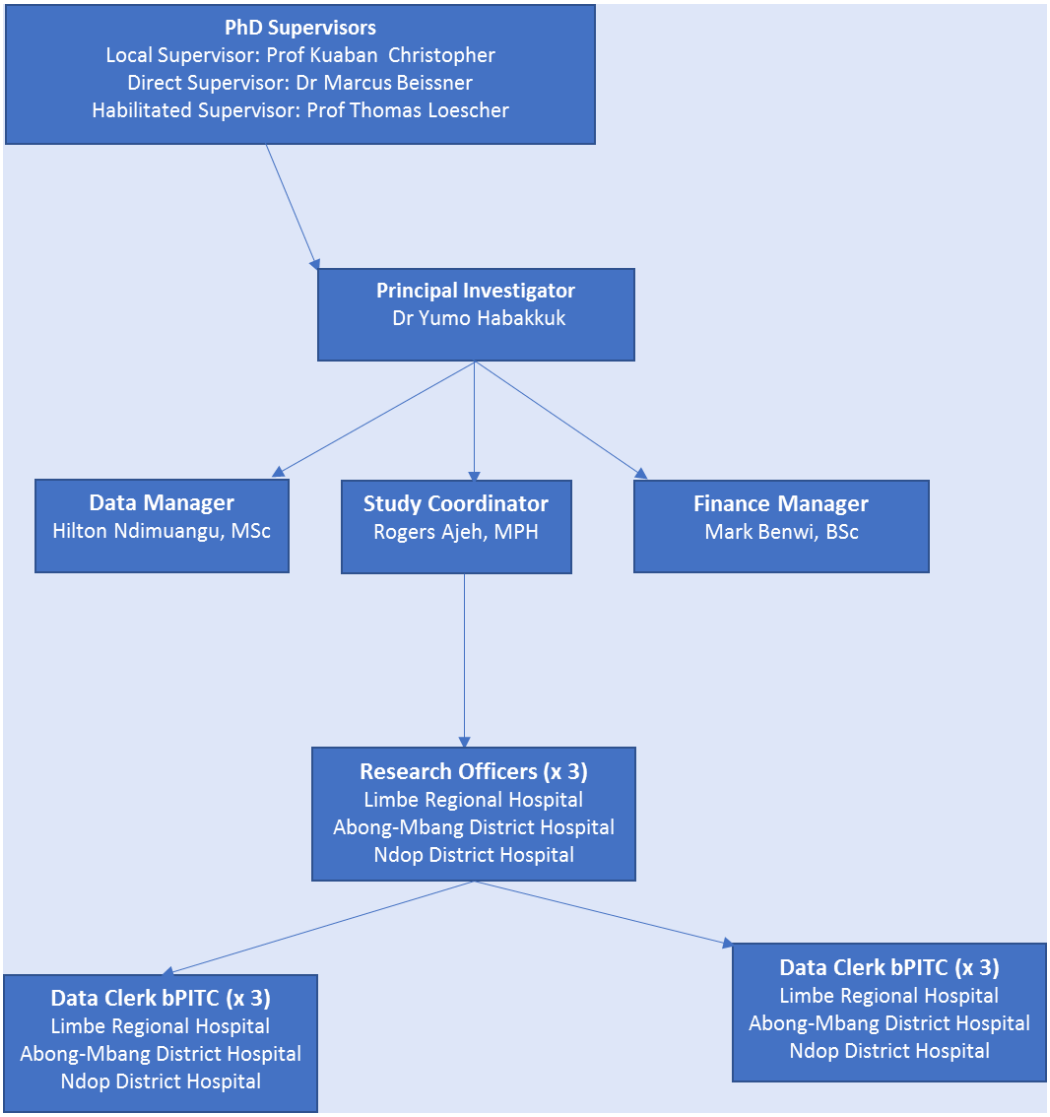

Figure 3.3: ASPA study coordination team

CHAPTER IV: RESULTS

IV. 1. Study cascade

In both groups (tPITC and bPITC), 3699 parents were counselled for enrolment of whom 3666 accepted to participated in the study. 33 (0.89%) parents refused to participate. The majority of parents enrolled came from the bPITC group represented with 2430 (66.3%) participants against 1236 (33.7%) from the tPITC group. Through these parents, 4 719 eligible children were identified and enrolled for HIV testing. Of those, 3 594 were tested, 80 tested HIV positive and 55 enrolled on ART (**Figure 4.4**).

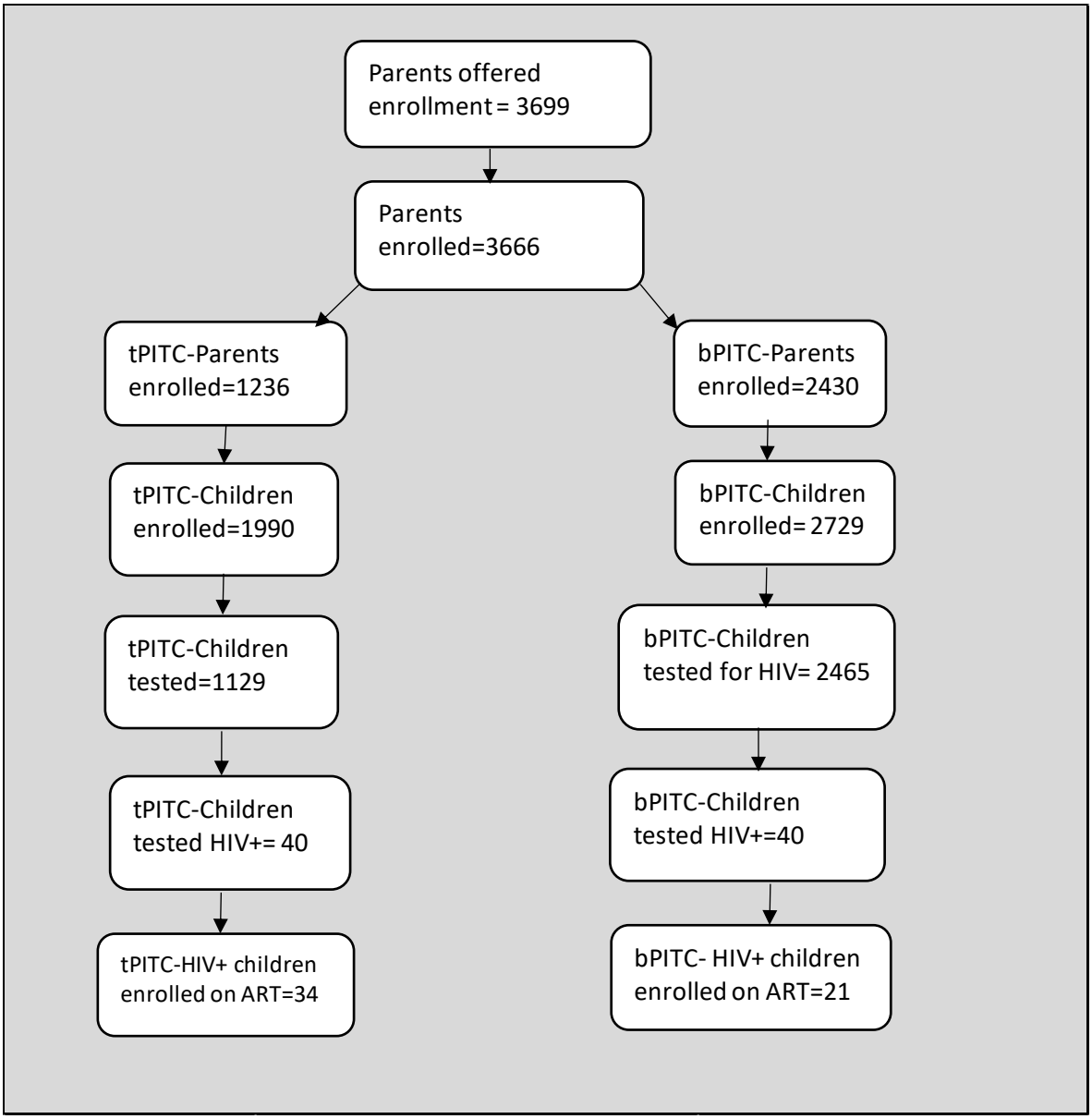

Figure 4.4: ASPA study cascade outcome

IV.2. Socio-demographic characteristics of parents/guardians

Females were more represented in both groups as compared to males, but slightly higher in the bPITC group (80.3% vs 81.8%, p= 0.0254). Parents were older in the tPITC group (median age (years): 36 vs 31) and the age range 25-40 was predominant in both groups, but significantly higher in the tPITC group (75.0% vs 58.0%, p<0.00001). The majority of participants were farmers in the tPITC group (50.7% vs 16.0%, p<0.00001). Parents having secondary/high school level were predominantly represented in both groups, but significantly higher in the bPITC group (37.0% vs 49.2%, p<0.00001). Married participants predominantly higher in bPITC group (40.2% vs 64.9%, p=0.00001) **(Table 4.2).**

Table 4.2: Socio-demographic characteristics of parents in tPITC and bPITC groups

Characteristics	tPITC				bPITC				
	Limbe	**Abong-Mbang**	**Ndop**	**Total**	**Limbe**	**Abong-Mbang**	**Ndop**	**Total**	
	n (%)	n(%)	n (%)	N (%)	n(%)	n(%)	n(%)	N (%)	**P***
Sex									
Male	68(20.8)	65(18.9)	111(19.6)	244 (19.7)	138(13.6)	146(25.4)	158(18.8)	442(18.2)	0.25475
Female	259(79.2)	279(81.1)	454(80.4)	992(80.3)	875(86.4)	429(74.6)	684(81.2)	1988(81.8)	
Age (years)									
Mean±SD	36.5±7.7	35.5±8.9	37.7±8.7	36.8±8.6	32.8±9.9	33.8±11.2	34.0±11.1	33.5±10.6	
Median[Q1,Q3]	36.0[31, 42]	35.0[29, 41]	36.0[31, 43]	36.0[30, 42]	31[26,37]	32[25, 41]	32[26,39]	31[26,39]	
<25	9 (2.7)	42(12.2)	22(3.9)	73(6.0)	165(16.3)	135(23.5)	151(18.0)	451(18.6)	<0.00001
25-40	266 (81.3)	243(70.6)	418(74.0)	927(75.0)	650(64.2)	277(48.2)	481(57.1)	1408(58.0)	
40-60	52(16.0)	59(17.2)	125(22.1)	236(19.0)	171(16.9)	149(25.9)	171(20.3)	491(20.2)	
>60	0 (0.0)	0(0.0)	0(0.0)	0 (0.0)	27(2.7)	14(2.4)	39(4.6)	80(3.2)	
Education level									
None	3 (0.9)	5(1.5)	37(6.5)	45 (3.6)	21(2.1)	12(2.1)	24(2.9)	57(2.4)	<0.00001
Primary	162 (49.5)	125(36.3)	422(74.6)	709(57.4)	223(22.0)	154(26.8)	294(34.9)	671(27.6)	
Secondary/high school	137 (42.0)	214(62.2	106(18.9)	457(37.0)	468(46.2)	356(61.9)	371(44.0)	1195(49.2)	
University	25 (7.6)	0(0.0)	0(0.0)	25(2.0)	301(29.7)	53(9.2)	153(18.2)	507(20.8)	

Occupation									
Farming	54(16.5)	150(43.6)	423(74.9)	627 (50.7)	40(4.0)	130 (22.6)	219(26.0)	389(16.0)	<0.00001
Trading	127(38.9)	48(14.0)	57(10.1)	232(18.7)	220(21.7)	51(8.9)	122(14.5)	393(16.2))	
Office work	27(8.2)	8(2.3)	31(5.5)	66(5.3)	118(11.6)	70(12.2)	258(30.6)	446(18.4)	
Student	8(2.5)	14(4.1)	7(1.2)	29(2.3)	102(10.1)	54(9.4)	107(12.7)	263(16.8)	
Others	111(33.9)	124(36.0)	47(8.3)	282(22.8)	533(52.6)	270(46.9)	136(16.2)	939(38.6)	
Marital status									
Married	167 (51.0)	60(17.4)	269(47.6)	496(40.2)	723(71.4)	209(36.3)	644(76.5)	1576(64.9)	<0.00001
Single	116 (35.5)	81(23.5)	64(11.3)	261(21.2)	212(20.9)	115(20.0)	139(16.5)	466(19.1)	
Cohabitating	7 (2.1)	156(45.3)	1(0.2)	164(13.2)	56(5.5)	220(38.3)	3(0.4)	279(11.5)	
Divorced/separated	3 (0.9)	4(1.3)	59(10.4)	66(5.3)	4(0.4)	13(2.3)	16(1.9)	33(1.4)	
Widow/Widower	34 (10.5)	43(12.5)	172(30.5)	249(20.1)	18(1.8)	18(3.1)	40(4.8)	76(3.1)	

In the bPITC group, 4.9% (120/2430) of parents declared to be HIV+. In the tPITC group, the large majority (94.9%) of parents were on ART, 22.2% have been on treatment for more than 10 years and 60.8% have not disclosed their HIV positive status to any of their children. Most (93.6%) of these parents preferred to have their children tested in the hospital rather than in their homes (5.6%). **(Table 4.3).**

Table 4.3: HIV history of parents in the tPITC and bPITC groups

Characteristics	tPITC				bPITC			
	Limbe	Abong-Mbang	Ndop	Total	Limbe	Abong-Mbang	Ndop	Total
	n (%)	n(%)	n (%)	N (%)	n(%)	n(%)	n(%)	N (%)
Sex								
HIV status (only bPITC)								
Positive					52(5.1)	37(6.4)	31(3.7)	120(4.9)
Negative					894(88.3)	370(64.4)	757(89.9)	2021(83.2)
Unknown					67(6.6)	168(29.2)	54(6.4)	289(11.9)
Currently on ART (only tPITC)								
Yes	316(96.6)	305(88.6)	552(97.7)	1173(94.9)				
No	11(3.4)	39(11.4)	13(2.3)	63(5.1)				
Duration on ARVs drugs (only tPITC) only tPITC)								
0-5 years	36(14.1)	221(79.5)	316(66.0)	573(56.6)				
6-10 years	22(8.6)	52(18.7)	141(29.5)	215(21.2)				
>10 years	198(77.3)	5(1.8)	22(4.5)	225(22.2)				
Had disclose HIV to children (only tPITC)								
Yes, to all of them	29(8.9)	112(32.5)	227(40.2)	368(29.8)				
Yes, to some of them	23(7.0)	25(7.3)	68(12.0)	116(9.4)				
No, to none of them	275(84.1)	207(60.2)	270(47.8)	752(60.8)				
Preferred site for HIV test of children (only tPITC)								
Hospital	315(96.3)	318 (92.5)	339(60.0)	972 (93.6)				
Home	12(3.7)	20 (5.8)	26(4.6)	58 (5.6)				
Indifferent	0 (0.0)	6(1.7)	2(0.4)	8 (0.8)				

IV.3. Socio-demographic characteristics of children

Children were almost twice as younger in the bPITC group as in the the tPITC (median age: 48 vs 96 months). The age range 60-120 and 19-60 months were significantly more represented in the tPITC and bPITC group respectively (31.8% vs 27.0%, p<0.00001). In the tPITC group a large proportion (46.2%) of children had primary school level while in the bPITC group most (41.2%) children had no education. In both groups, the majority of children were identified for testing through their mother (75.1% vs 63.8%, p<0.00001). In both groups, almost all the mothers of the children attended ANC during their pregnancy (96.7% vs 94.9%, p<0.00001). The large proportion of children were delivered in a health facility in both the tPITC and bPITC group (90.5% vs 98.9%, p<0.00001), but only 29.4% of HIV infected mothers (tPITC group) received ARVs for PMTCT during pregnancy **(Table 4.4).**

Table 4.4: Socio-demographic characteristics of children in tPITC and bPITC groups

Characteristics	tPITC			bPITC				Total	
	Limbe	Abong-Mbang	Ndop	Total	Limbe	Abong-Mbang	Ndop		
	n (%)	n(%)	n(%)	N(%)	n(%)	n(%)	n(%)	N(%)	P*
Sex									
Female	290(52.5)	199(49.8)	510(49.1)	999(50.2)	621(51.5)	313(50.2)	435(48.3)	1369(50.2)	0.98045
Male	262(47.5)	201(50.2)	528(50.9)	991(49.8)	584(48.5)	310(49.8)	466(51.7)	1360(49.8)	
Age (months)									
Mean ± SD	107.5± 61.2	85.95±62.5	100.32±58.0	99.4±60.4	75.4±69.4	66.0±60.3	82.8±69.1	75.7±67.4	
Median (Q1, Q3)	108(60,156)	72(36,132)	96(48,144)	96(48,144)	48(16,132)	48(18,96)	60(24,132)	48(18,120)	
0-19	34(6.2)	64 (16.0)	81(7.8)	179(9.0)	351(29.2)	161(25.8)	175(19.4)	687(25.2)	< 0.00001
19-60	98(17.7)	87(21.7)	188(18.1)	373(18.7)	283 (23.5)	189(30.3)	263(21.2)	735 (27.0)	
60-120	173(31.4)	117(29.2)	342(33.0)	632(31.8)	226 (18.8)	147(23.6)	175(19.4)	548(20.0)	
120-180	149(27.0)	83(20.8)	288(27.7)	520(26.1)	185 (15.3)	68(11.0)	152(16.9)	405(14.8)	
180-228	98(17.7)	49(12.3)	139(13.4)	286(14.4)	160 (13.2)	58(9.3)	136 (15.1)	354(13.0)	

Education level									
None	82(14.9)	106(26.5)	236(22.7)	424(21.3)	495(41.1)	309(49.6)	319(35.4)	1123(41.2)	< 0.00001
Nursery	46(8.3)	40(10.0)	52(5.0)	138(7.0)	127(10.5)	51(8.2)	123(13.6)	301(11.0)	
Primary	239(43.3)	172(43.0)	509(49.0)	920(46.2)	275(22.8)	182(29.2)	254(28.2)	711(26.1)	
Secondary/high school	185(35.5)	82(20.5)	241(22.2)	508(25.5)	308(25.6)	81(13.0)	205(22.8)	594(21.8)	
Identified for HIV testing through or brought to the hospital by									
Father	136(24.6)	88(22.0)	270(26.0)	494(24.9)	118 (9.8)	130 (20.9)	104 (11.5)	352 (12.9)	< 0.00001
Mother	416(75.4)	312(78.0)	768(74.0)	1496(75.1)	817 (67.8)	368 (59.1)	557 (61.8)	1742 (63.8)	
Grand-father	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1 (0.1)	4 (0.6)	5(0.6)	10 (0.4)	
Grand-mother	0(0.0)	0(0.0)	0(0.0)	0(0.0)	71 (5.9)	50 (80.0)	68 (7.6)	189 (6.9)	
Others	0(0.0)	0(0.0)	0(0.0)	0(0.0)	198 (16.4)	71 (11.4)	167 (18.5)	436 (16.0)	
Mother attended ANC during pregnancy									
No	N/A**	41(10.2)	6(0.6)	47(3.3)	N/A	23(3.7)	4(0.5)	27(1.8)	< 0.00001
Yes	N/A	359(89.8)	1032(99.4)	1391(96.7)	N/A	552(88.6)	895(99.3)	1447(94.9)	
Unknown	N/A	0(0.0)	0(0.0)	0(0.0)	N/A	48(7.7)	2(0.2)	50(3.3)	
Place of birth									
Health facility	N/A	296(74.0)	1006(96.9)	1302(90.5)	N/A	498(79.9)	891(98.9)	1389(91.1)	<0.00001
Home	N/A	104(26.0)	32(3.1)	136(9.5)	N/A	100(16.1)	7(0.8)	107(7.0)	
Unknown	N/A	0(0.0)	0(0.0)	0(0.0)	N/A	25(4.0)	3(0.3)	28(1.9)	
Mother received ARVs during pregnancy (only tPTIC)									
No	381(69.0)	267(66.7)	692(66.7)	1340(67.3)					
Yes	136(24.6)	118(29.5)	332(32.0)	586(29.4)					
Unknown	35(6.4)	15(3.8)	14(1.3)	64(3.2)					

*Data not collected for this site; ** P value for "Total" tPITC vs bPITC

Most children had never tested for HIV before with a significantly higher proportion in the bPITC group (64.3% vs 77.4%, p<0.00001). Even though most children's fathers were alive, the proportion of paternal orphans was significantly higher in the tPTIC group than in the bPTIC (22.2% vs 5.6%, p<0.00001) and fewer maternal orphans was observed in both groups (tPITC vs bPITC: 1.8% vs 2.3%). The large majority (96.1%) of children in the tPITC group were recruited through their parents on ART, follow by parents from PMTCT (1.02%) and VCT (0.3%). In the tPITC group, the large majority (88.7%) of parents preferred their children to be tested in the hospital and most (82.8%) children were finally tested in the hospital **(Table 4.5).**

Table 4.5: HIV history of children in the tPITC and bPITC groups

Characteristics	tPITC			bPITC				Total	
	Limbe	Abong-Mbang	Ndop	Total	Limbe	Abong-Mbang	Ndop		
	n (%)	n(%)	n(%)	N(%)	n(%)	n(%)	n(%)	N(%)	P*
Child ever tested for HIV before									
No	341(61.8)	356(89.0)	583(56.2)	1280(64.3)	935(77.6)	531(85.2)	646(71.7))	2112(77.4)	<0.00001
Yes	199(36.0)	39(9.7)	453(43.6)	691(34.7)	200(16.6)	58(9.3)	244(27.0)	502(18.4)	
Unknown	12(2.2)	5(1.3)	2(0.2)	19(1.0)	70(5.8)	34(5.5)	11(1.3)	115 (4.2)	
HIV status of the child									
Negative	194(35.1)	38(9.5)	448(43.2)	680 (34.2)	172(14.2)	58(9.3)	241(26.8)	471(17.2)	<0.00001
Positive	0(0.0)	0(0.0)	0(0)	0(0.0)	7(0.6)	0(0.0)	1(0.1)	8(0.3)	
Unknown	358(64.9)	362(90.5)	590(56.8)	1310(65.8)	1026(85.2)	565(9.7)	659(73.1)	2250 (82.4)	
Child's mother alive									
Yes	544(98.5)	396(99.0)	1016(97.9)	1956(98.2)	1177(97.7)	606(97.3)	883(98.0)	2666(97.7)	0.15143
No	8(1.5)	4(1.0)	22(2.1)	34(1.8)	28(2.3)	17(2.7)	18(2.0)	63(2.3)	
Mother's HIV status (only tPITC)									
Negative	31(5.6)	15(3.8)	104(10.0)	150(7.6)					

Positive	463(83.9)	355(88.7)	894(86.1)	1712(86.0)					
Unknown	58(10.5)	30(7.5)	40(3.9)	128(6.4)					
Mother on ARVs drugs (only tPITC)									
Yes	458 (83.0)	331 (82.7)	881 (84.9)	1670 (84.0)					
No	53 (9.6)	39 (9.8)	115 (11.1)	207 (10.4)					
Unknown	41 (7.4)	30 (7.5)	42 (4.0)	113 (4.6)					
Child's father alive									
Yes	450(81.5)	336(84.0)	743(71.6)	1529(77.8)	1138(94.4)	590(94.7)	849(94.2)	2577(94.4)	<0.00001
No	102(18.5)	64(16.0)	295(28.4)	461(22.2)	67(5.6)	33(5.3)	52(5.8)	152(5.6)	
Father's HIV status (only tPITC)									
Negative	121 (22.0)	49 (12.2)	181 (17.4)	351(17.6)					
Positive	220 (39.8)	174 (43.5)	588 (56.6)	982 (49.3)					
Unknown	211(38.2)	177 (44.3)	269 (26.0)	657(33.1)					
Father on ARVs drugs (only tPITC)									
Yes	201 (36.4)	143 (35.7)	505 (48.6)	849(42.6)					
No	136 (24.6)	23 (5.8)	73 (7.0)	232(11.7)					
Unknown	215(39.0)	234 (58.5)	460 (44.4)	909(45.7)					
*Data not collected for this site; ** P value for "Total" tPITC vs bPITC									

IV.4. Acceptability, feasibility and effectiveness of PITC

IV.4.1. Acceptability

The ASPA study offered enrolment to 3699 parents including 1240 and 2459 respectively in the tPITC and bPITC group. Among these parents, 99.7% (1236/1240) and 98.8% (2430/2459) (p=0.0005) respectively in the tPITC and bPITC group accepted to have their children tested for HIV. The acceptability was high across all the sites and in both groups: in the tPITC it was respectively 100%, 99.7% and 99.5% in Limbe, Abong-Mbang and Ndop. In the bPITC it was respectively 99.2%, 99.3% and 98.0% in the same order. In both groups, the acceptance of HIV testing among children was 100% **(Table 4.6).**

IV.4.2. Feasibility

Through consenting parents, the study enrolled 4719 children eligible for HIV testing, including 1990 in the tPITC and 2729 in the bPITC group. Among these children, the study was able to test 57.6% (1129/1990) and 90.3% (2465/2729) of them respectively in the tPITC and bPITC group. This difference was statistically significant (p<0.0001). In the tPITC group, the feasibility was highest (88.0%) in the Abong-Mbang District Hospital as compared to the Limbe Regional Hospital (54.3%, p < 0.0001) and the Ndop District Hospital (46.0%, p<0.0001). Likewise, in the bPITC group, this outcome was still highest in Abong-Mbang District Hospital (99.4%), followed by Ndop District Hospital (99.3%) and Limbe Regional Hospital (78.9%) **(Table 4.6).**

Table 4.6: Implementation outcome of tPITC and bPITC in 3 health facilities in Cameroon, ASPA Study

	tPITC					bPITC				
	Limbe	**Abong Mbang**	**Ndop**	**Total**		**Limbe**	**Abong-Mbang**	**Ndop**	**Total**	
	N(%)	N(%)	N(%)	N(%)		N(%)	N(%)	N(%)	N(%)	
Indicators										
Parents offered enrolment	327	345	568	1240		1021	579	859	2459	3699
Parents who refused enrollment	0	1	3	4		8	4	17	29	33
Parents enrolled	327	344	565	1236		1013	575	842	2430	3666
Children and adolescents offered enrolment	552	400	1038	1990		1205	623	901	2729	4719
Children and adolescents	0	0	0	0		0	0	0	0	0

who refused to enrolled											
Children and adolescents enrolled	552	400	1038	1990		1205	623	901	2729	4719	
Children and adolescents tested for HIV in the community (only tPITC)	43	140	15	198		N/A	N/A	N/A	N/A	N/A	
Children and adolescents tested for HIV in the hospital	257	212	462	931		951	619	895	2465	3396	
Children tested for HIV (both community and hospital)	300	352	477	1129		951	619	895	2465	3594	
Children and adolescents tested HIV+ in the community	0	1	0	1		N/A	N/A	N/A	N/A	N/A	

Children and adolescents tested HIV+ in the hospital	5	13	21	39		14	21	5	40	79	
Children and adolescents tested HIV+ (total HIV testing)	5	14	21	40		14	21	5	40	80	
Children and adolescents initiated on ART	1	13	20	34		3	16	2	21	55	
Outcome (%)					**%CI**					**%CI**	**P**
Acceptability	100.0%	99.7%	99.5%	99.7%	(99.5-100)	99.2%	99.3%	98.0%	98.8%	(98.3,99.2)	0.0005
Feasibility	54.3%	88.0%	46.0%	56.7%	(54.3,58.5)	78.9%	99.4%	99.3%	90.3%	(89.2,91.4)	<0.00001
Case detection	1.7%	4.0%	4.4%	3.5%	(2.3,4.4)	1.5%	3.4%	0.6%	1.6%	(1.1,2.1)	0.0008
Linkage	20.0%	85.7%	95.2%	82.5%	(70.7,94.3)	21.4%	76.2%	40.0%	52.5%	(37.0,67.9)	0.0018

IV.4.3. Effectiveness: case detection, case detection earliness and linkage

The study tested a total of 3 594 children and adolescents; 1129 and 2465 respectively in the tPITC and bPITC group. The prevalence (case detection or yield) of HIV among children was (3.5%, CI:2.3-4.4) and (1.6%, CI:1.1-2.1) respectively in the tPITC and bPITC group. This difference was statistically significant (p= 0.0008) (Table 4.6). This translates to a relative risk (RR) of 2.2, indicating that the probability of identifying a new pediatric HIV case through the tPITC strategy is 2 times as high as in the bPITC strategy. In other words, 29 and 62 children have to be tested to identify one new case with the implementation of the targeted and blanket PITC strategy respectively. In the same line, 31 and 61 parents have to be counselled in order to identify 1 (one) case of HIV infection among children. However, from an intention to test (ITT) perspective, the case detection would be 2.0%(40/1990) in the tPITC against 1.5%(40/2729) in the bPITC. Hence, tPITC would be 1.43 fold as effective as bPITC.

In the tPITC group, 18% (198/1129) of children were tested in the community and 82% (931/1129) in the hospital and, 0.5% (1/198) of children tested in the community were HIV positive while this HIV positivity was 4% (39/931) among children tested in the hospital. This difference was statistically significant (p= 0.0299). In the tPITC group, the age of HIV positive children varied from 9 to 228 months with a median age of 96 months (8 years) while in the bPITC, the age of HIV positive cases ranged from 2 to 228 months with a median of 48 months (4 years). Among all HIV positive cases identified in both groups (tPITC + bPITC), 78.7% (63/80) were below 15 years and only 11.2% (9/80) were below the age of 18 months.

The majority (84.8%) of cases in the tPITC group were diagnosed at WHO stage 1 while in the bPITC group, the majority of cases (39.2%) were diagnosed at WHO stage 3. This difference was statistically significant (p=0.0001) **(Table 4.7).**

Table 4.7: WHO clinical staging among HIV positive children in tPITC and bPITC groups

WHO staging	tPITC				bPITC				
	Limbe	**Abong-Mbang**	**Ndop**	**Total**	**Limbe**	**Abong-Mbang**	**Ndop**	**Total**	**P**
	n(%)	n(%)	n(%)	N(%)	n(%)	n(%)	n(%)	N(%)	
Stage 1	1(50.0)	8(72.7)	19(95.0)	28 (84.8)	1(20)	3(18.8)	1(50.0)	5(21.7)	0.0001
Stage 2	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0)	8(50.0)	0(0)	8(34.8)	
Stage 3	1(50.0)	3(27.3)	1(5.0)	5(15.2)	4(80)	4(25.0)	1(50.0)	9(39.2)	
Stage 4	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0)	1(6.2)	0(0.0)	1(4.3)	

In the tPITC group, 82.5% of children newly diagnosed with HIV were linked to care as compared to 52.5% in the bPITC group. This difference was statistically significant (p= 0.0018) **(Table 4.6).**

IV.5. Combined effectiveness of both tPITC and bPITC

IV.5.1. Outcome of targeted provider-initiated-testing and counselling (tPITC)

During the 6 months of the implementation of the ASPA project in the 3 hospitals, 2829 eligible children for HIV testing were identified at the HIV treatment center through their parents in HIV care (tPITC group). Of these children, 1163 tested for HIV, 64 tested HIV positive and 35 enrolled on ART. There was no data to compare these outcomes before the introduction of the ASPA project and this because the tPITC strategy was not consistently practiced and monitored in respective hospitals **(Table 4.8).**

Table 4.8: The effect of the implementation of both tPITC and bPITC in three hospitals in Cameroon

Indicators	Before ASPA								After ASPA									
	M1	M2	M3	M4	M5	M6	Total	Mean	M1	M2	M3	M4	M5	M6	Total	Mean	P	Progression
Number of children identified for HIV testing through HIV+ parents (tPITC)	0	0	0	0	0	0	0	0	563	681	578	352	388	267	2829	471.5		
Number of children seen at the outpatient department (bPITC)	878	804	990	1066	1138	1015	5891	981.8	899	881	656	573	765	869	4643	773.8		-21.2%
Number of children eligible for HIV testing in the hospital (tPITC+bPITC)	878	804	990	1066	1138	1015	5891	981.8	1462	1562	1234	925	1153	1136	7472	1245.3		26.8%
Number of children tested for HIV through tPITC	0	0	0	0	0	0	0	0	166	246	213	145	179	214	1163	193.8		
Number of children tested for HIV through bPITC	122	121	342	259	254	240	1338	223.0	384	364	301	327	347	367	2090	348.3	<0.0001	56.2%
Number of children tested for HIV in the hospital (tPITC+bPITC)	122	121	342	259	254	240	1338	223.0	550	610	514	472	526	581	3253	542.2	<0.0001	143.1%
Number of children tested HIV+ through tPITC (case detection)	0	0	0	0	0	0	0	0	17	13	16	5	6	7	64	10.7		
Number of children tested HIV+ through bPITC (case detection)	9	7	8	18	7	14	63	10.5	18	10	4	9	8	9	58	9.7	< 0.0001	-7.9%
Number of children tested HIV+ in hospital (tPITC+bPITC)	9	7	8	18	7	14	63	10.5	35	23	20	14	14	16	122	20.3	<0.0001	93.7%
Number of children enrolled on ART through tPITC	0	0	0	0	0	0	0	0	11	5	8	3	5	3	35	5.8		
Number of children enrolled on ART through bPITC	10	5	8	11	1	9	44	7.3	7	9	3	8	5	6	38	6.3	0.1368	-13.6%
Number of children enrolled on ART in the hospital (tPITC+bPITC)	10	5	8	11	1	9	44	7.3	18	14	11	11	10	9	73	12.2	< 0.0001	65.9%

IV.5.2. Outcome of blanket provider-initiated-testing and counselling (bPITC)

During the study period, 5891 and 4643 children were seen for external consultations at the outpatient department (bTPIC group) respectively before and after the introduction of the ASPA project. The mean number of children tested for HIV per month was 223.0 and 348.3 respectively before and after the intervention. This difference was statistically significant ($p<0.0001$). The mean number of HIV cases detected per month among children was 10.5 and 9.6 before and after the project. The difference was statistically significant ($p<0.00001$). The mean number of HIV positive children enrolled on ART per month was 7.3 and 6.3 respectively before and after the project. The difference was not statistically significant ($p=0.1368$) **(Table 4.8).**

IV.5.3. Outcome of the concurrent implementation of tPITC and bPITC

During the implementation period of both tPITC and bPITC strategies, 7472 eligible children were identified for HIV testing in the 3 hospitals (2829 and 4643 children respectively from tPITC and bPITC group). This represents a 26% increase as compared to the 5891 children seen at the outpatient department (OPD) of these hospitals before the intervention.

The mean number of children tested per month for HIV was 223.0 and 542.2 respectively before and after the project. This difference was statistically ($p<0.0001$) and represented an increase of 143% in HIV testing uptake as compared to the period prior to the intervention **(Figure 4.5).**

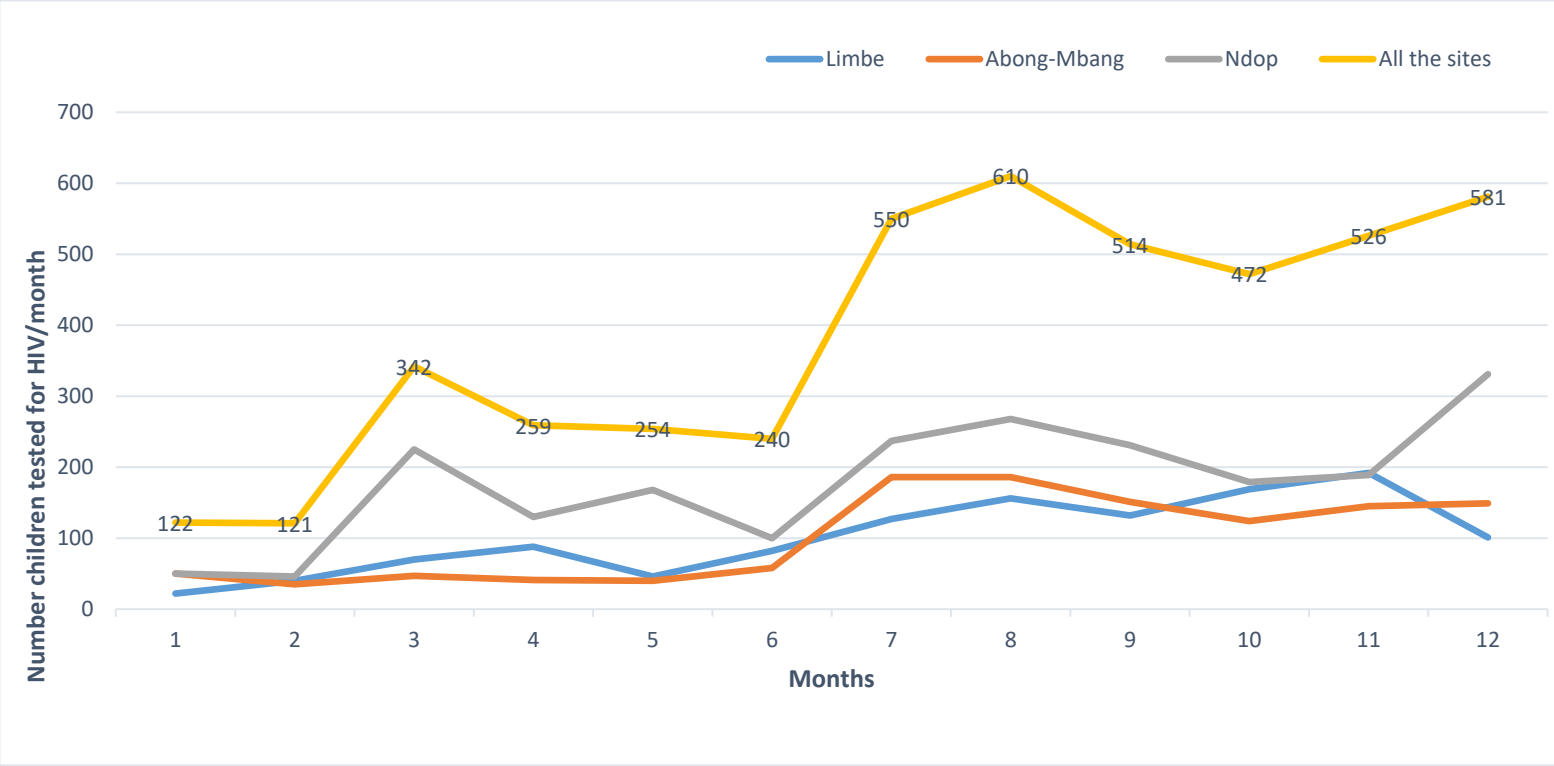

Figure 4.5: Trends in the number of children and adolescents (6weeks-19 years) tested for HIV in three hospitals in Cameroon 6 months before and after the ASPA project, July 2015-November 2016.

The mean number of HIV cases detected among children per month was 10.5 and 20.3 respectively before and after the project. The difference was statistically significant (p<0.0001) and represented an increase of 93.7% in HIV case detection as compared to the period prior to the intervention **(Figure 4.6).**

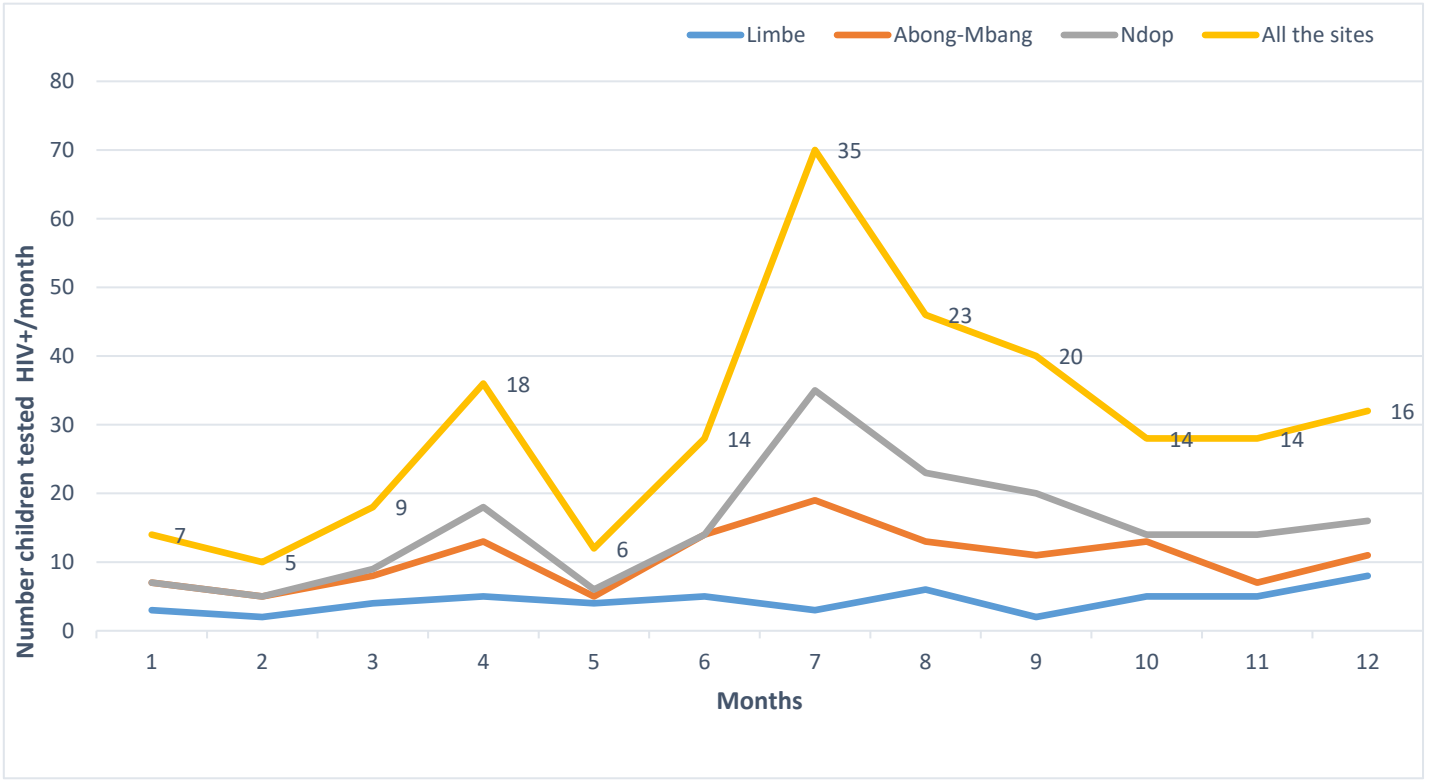

Figure 4.6: Trends in the number of children and adolescents (6 weeks-19 years) tested HIV+ in three hospitals in Cameroon 6 months before and after the ASPA project, July 15-November 2016.

The mean number of children enrolled on ART per month was 7.3 and 12.2 respectively before and after the ASPA project. The difference was statistically significant (p=0.0001) and represented an increase of 66.0% in ART enrolment as compared to the period before the project **(Figure 4.7).**

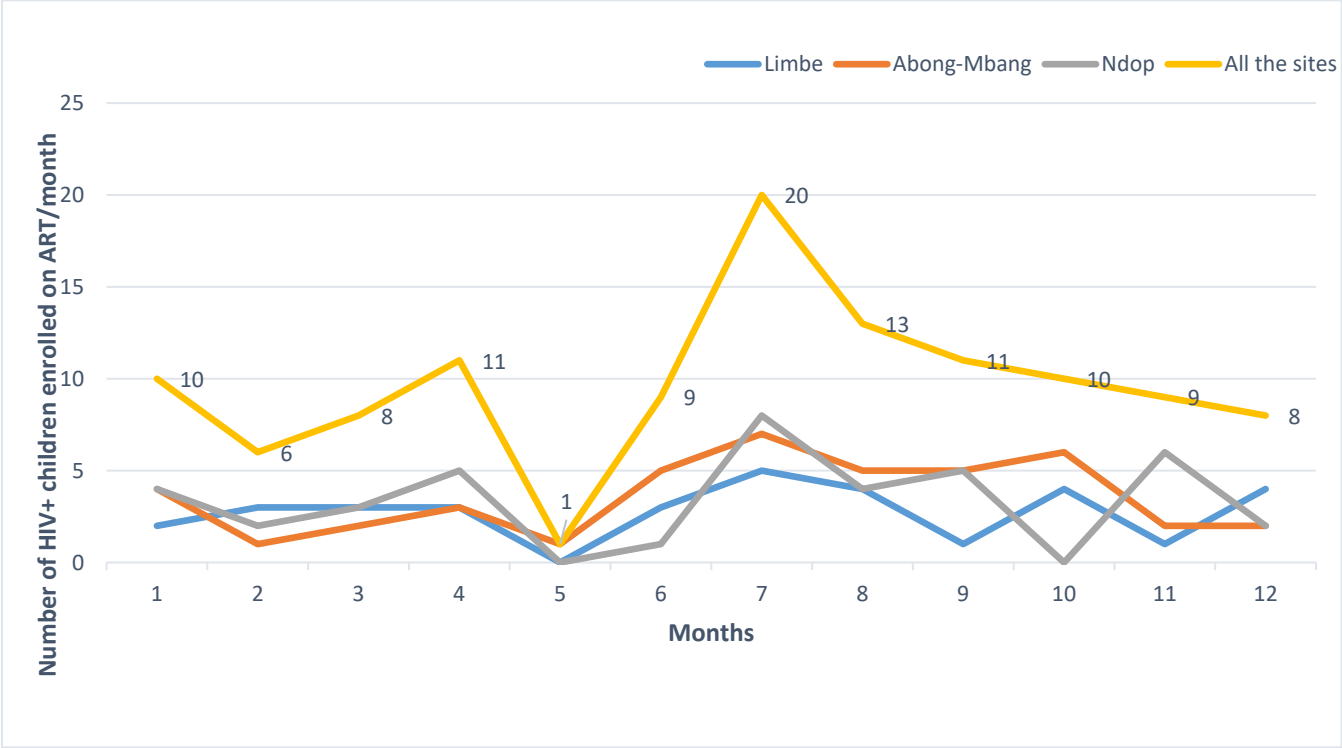

Figure 4.7: Trends in number of HIV+ children and adolescents enrolled on ART in 3 hospitals in Cameroon 6 months before and after the ASPA project, July-November 2016.

IV.6. Barriers to pediatric HIV testing and treatment

IV.6.1. Patients' level barriers

In the tPITC group, a subgroup of parents who initially accepted to have their children tested for HIV but did not respect their promise were interviewed in order to determine the reasons of failure to return to the hospital with their children. The lack of transport fare (38.3%), children living elsewhere (25.5%) and the missing consent of the spouse/partner (12.7%) were the 3 main reasons of failure to return with children to the hospital for HIV testing **(Table 4.8).**

Table 4.9: Reasons of failure to return to the hospital with children for HIV testing

Reasons for not bringing children for HIV testing	**N**	**%**
Children in school	6	6.9
Children not living with me	22	25.6
Do not want my child to know I am HIV positive	3	3.5
Lack of time	9	10.5
Lack of transport fare	33	38.4
Spouse/partner opposed my decision	2	2.4
Others*	11	12.7
Total	**86**	**100**

Other reasons are presented in ***table 4.9 below.*

Other reasons mentioned by parents as hindrance for them to return to the hospital with their children for HIV testing include forgetfulness (36.3%), child refusal to go to the hospital (18.1%) and bad weather (18.18%).

Table 4.10: Other reasons of failure to return to the hospital with children for HIV testing

Other reasons for not returning with children to the hospital for HIV testing	N	%
Because of bad roads	1	9.1
Because it rained seriously this morning	2	18.2
Family related issues	1	9.1
I forgot to bring the child	4	36.4
Children on holidays	1	9.1
Children refused to come	2	18.1
Total	**11**	**100**

According to parents who responded, 41.0% of them declared that they will bring their children for testing if transport fare is reimbursed. More than half (57.7%) declared that there is no external factor that can make them bring their children for HIV testing **(Table 4.11).**

Table 4.11: Enablers and barriers for parents to return to the hospital with children for HIV testing

What can be done for you to bring your children for HIV testing?	N	%
If spouse is properly counselled	1	1.3
If transport fare is reimbursed	32	41.0
Nothing (no external factor)	45	57.7%
Total	**78**	**100**

The large majority of parents (74.4%) were unwilling to have their children tested at home by community health workers **(Table 4.12).**

Table 4.12: Parents' willingness to have children tested at home

Would you be willing for community health workers to come and test your child at home?	**N**	**%**
No	64	74.4%
Undecided	11	12.8%
Yes	11	12.8%
Total	**86**	**100**

IV.6.2. Health care providers' level barriers

In the 3 study sites, we interviewed a total of 48 clinicians (doctors, nurses) to assess their knowledge, attitudes and practices regarding pediatric HIV care and treatment. Among these health care providers, 81.25 % had been trained in pediatric HIV testing and counselling, while 66.67% had been trained in pediatric HIV treatment. The majority of health care providers (72.92%) declared to have requested an HIV test to the last child they consulted, while 21.05% of them declared it is not necessary to request an HIV test to all children seen in consultation and this irrespective of the chief complaint **(Table 4.13).**

Table 4.13: Knowledge, attitudes and practices of health care providers regarding pediatric HIV testing and counselling

Knowledge, attitudes and practices		
When last did you consult a child < 19 years of age?	**N**	**%**
< 3 days	23	47.92
3-7 days	6	12.50
>7 days	19	39.58
Total	**48**	**100**
Did you request for HIV test for that child?	N	%
Yes	35	72.92
No	12	25.00
Do not remember	1	2.08%

Total	**48**	**100**
Do you always request for an HIV test to all children during consultations?	N	%
Yes	29	60.42%
No	17	35.42%
Dot not remember	2	4.17%
Total	**48**	**100%**
What are some of reasons you do not request HIV test to all children?	N	%
HIV testing reagent not available	1	5.26%
It is not necessary	4	21.05%
Lack of time	2	10.53%
Other reasons	12	63.16%
Total	**19**	**100%**
When last did you have a training in HIV testing and counselling?	**N**	**%**
< 3 years ago	30	62.50
> 5 years ago	3	6.25
3-5 years ago	6	12.50
I have never been trained	8	16.67
I do not remember	1	2.08
Total	**48**	**100**
When last did you have a training in pediatric HIV treatment	**N**	**%**
< 3 years ago	26	54.17%
> 5 years ago	3	6.25%
3-5 years	3	6.25%
I have never been trained	11	22.92%
I do not remember	5	10.42%
Total	**48**	**100%**

CHAPTER V: DISCUSSION

Despite a substantial 48% reduction in mother-to-child HIV transmission (MTCT) in the past 2 decades, an estimated 170 000 new paediatric HIV infections occurred in 2014 (46). Moreover, due to years of failure to prevent MTCT, as well as the success of ART programmes in keeping children alive, there are an estimated 2.1 million children below 15 years living with HIV worldwide, nearly 90% of them in sub- Saharan Africa (SSA)(23). It's estimated that every day, 410 children die from HIV across the world (47) and in 2013, 210,000 children and 120,000 adolescents died because of HIV/AIDS (48). HIV infection is the second leading cause of death among adolescents, second only to road traffic injuries (49). This high HIV related mortality and children and adolescents is mainly due to the current low pediatric ART coverage estimated. In 2016, only 43% of children below 15 years of age against 53% of adults in need were effectively on ART (50) and by 2020, it is estimated that there will still be well over one million children below 15 years old needing ART (51). Failure of PMTCT despite relatively high ANC attendance in most Sub-Saharan African countries will contribute significantly to the situation. For example in 2016 in Cameroon, the coverage of pregnant women who receive ARV for PMTCT was 76% (52) despite the free provision of HIV testing and ARVs drugs for mothers at ANC services.

In October 2014, the UNAIDS proposed the ambitious 90-90-90 new targets to accelerate the HIV treatment scale-up in low-and middle income
countries with the aim to end the AIDS epidemic by 2030 (53)). The targets, described as ''90-90-90,'' propose that by 2020, 90% of all people living with HIV will know their HIV status, 90% of all people with diagnosed HIV infection will receive sustained antiretroviral therapy and 90% of all people receiving antiretroviral therapy will have viral suppression by 2020 (53). Applying the 90-90-90 paradigm to paediatrics which would require identifying 3.7 million infants, children and adolescents with HIV infection, treating 3.3 million and achieving viral suppression among 3 million within the next four years (40).

In such a context, it's a paramount need for the global public health community to continue addressing the current challenges in identifying children and adolescents living with HIV/AIDS and providing them with long live saving antiretroviral medicines. The ASPA study aims at contributing to achieve this objective by assessing the comparative advantage of active case finding over the (passive) routine provider- initiated- testing and counselling in identification and linkage of children and adolescents in pediatric HIV care and treatment. The assessment of active versus passive case finding strategies has

been published in TB control [(54), (55)]. To the best of our knowledge, this is the first study comparing the active versus the passive case finding in HIV control.

The ASPA study found that the yield of newly identified HIV cases among children and adolescents was twice as high with tPITC (index case testing or active case finding) as with bPITC (routine PITC) strategy. In the tPITC group, we found a prevalence (yield/case detection) of 3.5%. This prevalence is also closer to the 4.0% but lower to the 7.4% reported respectively by Saeed et al. in Malawi and Wagner et al. in Kenya in studies assessing the outcome of active case finding for pediatric HIV [(56), (57)].

This difference in the prevalence reported by Wagner et al. could be due to the fact that this study only enrolled children 12 years or younger while in our study children's age ranged from 6 weeks-19 years. In the study of Saeed et al. the age of children tested for HIV ranged from 1-24 years. This age range is similar to that of our study and may explained the similarity of the prevalence reported by both studies. It's known from the evolution of HIV infection that only approximately 70% of children reach the age of 6 years (58). Therefore, lower HIV prevalence should be expected among older HIV exposed children as it is the case in our study likewise that of Saeed et al.

In the bPITC group, we found a prevalence of 1.6%, similar to the 1.8% reported by Zoufaly et al. in a study assessing the outcome of routine PITC among children in rural Cameroon (59). Our result is also closer to the 2.7% reported by Cohn et al. in a systematic review and meta-analysis of pediatric HIV testing in low-middle income countries (60). In our study, to identify one new pediatric HIV case, 40 and 61 parents have to be counselled in the tPITC and bPITC group respectively and 29 and 62 children have to be tested in the same order. These findings indicate that in comparison with the routine PITC strategy, there is less effort needed to find a new pediatric HIV case with the index case HIV testing approach. Hence, the index case testing strategy is more effective as compared to the routine PITC.

Parents' acceptance (acceptability of tPITC) of HIV testing for their children was higher in the tPITC group (99.7% vs 98.8%) most probably because of a better HIV awareness level resulting to the contact of parents in this group with HIV services. Saeed et al. reported a similar high acceptability (93.5%) in a study in Malawi (56). In the contrary, our result contrasts the 48% acceptance of HIV infected parents who accepted

to test their children in a referral service delivery model in Kenya reported by Wagner et al. (57).

The uptake of HIV testing (feasibility) among children was significantly lower in the tPITC group (56.7% vs 90.3%, p < 0. 0001). The prominent reasons for this low HIV uptake in the group in order of importance were: lack of transport fare (38.37%), children not living with parents (25.58%), missing consent of one parent (12.79%), lack of time to bring children to the hospital (10.47%); and children in school (6.98%). As per parents' declarations, the lack of transport fare was the main obstacle for bringing children to the hospital for testing. This finding should be taken with caution if considering the variations observed in the HIV testing uptake percentage (feasibility of tPITC) in the 3 hospitals. Actually, the feasibility of tPITC was highest in Abong-District Hospital (88%), moderate in Limbe Regional Hospital (54. 3%) and lowest in Ndop District Hospital (46%). Through the humanitarian component of the ASPA project, transport reimbursed was provided to parents in Abong-Mbang and Ndop District Hospital. Parents were reimbursed the transport fare of their children when brought to the hospital for HIV testing. This support was not available in Limbe Regional Hospital (the funding for this support was not yet available when the project was lunched in Limbe). That notwithstanding, the feasibility of tPITC was higher in Limbe Regional Hospital in comparison to Ndop District Hospital. In the same line, the feasibility of tPITC was almost twice as high in Abong-Mbang as to Ndop District Hospital. This finding suggests that transport reimbursement alone cannot account for better outcome of HIV testing uptake among children in the tPITC group. Moreover, it's observed that the Abong-Mbang District Hospital had the highest proportion (39.7%) of children tested in the community, followed by Limbe Regional Hospital (14.3%) and Ndop District Hospital (3.1%).

The better outcome of the feasibility of tPITC in the Abong-Mbang District Hospital can be explained by this higher achievement in community HIV testing for children in this locality. This high achievement was linked to the existence of a community distribution of ARVs program in Abong-Mbang District Hospital. Here, ARVs drugs are distributed in homes to stable patients by community health workers. This existing network was used by the ASPA study to reach children for HIV testing. This finding indicates the potential of community distribution of ARVs programs to achieve better HIV testing uptake among children in the tPITC group. There is need for research investigating the outcome of community distribution of ARVs in uptake of HIV testing among children and adolescents.

The low HIV uptake testing among children during the implementation of index case testing strategy was reported in a previous study in Kenya where only 14% of parents who initially consented to test children finally have their children tested (57). This study has provided evidence that targeting children of HIV infected parents with HIV testing (tPITC) is a high yield strategy. However, the optimal implementation is challenged by the low HIV uptake testing among children. In previous studies on pediatric HIV services, parents reported fearing emotional suffering for their child if tested and fears of a child testing positive or dying of HIV, if infected [(27), (57), (61), (62)]. Other reasons why parents may not want to test their children include the perception of the child being healthy, the uncertainty about the benefits of testing either before symptomatic illness or before sexual debut (61), parents feel guilt or blame regarding having possibly infected the child [((27), (62)], parents fear inadvertent disclosure of their own status if the child is tested HIV positive [(27), (61), (63)].Thus, while designing index case testing programs for children and adolescents, a focus should be put on interventions/strategies to address the aforementioned barriers to uptake of pediatric HIV testing. Actually, in the intention to test (ITT) perspective, tPITC was not twice as effective as bPITC but only 1.43 fold and this due to the low HIV testing uptake among children in the tPITC. This suggests that the superiority of tPITC over bPITC may be challenged by barriers impeding the HIV testing uptake among children in the context of implementation of this novel strategy. This further highlights the need for HIV programs to identified contextual factors and obstacles to tPITC uptake and address them according in order to maximize the outcome of this high yield strategy for pediatric and adolescents HIV cases.

The uptake was significantly higher in the routine PITC group because children were already in the hospital with their parents at the time of enrolment and could be tested on the same day. Though the HIV testing uptake was highest (90.3%) in the bPITC, almost 10% of children enrolled were not finally tested. This occurred because some parents accepted enrolment but later changed their decision and did not go to the laboratory for testing; some may have gone to the laboratory and because of the long waiting time decided to leave without testing the child. Conducting the HIV testing on the spot or having a dedicated testing room for these children near to the counselling office could have reduced the missed opportunity for testing.

In our study, pediatric HIV cases were diagnosed earlier in the tPITC group (84.8% at WHO stage 1) because this strategy tested asymptomatic children in contrast to the

bPITC where all children tested were already sick (34.8 % at WHO stage 2 and 39.1% at WHO stage 3). Our result is in line with a previous index case finding in Malawi where the majority (46.7%) of HIV infected children were diagnosed at WHO stage 1 (56). Therefore, pediatric HIV programs should prioritize the index case testing for early case identification as this could contribute in reducing the high mortality rate associated with non-treatment of pediatric HIV cases [(64), (65), ((66)].

Linkage to care was significantly higher in the tPITC group (82.5% vs 52.5%). This could be explained by the fact that the large majority of parents were already in HIV care (96% of children were identified through parents on ART) and it was easier to link the children in HIV services. This highlights the effect prior enrolment of parents in care could have in linkage of children and adolescents in HIV care and further demonstrates the effectiveness of the family-centered approach in enhancing pediatric HIV linkage and retention in care [(67), (68),(69), (70)].

That notwithstanding, the variations observed in linkage across study sites warrant some explanations. Actually, in the tPITC group, the linkage in the Limbe Regional Hospital (20.0%) was more than 4 times as lower than in Abong-Mbang District Hospital (92.9%) and Ndop District Hospital (95.2%). This can be explained by the fact that in Limbe Regional Hospital, there was no staff tasked to ensure linkage to care of children diagnosed HIV positive. Though this was the responsibility of community health workers of the hospital to track parents and ensure their children were linked to care, we later realized that this follow up was not consistently done. Hence, when starting the ASPA study in Abong-Mbang and Ndop District Hospital, we tasked one of the dedicated study staff (the Research Officer) to ensure that all children diagnosed HIV positive are linked to care. To achieve this, the research officer (linkage agent) was tasked to maintain a logbook with the names and contacts of all parents whose children were diagnosed HIV positive in the hospital. Through this logbook, children not linked to care could easily be identified and parents followed up through reminder calls. In addition to this active follow up, nutritional support to HIV positive children was also introduced in Abong-Mbang and Ndop District Hospital and this through the humanitarian component of the ASPA project. This support consisted in providing on monthly basis to all HIV positive children in care, nutritional kits (compose of milk, rice, sugar and oil) during drug refills in the hospital. Previous studies have demonstrated the effect of nutritional supports in improving retention in pediatric HIV programs (71). This intervention may have also contributed in

improving linkage in Abong-Mbang and Ndop District Hospital. Overall, in addition to prior exposure of parents in HIV care, the presence of both a linkage agent (research officer) and nutritional support could explain the better outcome of linkage in the tPITC group.

In our study, the main factor affecting linkage to care was the lost to follow up of parents as some did not return to the hospital with the child for enrollment on ART after diagnosis. This factor was prominent in the bPITC group where the linkage were lowest (21.4%, 76% and 40% respectively for Limbe, Abong-Mbang and Ndop). This lost to follow up seemed to be pronounced among parents with unknown HIV status. We may have reduced it if instead of screening the child alone, we screened both the parent and the child at the same time. There is need to investigate this hypothesis to inform strategies to optimize linkage among children and adolescents diagnosed HIV positive at the outpatient department.

In the tPITC group, the large majority of children (96%) were recruited through their parents on ART. This points out the role the ART clinics may play in identification of pediatric HIV cases through the active case finding approach. Also in this group, only 34.7% of children had ever been tested for HIV despite the high acceptance (99.7%) observed among parents. This finding highlights the failure of the health system in offering testing opportunity to children of people living with HIV/AIDS receiving HIV services and this, despite the recommendation of this strategy by WHO since 2010 (26). The current low pediatric ART coverage in Cameroon and other Sub-Saharan Africa countries [(6), (50), (72)] suggests that this failure to offering HIV testing opportunity to children of PLHIV is not specific to Limbe Regional Hospital, Abong-Mbang and Ndop District Hospital, but cut across most health facilities in most countries in Africa. There is need to assess health facility barriers to tPITC at country level and address them accordingly. Health facility barriers to routine PITC (bPITC) has been published in previous studies [(29), ((30), (73)] . In our study, the attitudes of health care providers regarding pediatric HIV testing and counselling was found to be suboptimal as only 72.9% of them requested an HIV test to the last child they consulted. Most importantly, 21% of these care providers will not request an HIV test to an asymptomatic child. Continued education, sensitization and mentoring of health care providers are required to uplift the current health personnel barriers to PITC (including tPITC) and improve their attitudes toward pediatric HIV services.

The large majority (93.6 %) of parents preferred to have their children tested in the hospital rather than in homes. This is probably due to parents' fear of self-disclosure, stigma and discrimination that the presence of the community health workers in their home may cause ((61)). This is further justified by the fact in this study, only 29.8% of parents declared to have disclosed their HIV status to all their children. Disclosure of parental HIV status is known to be low worldwide and constitutes a major obstacle to the uptake of pediatric HIV services uptake (74). This finding should serve as a caution when designing the WHO recommended HIV testing, counselling and treatment at community level (40). The yield of new cases identified was significantly higher among children tested in the hospital as compared to home-based testing, suggesting the needs to prioritize hospital- based HIV testing in a context of scarce resources. More so because previous reported that 89% of parents in HIV care will still test children at health facility level in the absence of home-based testing option (45). That notwithstanding, as described above, considering the potential impact of using the network of community distribution of ARVs to reach children of PLHIV with HIV testing in homes, community HIV testing for children should be contextualized and implemented based on potential yield, the acceptability and the affordability.

Following 6 months of implementation, the ASPA project increased HIV testing uptake by 143% (2.3-fold increase), almost doubled (1.93-fold increase) the case detection and increased by 66% the number of children and adolescents enrolled on ART in the 3 hospitals. These findings demonstrate that the implementation of both tPITC and bPITC is effective in increasing HIV testing uptake, but ineffective in HIV case detection and ART enrollment. This suggests that implementing both strategies at the same time in the same health facility may not be appropriate in low HIV prevalence context such as Cameroon. In fact, though effective in HIV testing uptake, bPITC was ineffective in HIV case detection and ART enrolment among children and adolescents. On the contrary, tPITC was associated with the doubling of HIV case detection, but also with a significant increase on ART enrolment. These findings highlight the potential of tPITC to fast track the expansion of HIV treatment among children and adolescents, especially in low HIV prevalence countries such as Cameroon. For example, in 2015 in Cameroon, among the 39 000 children eligible for ART only 7 096 were on treatment, given a treatment gap of 31 904 children (72). If tPITC were implemented according to the service delivery model of the ASPA study, and when applying the 66% progression rate every 6 months on the

baseline, 18 733 additional children could have been enrolled on ART every year, and the pediatric ART gap could be closed in this country by 2019 with the enrollment of 37 467 children and adolescents on ART. Similar projections and results are applicable to other countries, especially the top 5 countries with the highest burden of pediatric HIV namely Nigeria, South Africa, India, Mozambique and Kenya having nearly half of the 1.8 million children (<15 years) living with HIV/AIDS in 2015 (75). That notwithstanding, the effectiveness of the implementation of both tPITC and bPITC might be different in higher prevalence context such as in Eastern and Southern Africa Region. There is need of evidence on the implementation effectiveness of both tPITC and bPITC in this Region.

The large majority (88.9%) of cases identified in the both groups (tPITC and bPITC) were above the age of 18 months. This finding corroborates the UNAIDS Spectrum data for Cameroon and most African countries (10). 18 months being the cut-off age for early infant diagnosis (EID) of pediatric HIV using DNA-PCR technology (39), our finding indicates that without requiring to DNA-PCR technology, the effective implementation of both targeted and blanket PITC could contribute to identify close to 90% of all pediatric HIV cases in Cameroon and other Sub-Saharan African countries. This evidence should comfort the HIV program managers to investing more in rapid tests for pediatric HIV diagnosis. In the past decades in Cameroon and other Sub-Saharan African countries, the focus on pediatric HIV diagnosis has been on EID (using DNA-PCR technology). Despite being an effective technique in detecting HIV infection in neonates and infants [(76),(77)], the implementation of this technology in resource-limited settings is constrained by numerous operational barriers [(78),(79),(80), (81)] and more that, the full and optimal implementation of this strategy will allow to detect only approximately 10-15% of pediatric HIV cases in Cameroon and other Sub-Saharan countries. Hence, the need to refocus the attention to HIV rapid screening tests, cheaper and easy to use is evident. That notwithstanding, considering the high HIV related mortality among neonates and infants, the current efforts to expand the innovative approaches to EID for infants including point-of-care testing, SMS printers and mobile phone network to connect the central laboratory and health facilities should be sustained (82). In our study, 21.3% of diagnosed cases were adolescents between 15-19 years, suggesting that both tPITC and bPITC can also contribute meaningfully in improving access to HIV care among adolescents, the only age group in which AIDS-related deaths are increasing (83), and

where HIV is the leading cause of deaths in Africa and the second leading cause of death globally (84).

The Limbe Regional Hospital was enrolled July 2015 while the Abong-Mbang and Ndop District Hospitals were enrolled in June 2016. We tweaked the implementation strategies in these 2 additional sites from lessons learned from the first site. In particular, we reinforced the follow up of children diagnosed HIV + to ensure linkage (introduction of a linkage agent). This resulted to a higher linkage in these 2 sites as compared to the first. Secondly, during implementation in Abong-Mbang and Ndop District Hospital, provision of nutritional kits to HIV+ children in care were introduced as part of the humanitarian component of the ASPA project. This also contributed to enhanced linkage into care in these 2 sites. Hence, the results of Limbe Regional Hospital and that of Abong-Mbang and Ndop District Hospital are not comparable in all aspects. That notwithstanding, since the primary objective of the study was not to compare the outcome per site, but instead the outcome of both tPITC vs bPITC, the time difference in implementation per site does not affect the results of the study, instead this stepwise implementation approach was found very useful as lessons learned from the first site (Limbe) informed adjustments needed to have a more robust strategy for better linkage to care of HIV positive children. On the other hand, the fact that nor the study participants neither the study sites were not randomized may have introduced selection bias in the results. However, the study design aimed at evaluating the outcome of both strategies in a pragmatic context. The fact that the study was implemented in 3 hospitals located in 3 different regions in Cameroon with an increase in sample size has increased the power of the study. This has increased the external validity and the generalizability of the results of the study. On another notes, all studies published to date and evaluating the outcome of targeted PITC among children have used similar non-randomized designed [(56), (57)].

CHAPTER VI:

CONCLUSION AND RECOMMENDATIONS

Overall, both tPITC and bPITC are highly acceptable. The tPITC has a higher yield and is more suitable for early detection of pediatric HIV cases and linkage to care. However, the feasibility of this strategy is lower and this is due to the low HIV uptake testing among children and adolescents. The bPITC has a higher HIV testing uptake, but a lower linkage. Thus, the clinical cascade for the tPITC is challenged by the HIV testing uptake gap while that of the bPITC is constrained by the ART linkage gap. The ASPA study has demonstrated the superiority of the tPITC over the bPITC in terms of case detection, case detection earliness and linkage to care. However, tPITC is challenged by the HIV uptake of HIV testing gap (feasibility) and this points out the need to implement adequate strategies to overcome the parents' level barriers impeding the optimal outcome of this higher yield PITC approach. Despite the superiority of tPITC, it is still important for care providers to offer HIV testing to sick children presenting at the outpatient consultations. In fact, though the yield of bPITC may be low, providing HIV testing to children with clinical suspicion of HIV/AIDS should be considered to avoid missed opportunities in providing HIV care and treatment to sick children seen in the hospitals.

Our study found that tPITC is a higher yield case finding and linkage strategy that could allow Cameroon to close the current gap in pediatric ART by 2019. Moreover, the implementation of tPITC should be considered to fast track the achievement of the 90-90-90 targets among children and adolescents, especially in high burden pediatric HIV countries in Sub-Saharan Africa. This study did not assess retention of children on ART neither viral suppression among these children. These important areas need to be investigated in order to provide information on the full picture of the clinical cascade of pediatric HIV care in Cameroon.

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ANNEXES

Annex 1

Curriculum Vitae

Name: Habakkuk Azinyui Yumo, MD, MSc, PhD (Candidate)

Present position: Specialist, Public Health and M&E, The Global Fund to fight AIDS, TB and Malaria: 2017

Professional career:

1. Senior HIV Program Management Specialist, Centers for Disease Control and Prevention (CDC, Yaoundé-Cameroon): 2013-2014
2. Specialist, Public Health and M&E, Pricewaterhousecoopers (PwC, Douala-Cameroon): 2011-2013
3. Technical Expert, National AIDS Control Committee, Ministry of Public Health (Yaoundé-Cameroon): 2010-2011
4. General Practitioner, Batibo District Hospital, Ministry of Public Health (Yaoundé, Cameroon): 2002-2008.

Degrees and Diplomas: Master of Sciences in International Health, Heidelberg University, Germany (2009), Diploma in Epidemiology, University of Bordeaux 2, France (2008), Doctor of Medicine, University of Yaoundé I, Cameroon (2002).

Selected publications:

1. Isidore Sieleunou, Anne-Marie Turcotte-Tremblay, Jean-Claude Taptué Fotso, Denise Magne Tamga , **Habakkuk Azinyui Yumo** , Estelle Kouokam, Valery Ridde. Setting performance-based financing in the health sector agenda: a case study in Cameroon. Globalization and Health (2017) 13:52 DOI 10.1186/s12992-017-0278-9.
2. Isidore Sieleunou, Anne-Marie Turcotte-Tremblay, **Habakkuk Azinyui Yumo**, Estelle Kouokam, Jean-Claude Taptué Fotso, Denise Magne Tamga, Valery Ridde (2017). Transferring the Purchasing Role from International to National Organizations During the Scale-Up Phase of Performance-Based Financing in Cameroon, Health Systems & Reform, 3:2, 91-104, DOI: 10.1080/23288604.2017.1291218
3. Esther Freeman, Aggrey Semeere, Megan Wenger,...,Francois Dabis, **Habakkuk Azinyui Yumo**, Jean Claude Dusingize,…,Kara Wools-Kaloustian and Jeffrey Martin. Pitfalls of practicing cancer epidemiology in resource-limited settings: the case of survival and loss to follow-up after a diagnosis of Kaposi's sarcoma in five countries across sub-Saharan Africa. BMC Cancer (2016) 16:65. DOI 10.1186/s12885-016-2080-0.
4. 5**. Yumo HA**, Kuaban C, Neuhann F. WHO recommended collaborative TB/HIV Activities: Evaluation of the Implementation and Performance in a rural health district in Cameroon. The Pan African Medical Journal 2011; 10:30.
5. **Yumo HA**, Mbanya D, Kuaban C, Neuhann F. Outcome Assessment of a Global Fund Grant on TB Control at District Level in Rural Cameroon. Int J Tuberc Lung Dis 2011;15(3):352-357.

27/09/2017

Annex 2

List of publications (from PhD research project)

Habakkuk Azinyui Yumo, MD; Christopher Kuaban, MD; Rogers A Ajeh, MPH; Akindeh M Nji, PhD; Denis Nash, PhD; Anastos Kathryn, MD; Marcus Beissner, MD; Thomas Loescher, MD. Active Search for Pediatric HIV/AIDS (ASPA): A comparative study of targeted and blanket provider-initiated-testing and counselling (PITC) among children and adolescents in Cameroon. **Manuscript-**Submitted to TheLancet HIV on 25/09/2017.

HA Yumo, RA Ajeh, M Beissner, I Sieleunou, MN Akindeh, PB Kuwoh, D Addison, AA Adedimeji, D Nash, K Anastos, C Kuaban, T Loescher. Reaching out children of people living with HIV/AIDS with HIV testing, care and treatment: Preliminary results of the Active Search for Pediatric HIV/AIDS (ASPA) Study in Cameroon. 21st International AIDS Conference, 18-22 July 2016, Durban, South Africa, **Abstract** No: A-792-0462-08953.

Annex 3

Statement on Pre-release and Contribution

Part of the study was presented as an abstract at the 21st International AIDS Conference in Durban (South Africa) in July 2016. On the other hand, a manuscript has been submitted to TheLancet HIV. It's at the early processing state for review.

My contributions to the study was as follows: I conceived and designed the study, wrote the protocol, raised funds for implementation, trained the study staff on data collection, supervised data collection, analyzed data, interpreted the results and wrote the thesis.

Annex 4

QUESTIONNAIRE NO 1 : PARENTS LIVING WITH HIV/AIDS

(Each parent/guardian should have only one form, irrespective of the number of children brought to the hospital)

Study IDP|___|___|___|___|___|___|

1. Full name			
2. Residence (village/quarter)			
3. Phone number			
The section above should be detached from this form prior to data entry			
ASPA QUESTIONNAIRE NO 1: PLWH:		**Study IDP**|___|___|___|___|___|___|___|	
4. Age |__|__|	5. Sex	❑ Male ❑ Female	
6. Education level	❑ None ❑ nursery ❑ primary ❑ secondary ❑ higher level	7. Occupation	❑farming ❑trading ❑office work ❑ student ❑Others, specify: ……
8. Marital status	❑Married ❑Single ❑Cohabitating ❑Divorced/separated ❑Widow/widower		
9. Have you ever had TB	❑yes ❑no	10. Are you currently on TB treatment?	❑yes ❑no
11. Are you on ARV drugs?	❑yes ❑no	12.If yes, for how long have you been on ARV drugs	|__|__|
13. How many children below 19 years do you have?	|__|__|	14. Have you disclose your HIV status to your children?	❑yes, to all of them ❑yes, to some of them, specify why?..... ❑No, to none of them, specify why?.....
15. How many of your children less than 19 years have been tested for HIV? If =0, go to no 19	|__|__|		

16. How many of them have tested HIV positive? If =0, go to no 19		|__|__|
17. How many of your HIV positive children are receiving the following services?	CD4 count monitoring	|__|__|
	Antiretroviral drugs (ARVs)	|__|__|
	Cotrimoxazole prophylaxis	|__|__|
	nutritional support	|__|__|
	home visits by community health workers	|__|__|
18. Are you	receiving nutritional support from the treatment center?	❑yes ❑no
	receiving home visits by community health	❑yes ❑no
	a member of an association of people living with HIV/AIDS	❑yes ❑no
	are you on antiretroviral drugs (ARV)	❑yes ❑no
19. How many of your children less than 19 years have not been tested for HIV? (this can be calculated = 13-15) If = 0, end of questionnaire	❑|__|__| ❑ don't have children less than 19 years that have not been tested for HIV	
20. Are you willing to have these children tested for HIV?	❑ No ❑ Yes (go to 22 and then enrolment form for children)	
21. Why don't you want to have them tested for HIV?		
22. Where will you like to have your children tested?	❑hospital ❑community ❑indifferent ❑other, specify:…… …	23. How many children did this parent enrolled in the study for HIV testing? (this question should be answered at the end of the enrolment |__|__|

Annex 5

QUESTIONNAIRE No 2: PARENTS/GUARDIANS ACCOMPANYING CHILDREN TO HOSPITAL

(Each parent/guardian should have only one form, irrespective of the number of children brought to the hospital)

Study IDP|___|___|___|___|___|___|___|___|___|

Health Facility : …….. Date of encounter:……../ …./…….

1. Full name			
2. Residence (village/quarter)			
3. Phone number			
The section above should be detached from this form prior to data entry			
ASPA QUESTIONNAIRE NO 2: Parents at OPD		**Study IDP**|___|___|___|___|___|___|___|___|	
4. Age	|__|__| 5. Sex	❑ Male ❑ Female	
6. Education level	❑ None ❑ nursery ❑ primary ❑ secondary ❑ higher level	7. Occupation	❑farming ❑trading ❑office work ❑ student ❑Others, specify: ……
8. Marital status	❑Married ❑Single ❑Cohabitating ❑Divorced/separated ❑Widow/widower		
9. What is your HIV status?	❑positive ❑negative ❑unknown		
10. How many children have you brought to the hospital today?	|__|__|		
11. Are you willing to have these children tested for HIV today?	❑yes , go to children enrollment form ❑no if no, go to Q21		
12. Why don't you want to have them tested for HIV today?	……		

Interviewed by: _____ _____|__|__|/|__|__|__|/|__|__|__|__|

(Name) (Signature) (Date)

Checked by: _____ _____ |__|__|/|__|__|__|/|__|__|__|__|

(Name) (Signature) (Date)

Annex 6

QUESTIONNAIRE No 3: ENROLMENT FORM FOR CHILDREN BORN TO HIV POSITIVE PARENT(S)

(Each child should have a separate form)

Health Facility:……. Date of encounter:……../ …./…….

Child' full names: …… Study IDC|___|___|___|___|___|___|___|___|___|	
Parent' details	
Full names	
Phone number	
Residence	
The section above should be detached from this form prior to data entry	
ASPA QUESTIONNAIRE NO 2: Children of PLWH Study IDP|___|___|___|___|___|___|___|___|	

A. Socio-demographic and HIV status of the child

1. Age	|__|__|	**2. Sex**	❑ Male ❑ Female
3. Identify for HIV testing through	❑Mother ❑Father		
4. Education level	❑ none ❑ nursery ❑ primary ❑ secondary ❑ higher level		
5. Did the mother attended antenatal consultations (ANC) during the pregnancy of this child?	❑Yes ❑No ❑Unknown		
6. Where was the child born?	□ Hospital □ Home □ Unkknown	**7. Was the mother received ARVs (PMTCT) drugs during pregnancy?**	□ Yes □ No □ Unknown
8. Has the child ever tested for HIV?	❑ yes ❑ no (go to 9) ❑ unknown (go to 9)	**9. What is the HIV status of the child?**	❑ Positive ❑ Negative ❑ unknown

10. Is the child receiving ARVs?	❑Yes(go to Q10) ❑No	**11. Why is the child not in care?**	
12. Is the mother alive?	❑ yes ❑ no	**13. Mother's education level**	❑ none ❑ nursery ❑ primary ❑ secondary ❑ higher level
14. Mother's occupation	❑ farming ❑ trading ❑ office work ❑ others, specify:	**15. Mother's HIV status**	❑ negative ❑ positive ❑ unknown
16. Is mother on ART?	❑ yes ❑ no ❑ unknown	**17. Is the father alive?**	❑ yes ❑ no
18. Father's education level	❑ None ❑ nursery ❑ primary ❑ secondary ❑ higher level	**19. Father's occupation**	❑ farming ❑ trading ❑ office work ❑ Others,specify: ……
20. Father's HIV status	❑ Negative ❑ Positive ❑ unknown	**21. Is father on ART?**	❑ yes ❑ no ❑ unknown
22. Mode of recruitment (parents from)	❑ ARVs ❑ VCT ❑ PTMCT ❑ TB unit ❑ LTF Others…..	**23. Did the mother take ARVs drugs during the pregnancy of this child?**	❑ yes ❑ no ❑ unknown
24. Preferred site for HIV testing?	❑ Hospital ❑ Community ❑ Indifferent	**25. Actual site for HIV testing?**	❑ Hospital ❑ community
26. 1st rapid HIV test result	❑ Negative ❑ Positive ❑Indeterminate	**27. 2nd rapid HIV test result**	❑Negative ❑Positive ❑Indeterminate
28. PCR testing (if child <18 months)	❑Negative ❑Positive❑	**29. Final HIV results**	❑Negative ❑Positive ❑Indeterminate

B. ART ELIGIBILITY ASSESSMENT AND LINKAGE TO CARE (*only for HIV+ children*)

<table>
<tr><td>30. Clinical Assessment</td><td>Weight: __ __.__(kg)
Height: __ __.__(cm)
Head Circumference: __ __.__(cm)
WHO Staging:
❑ Stage 1 ❑ Stage 2
❑ Stage 3 ❑ Stage 4</td><td>31.Laboratory Assessment</td><td>Hb (g/dl): __ __._
TLC: __ __ __ __
CD4:__ __ __
%CD4:__ __ __</td></tr>
<tr><td colspan="2">31. Immunological Classification:</td><td colspan="2">❑ No evidence of suppression (%CD4≥25)
❑ Evidence of moderate suppression (15≤%CD4≤24)
❑ Severe suppression (%CD4<15)</td></tr>
<tr><td>32. Eligible to ART</td><td>❑ No(go to Q31)
❑ Yes</td><td>33. ART regimen prescribed</td><td>❑ NVP-based
❑ EFV-based
❑ PI-based</td></tr>
<tr><td>34. Registration in pre-ART register</td><td>❑ Yes
❑ No</td><td>35. specify the reasons for the non registration in pre-ART register</td><td>❑ Lost to follow up
❑ No register
❑ Others, specify: ……....</td></tr>
<tr><td>36. Cotrimoxazole prescribed</td><td colspan="3">❑ yes
❑ no, specify reasons: …….....</td></tr>
</table>

Annex 7:

QUESTIONNAIRE No 4: ENROLMENT FORM FOR CHILDREN SEEN AT THE OUTPATIENTS DEPARTMENT

(Each child should have a separate form)

Child' full names: ……...

Study IDC|___|___|___|___|___|___|___|___|___|

Parent' details	
Full names	
Phone number	
Residence	

The section above should be detached from this form prior to data entry

ASPA QUESTIONNAIRE NO 2: Children of PLWH **Study IDP**|___|___|___|___|___|___|___|___|___|

1. Age	|__|__|	**2. Sex**	❑ Male ❑ Female
3. Brought to the hospital by	❑Mother ❑Father ❑Grand-mother ❑Grand-father ❑Others, specify: …….....		
4. Education level	❑ none ❑ nursery ❑ primary ❑ secondary ❑ higher level		
5. Did the mother attended antenatal consultations (ANC) during the pregnancy of this child?	❑Yes ❑No ❑Unknown	**6. Where was the child born?**	❑ Hospital ❑ Home ❑ Unknown
7. Has the child ever tested for HIV?	❑ yes ❑ no (go to no 7) ❑ unknown (go to no 7)	**8. What is the HIV status of the child?**	❑ negative (go to Q9) ❑ positive ❑ unknown
9. If positive, is the child on ARVs	❑ Yes (go to Q9) ❑ No	**10. Why is the child not on ART**	
11. Is the mother alive?	❑ yes ❑ no	**12. Mother's education level**	❑ none ❑ nursery ❑ primary ❑ secondary ❑ higher level ❑ Unknown

13. Mother's occupation	❑ farming ❑ trading ❑ office work ❑ Others, specify: ……..	**14. Is the father alive?**	❑ yes ❑ no
15. Father's education level	❑ None ❑ nursery ❑ primary ❑ secondary ❑ higher level ❑ unknown	**16. Father's occupation**	❑ farming ❑ trading ❑ office work ❑ Others, specify: ……
17. 1st rapid HIV test result	❑ Negative ❑ Positive ❑ Indeterminate	**18.** 2nd **rapid HIV test result**	❑Negative ❑Positive ❑Indeterminate
19. PCR (if child <18 months) ❑Negative ❑Positive		**20. Final HIV status**	❑ Negative (stop here) ❑ Positive ❑ Indeterminate

B. ART ELIGIBILITY ASSESSMENT AND LINKAGE TO CARE (*only for HIV+ children*)

21. Clinical Assessment	Weight: __ __.__(kg) Height: __ __.__(cm) Head Circumference: __ __.__(cm) WHO Staging: ❑ Stage 1 ❑ Stage 2 ❑ Stage 3 ❑ Stage 4	**22.Laboratory Assessment**	Hb (g/dl): __ __.__ TLC: __ __ __ __ CD4:__ __ __ %CD4:__ __ __
23. Immunological Classification:	❑ No evidence of suppression (%CD4≥25) ❑ Evidence of moderate suppression (15≤%CD4≤25) ❑ Severe suppression (%CD4<15)		
24. Eligible to ART	❑ No*(go to Q26)* ❑ Yes	**25. ART regimen prescribed**	❑ NVP-based ❑ EFV-based ❑ PI-based
26. Registration in pre-ART register	❑ Yes ❑ No	**27. specify the reasons for the non registration in pre-ART register**	❑ Lost to follow up ❑ No register ❑ Others, specify: …….....
28. Cotrimoxazole prescribed	❑ yes ❑ no, specify reasons: …….....		

Interviewed by: _____ ____|__|__|/|__|__|__|/|__|__|__|__|

(Name) (Signature) (Date)

Checked by: _____ _____|__|__|/|__|__|__|/|__|__|__|__|

(Name) (Signature) (Date

<u>Annex 8</u>: ASPA Study: Routine Data Form

Pediatric consultations, testing, care and treatment

Health Facility:……

		Jan	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
Consultation at OPD	2014													
	2015													
Testing of children in the lab	*2014*													
	2015													
Children tested HIV+	*2014*													
	2015													
HIV+ children linked to care	*2014*													
	2015													
HIV+ children initiated on ART	*2014*													
	2015													

Source: Registers: OPD Consultations, Laboratory, Pre-ART and ART

Annex 9

QUESTIONNAIRE-SURVEY

PARENTS LIVING WITH HIV/AIDS QUESTIONNAIRE

Study IDP|___|___|___|___|

What is the travel time in a vehicle from your home to the hospital?	❑<30 min ❑30min-60min ❑>60min
What are the reasons for not bringing your child to the hospital for HIV testing?	❑ Lack of transport money ❑ Lack of time ❑ Children in school ❑ Children not living with me ❑ Spouse/partner opposed my decision ❑ Do not want my child to know I am HIV positive ❑ Child too small ❑ Others:…….....
If applicable, what can be done for you to bring your child in the hospital for HIV testing?	
Will you be willing for community health workers to come and test your child at home?	❑Yes ❑No Undecided I have to ask my spouse/partner
Have disclose your status to your spouse/partner	Yes No Do not remember Choose not to anwser

Annex 10

QUESTIONNAIRE-SURVEY

HEALTHCARE PROVIDERS INVOLVED IN CONSULTATIONS OF CHILDREN

Study IDCP|___|___|___|___|

1.When last did you consult a child aged 0-19 years?	❑3days ❑3days-7days ❑>7days
2.Did you request an HIV for that child?	❑ Yes ❑ No ❑ Do not remember
What are some of the reasons you do at times request for HIV test for children with unknown HIV status?	
When was your last training in HIV testing and counselling? ❑ <3years ❑3 years-5years ❑>5 years ❑ I do not remember ❑ I have never been trained	
Can you request an HIV test for all children you see in the hospital irrespective of their motive of consultation? ❑ Yes ❑ No ❑ Undecided	
If no to No 5, please give reasons:	

Annex 11

Information Notice and Informed Consent Form (English and French)

INFORMATION NOTICE

ACTIVE SEARCH FOR PAEDIATIC AIDS (ASPA) STUDY: Assessing the feasibility, effectiveness of the targeted versus blanket provider-initiated-testing and counselling (PITC) among HIV infected children and adolescents in Cameroon

Principal Investigator: Dr Yumo Habakkuk, MD, Msc,

DESCRIPTION OF THE STUDY

Aim of the study

The ASPA study aims at identifying the best strategy that should be used by health care workers to identifiy HIV infected children and enrol them to HIV treatment and care and this to reduce the HIV/AIDS related morbidity and mortality amongst children in our community.

Strategy and procedures of the study

The study will offer HIV testing to children between 6 weeks to 19 years and this will be done following the consent of their parents/guardians. Children to be tested will be identified either in the hospital during consultations with their parents/guardians or through their parents receiving HIV services in the hospital. Orphans identified in the community will also be tested. Children could be tested either in the health facility or at home and this at the convenience of the parents/guardians. Children tested HIV positive will have another blood tests to see if they have to start HIV treatment (ARVs drugs). Children already enrolled on HIV treatment will be follow up to find out how they are doing with their treatment.

Data collection and management procedures

The interviewer will use a questionnaire to collect information from parents and children. These information include socio-demographic data, willingness to test for HIV, HIV serology results, ART eligibility, linkage to care and treatment status, nutritional support, home-visits, time of HIV diagnosis and parents disclosure of HIV status. Confidentiality of this information will be

guaranteed at all points of data collection, management and analysis by replacing names, addresses or other information that can lead to patient identification during or after the study.

Research team

The research team is made up of doctors, nurses, pharmacy attendants, laboratory technicians, community health workers, social workers, data managers and statisticians. These professionals have received training on ethical issues around the management of people living with HIV/AIDS in particular, as well as the ethics of their profession in general.

Risk associated with the study

The study is associated with the risk of confidentially breach. To minimize this, study staff will be trained on HIV research ethics issues. They will also signed the confidentially agreement form. Children will be exposed to the risk of pains,

excessive bleeding and hematoma due to veins punctures. To minimize this risk blood collection will be performed only by trained staff.

Benefits of the study

Participant will benefit early access to HIV diagnosis, early enrolment in care and/or treatment for children with HIV-infection, information on HIV infection and adherence. In addition, the knowledge generated by this study will be used to strengthen the pediatric HIV program in the Cameroon and beyond.

Consent to participate or withdraw from the study

Parents/guardians or child reserve the full rights to give their free and informed consent to participate or not to participate in the study or withdraw whenever they deem it necessary. They also have the right to obtain further information for a better understanding of the study before giving, withdrawing or refusing their free and informed consent. They can refuse to participate or withdraw from the study without justification or prejudice in regards to care and treatment provided to them or to the child by the hospital. Copies of the Informed Consent Form together with this Information Notice will be handed over to you for your record if you accept to participate in this project.

This protocol has been approved by the Cameroon National Ethics Committee (NEC). For more information on approval of this protocol, please contact NEC through: Tel 222762114 or email: cnethique_minsante@yahoo.fr

For any problems or difficultis encountered in relation to this study, kindly contact the following persons:

5. The site coordinator through the address below
   Name of site coordinator:……

   Tel:.....

   Email:……....

6. The Study Coordinator

INFORMED CONSENT FORM

ACTIVE SEARCH FOR PAEDIATIC AIDS (ASPA) STUDY: Assessing the feasibility, effectiveness of the targeted versus blanket provider-initiated-testing and counselling (PITC) among HIV infected children and adolescents in Cameroon

I the undersigned, _____ consenting on the behalf of my child and this with his/her assent (when applicable) that I have read or have been explained (for those who cannot read), and understood the aims of the ASPA study, the procedures involved in data collection, management and analysis, and freely give my informed consent to participate in the study. I was informed about the risk involved in the study for me and my child and understand that the study constitutes no direct nor indirect harm to my care or that of my child, and does not in any way infringe on my basic human and ethical rights of beneficent, non-maleficent, autonomy, justice and equity. I acknowledge having received appropriate information regarding the confidentiality involved in the handling of my information, and that I reserve the right to withdraw my consent and participation in the study, whenever I so deem it necessary without any negative repercussion on my care and/or treatment. I have been informed on the persons to contact in case I need further information or encounter any problem in the course of the study. I have received satisfactory answers to questions I asked in relation to this study.

Place :……Date:……

Signature:…….....

Principal Investigator: Dr Yumo Habakkuk, MD, Msc,

Annex 12

ASSENT FORM

(for children more than 11 years old)

ACTIVE SEARCH FOR PAEDIATIC AIDS (ASPA) STUDY: Assessing the feasibility, effectiveness of the targeted versus blanket provider-initiated-testing and counselling (PITC) among HIV infected children and adolescents in Cameroon

I the undersigned, _____ affirm that I have been explained and I understand the aims of the ASPA study, the procedures involved in data collection, management and analysis, and freely give my assent to participate in the study. I was informed about the risk involved in the study and I understand that the study constitutes no direct nor indirect harm to my care or that of my child, and does not in any way infringe on my basic human and ethical rights of beneficent, non-maleficent, autonomy, justice and equity. I acknowledge having received appropriate information regarding the confidentiality involved in the handling of my information, and that I reserve the right to withdraw my consent and participation in the study, whenever I so deem it necessary without any negative repercussion on my care and/or treatment. I have been informed on the persons to contact in case I need further information or encounter any problem in the course of the study. I have received satisfactory answers to questions I asked in relation to this study.

Done in :……..

Date:…….

Signature:…….....

Principal Investigator: Dr Yumo Habakkuk, MD, Msc,

NOTICE D'INFORMATION AUX PARTICIPANTS

ACTIVE SEARCH FOR PAEDIATIC AIDS (ASPA) STUDY: Assessing the feasibility, effectiveness of the targeted versus blanket provider-initiated-testing and counselling (PITC) among HIV infected children and adolescents in Cameroon

DESCRIPTION DE L'ETUDE

But de l'étude : L'étude ASPA vise à identifier la meilleure stratégie devant être utilisée par les professionnelles de la santé afin d'identifier les enfants infectés par le VIH et les mettre sous traitement et ceci dans le but de réduire la morbidité et la mortalité liées liée au VIH/SIDA pédiatrique dans nos communautés.

Stratégies et procédures de l'étude : L'étude offrira le dépistage du VIH à des enfants de 6 semaines à 19 ans et ceci après le consentement de leurs parents / tuteurs. Les enfants à tester seront identifiés soit à l'hôpital au cours des consultations avec leurs parents / tuteurs ou à travers leurs parents recevant les services VIH à l'hôpital. Les orphelins identifiés dans la communauté seront également testés. Les enfants peuvent être testés soit au sein de l'établissement de santé ou à la domicile et ce, à la convenance des parents / tuteurs. Les enfants testés séropositifs à faree d'autres tests sanguins pour voir s'ils doivent commencer de traitement du VIH (médicaments ARVs). Les enfants recevant déjà les antiretroviraux seront suivi pour savoir comment ils vont sous traitement.

Collecte et gestion des données : Les enquêteurs vont utiliser un questionnaire pour recueillir des informations auprès des parents et des enfants. Ces informations comprennent des données socio-démographiques, la volonté de tester les enfants pour le VIH, la sérologie VIH, l'éligibilité aux ARVs, l'enrolement sous traitement ARVs, le soutien nutritionnel, les visites à domicile, le moment du diagnostic VIH et l'annonce de la sero-positivité aux enfants. La confidentialité de ces informations sera garantie à tous les points de la collecte, la gestion et l'analyse des données. Pour ce faree, avant l'analyse, les questionnaires seront codifiées en remplaçant les noms, adresses ou autres informations qui peuvent conduire à l'identification du patient pendant ou après l'étude par un numero d'étude.

Équipe de recherche : L'équipe de recherche est composée de médecins, infirmières, commis de pharmacie, techniciens de laboratoire, agents de santé communautaires, travailleurs sociaux, gestionnaires des données et les statisticiens. Ces professionnels ont reçu une formation sur les questions éthiques autour de la gestion des personnes vivant avec le VIH / SIDA en particulier, ainsi que l'éthique de leur profession en général.

Risque lié à l'étude : L'étude est associée avec le risque de violation de la confidentielle. Pour minimiser ce risque, le personnel de l'étude sera formé sur les questions d'éthiques de la recherche sur le VIH/SIDA. Ce personnel signera également le formulaire sur la clause de confidentialité. Les enfants seront exposés aux risques des douleurs, des saignements excessifs et d'hématome lors des prelevements sanguins. Pour minimiser ce risque, les prelevements sanguins seront effectués uniquement par du personnel formé.

Benefices de l'étude: Les participants de l'étude bénéficieront d'un accès précoce au diagnostic du VIH, l'enrolement aux soins et / ou le traitement pour les enfants infectés par le VIH, des informations sur l'infection à VIH et l'adherence aux traitements. En outre, les connaissances générées par cette étude sera utilisée pour renforcer le programme de prise en charge pédiatrique au Cameroun et au-delà.

Consentement à participer ou à se retirer de l'étude: Les parents/tuteurs ou les enfants se reservent tous les droits de donner leur consentement libre et éclairé, de participer ou ne pas participer à l'étude, ou de se retirer chaque fois qu'ils le jugent nécessaire. Ils ont aussi le droit d'obtenir amples informations pour une meilleure compréhension de l'étude avant de donner, retirant ou en refuser leur consentement libre et éclairé. Ils peuvent refuser de participer ou se retirer de l'étude sans justification, ni préjudice sur leurs soins ou traitement à l'hôpital. Les copies du formulaire de consentement éclairé avec la présente notice d'information vous seront remis pour votre dossier si vous acceptez de participer à cette étude. Cette étude a été approuvée par le Comité National d'Ethique du Cameroun (CNE). Pour plus d'informations sur l'approbation de cette étude, vous pouvez contacter s'il vous plaît CNE par : Tel 222762114 ou par email: cnethique_minsante@yahoo.fr. En cas de problèmes ou de difficultés rencontrés dans le cadre de cette étude, bien vouloir contacter les personnes suivantes:

1. Le Coordinateur de site à l'adresse ci-dessous :
2. Name du coordinateur de site :……Tel:.....Email:…….
3. Le Coordinateur du projet:

FORMULAIRE DE CONSENTEMENT

ACTIVE **S**EARCH FOR **P**AEDIATIC **A**IDS (ASPA) STUDY: **Assessing the feasibility, effectiveness of the targeted provider-initiated-testing and counselling (PITC) and retention into care among HIV infected children and adolescents in Cameroon**

Je soussigné, _____ consentant au nom de mon enfant et cela avec son assentiment (le cas échéant) que j'ai lu ou on m'a été expliqué (pour ceux qui ne savent pas lire), et que j'ai compris les objectifs, les procédures de la collecte, la gestion et l'analyse des données de l'étude ASPA ; donne librement mon consentement éclairé à participer à cette étude. J'ai été informé sur le risque lié à l'étude pour moi et mon enfant et je comprends que cette étude ne constitue pas un préjudice direct ou indirect à mes soins ou à ceux de mon enfant, et ne peux en aucune façon porter atteinte à mes droits humains et éthiques de base, d'autonomie, de justice et l'équité. Je reconnais avoir reçu des informations appropriées concernant la confidentialité impliquée dans le traitement de mes données, et que je me réserve le droit de retirer mon consentement et ma participation à l'étude, chaque fois que je le juge nécessaire, sans aucun préjudice sur mes soins et / ou le traitement. J'ai ai été informé sur les personnes à contacter au cas où j'aurais besoin d'amples informations ou je rencontre des problèmes dans le cadre de cette l'étude. J'ai reçu des réponses satisfaisantes aux questions que j'ai posées en rapport avec cette étude.

Fait à:……

Date:……

Signature:…….....

FORMULAIRE D'ASSENTISSMENT

(Pour enfants de plus de 11ans)

ACTIVE **S**EARCH FOR **P**AEDIATIC **A**IDS (ASPA) STUDY: **Assessing the feasibility, effectiveness of the targeted provider-initiated-testing and counselling (PITC) and retention into care among HIV infected children and adolescents in Cameroon**

Je soussigné, ... affirme qu'il m'a été expliqué et que j'ai compris les objectifs, les procédures de la collecte, la gestion et l'analyse des données de l'étude ASPA ; donne librement mon assentiment à participer à cette étude. J'ai été informé sur le risque lié à l'étude et je comprends que cette étude ne constitue pas un préjudice direct ou indirect à mes soins , et ne peux en aucune façon porter atteinte à mes droits humains et éthiques de base, d'autonomie, de justice et l'équité. Je reconnais avoir reçu des informations appropriées concernant la confidentialité impliquée dans le traitement de mes données, et que je me réserve le droit de retirer mon assentiment et ma participation à l'étude, chaque fois que je le juge nécessaire, sans aucun préjudice sur mes soins et / ou le traitement. J'ai ai été informé sur les personnes à contacter au cas où j'aurais besoin d'amples informations ou je rencontre des problèmes dans le cadre de cette l'étude. J'ai reçu des réponses satisfaisantes aux questions que j'ai posées en rapport avec cette étude.

Fait à:……

Date:……

Signature:…….....

Investigateur Principal: Dr Yumo Habakkuk, MD, Msc,

THE ASPA STUDY

CONFIDENTIALITY AGREEMENT

This confidentiality agreement is signed by all ASPA Study staff to ensure that all necessary administrative, technical, and physical safeguards are taken to ensure the confidentiality of the ASPA data project.

I……

Staff member, ASPA Study

1. Keep all data files in a secure location.
2. Use only subject IDs when entering data into the database.
3. Not disclose any identifying information or combination of data elements (name, contact information, age, sex) that might allow for identification or the deduction of a study participant's identity to anyone who is not an ASPA staff member.
4. Not attempt to link nor permit others to link the data with individually identified records in any other database. In the event that I discover or am able to deduce the identity of a specific participant, I agree that I will not reveal that information or attempt to contact these individuals.

By signing this confidentiality statement, I acknowledge that I will follow the procedures described above to protect the confidentiality of ASPA data, and understand that if I do not follow these procedures I may be terminated from my position, and relevant disciplinary measures will be taken.

Signature ***Date (mm/dd/yyyy)***