Mid-term Evaluation
ICAP-Supported HIV Services in Nyando District of Nyanza Province, Kenya
This mid-term evaluation was completed by ICAP staff in New York and Kenya. Eliud Mwangi conceived the original concept for the evaluation; Batya Elul refined the idea and developed the specific evaluation questions; Hannah Chung and Suzue Saito led the data analysis and interpretation; and Mark Hawken and Molly Strachan provided overall technical guidance. Additional contributors included Muhsin Sheriff, Alfred Otieno, Geoffrey Nyamongo, and Ruby Fayorsey.
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<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
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<td>ANC</td>
<td>Antenatal care</td>
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<td>ART</td>
<td>Antiretroviral therapy</td>
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<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
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<td>FTE</td>
<td>Full-time equivalent</td>
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<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
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<td>MOH</td>
<td>Ministry of Health</td>
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<td>NASCOP</td>
<td>National AIDS and STI Control Program</td>
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<td>PFaCTS</td>
<td>Program and Facilities Characteristics Tracking System</td>
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<td>PLWH</td>
<td>People living with HIV</td>
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<tr>
<td>PMTCT</td>
<td>Prevention of mother-to-child transmission</td>
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<td>TB</td>
<td>Tuberculosis</td>
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Nyanza Province has the highest prevalence of HIV/AIDS among all provinces in Kenya, with 14% of all adults in the province estimated to be HIV-infected [1]. In 2008, ICAP received a five-year cooperative agreement from the United States Centers for Disease Control and Prevention (CDC) to scale-up comprehensive HIV services in that province, with a particular focus on decentralization of services from higher-level to lower-level facilities. As ICAP entered into the second half of the cooperative agreement, an internal midterm evaluation was conducted utilizing routinely collected data from 34 facilities in Nyando District of Nyanza Province. The primary goal of the evaluation was to describe the impact of decentralization on facility characteristics, enrollment and transfer trends, and patient outcomes in three health networks—Muhoroni, Nyakach, and Nyando networks—between January 1, 2009 and September 30, 2011, and in the process, identify gaps and challenges along with potential approaches for improvement for the remainder of the funding cycle.

RESULTS

Over the nearly three-year period from January 2009 to September 2011, the number of ICAP-supported health facilities in Nyando District increased from 29 to 34. The number of patients active in HIV care increased from 4,821 to 23,625 patients, and the number of patients currently on ART increased from 2,711 to 11,120 patients during this period. Growth was predominantly seen in lower-level facilities across all three health networks as evidenced by a marked increase in the number and proportion of new patients enrolling into lower-level facilities for HIV care and ART services during this period. At the same time, a large number of patients transferred from higher- to lower-level facilities and among lower-level facilities, while the number of patients who transferred into higher-level facilities remained small. Though lower-level facilities had limited infrastructure and services compared to higher-level facilities, overall, patient outcomes in HIV services did not significantly differ by facility type. In both higher- and lower-level facilities, the proportion of patients receiving CD4-testing and TB screening increased while cohort attrition steadily decreased over time for two of the three networks. By the end of September 2011, at least 90% of patients had a documented CD4+ cell count at ART initiation, and at least 80% of patients newly enrolling into HIV care overall were receiving TB screening at higher- and lower-level facilities in all three networks. There was evidence, however, that completeness of documentation was suboptimal in lower-level facilities compared to higher-level facilities.

CONCLUSION

Decentralization of comprehensive HIV services has been extensive in Nyando District of Nyanza Province, Kenya. Patients receiving care in lower-level facilities had similar short-term outcomes to those receiving care in higher-level facilities, suggesting that quality of care in lower-level facilities is comparable to that in higher-level facilities. However, health systems and laboratory capacity should be further strengthened and technical assistance to improve data quality and documentation should continue in lower-level facilities.
Despite considerable progress in the scale-up of HIV/AIDS prevention, care, and treatment services in resource-limited settings over the past decade, 1.6 million people are living with HIV (PLWH) in Kenya, and approximately 105,000 Kenyans were newly infected with HIV in 2011 [1,2]. Additionally, of the 710,000 Kenyans who were eligible to receive ART, only 61% were receiving ART in 2010 [3]. Nyanza Province, located in Western Kenya near the Ugandan border, is the most heavily affected province in Kenya. Nyanza Province contributes over one-third of all new HIV infections in Kenya and has an overall HIV prevalence of 14%, more than double the prevalence found in the remaining seven provinces [1].

Under a five-year cooperative agreement from CDC which was executed in 2008, ICAP at Columbia University has led the expansion of comprehensive HIV services in all health facilities in Nyanza Province in order to reduce morbidity and mortality among PLWH in the province. A consortium comprising ICAP and two faith-based organizations—the Christian Health Association of Kenya (CHAK) and the Catholic Medical Mission Board (CMMB) —was formed to coordinate and implement the IMARISHA Program. Drawing on the Kiswahili word for strengthening, the program aims to strengthen the already existing MOH systems. (In the second year of support, at the request of CDC, subcontracts with CMMB and CHAK were not renewed, and a local organization, OGRA Foundation, was incorporated as a sub-grantee.)

Decentralizing comprehensive HIV services from higher-to lower-level facilities has been a key strategy of the IMARISHA Program. Decentralization not only increases geographic coverage of HIV services, but also decreases burden in higher-level facilities [4]. To this end, ICAP has provided technical, logistical, and financial support for the expansion of comprehensive HIV services at all levels of the health care system and built local capacity to ensure sustainability of services in Nyanza Province. ICAP support for facilities has included in-service training and clinical mentorship for providers, data clerks, accountants and other facility personnel; development and introduction of job aids; renovation of clinics and laboratories; procurement of equipment and supplies; strengthening of laboratory referral mechanisms; and enhancement of patient and program monitoring systems. Additionally, ICAP has built the capacity of district and provincial health teams to manage and monitor facility-level activities by conducting joint work planning, review meetings, and facility supervision meetings. In this way, both infrastructure and human capital have been developed, and providers have received the tools and training necessary to provide high quality HIV care and treatment services.

ICAP currently supports nine districts in Nyanza Province. As support in the first two years of the IMARISHA Program was limited to providing HIV care and treatment and TB and HIV (TB/HIV) services in Nyando District of Nyanza Province, the present report summarizes findings from an internal mid-term evaluation focusing on the delivery of those two services in Nyando District of Nyanza Province, Kenya.
OBJECTIVES

The primary goals of the evaluation are to:

1. **Describe and compare facility characteristics** between higher-level and lower-level facilities;
2. **Examine and compare enrollment and transfer trends** among adult and pediatric patients between higher-level and lower-level facilities;
3. **Examine and compare patient outcomes**, which include ICAP’s two organizational priority indicators, between higher-level and lower-level facilities following decentralization of services in Nyando District of Nyanza Province, Kenya.

At the same time, the evaluation aims to document best practices and identify gaps and challenges along with potential approaches for improvement. Evaluation findings will ultimately inform work planning for the remainder of the funding cycle as well as potential work planning in other provinces in which ICAP supports scale-up of HIV services.
METHODS

Data Source
The evaluation used routinely-collected aggregate program data reported to CDC, NASCOP, and ICAP in New York from January 1, 2009 to September 30, 2011 from 34 ICAP-supported health facilities in Nyando District of Nyanza Province. Additionally, data from the sixth round of ICAP’s annual facility assessment and the first round of ICAP’s annual laboratory facility assessment conducted in September 2011 were used.

Sample
Of the 37 facilities supported by ICAP during the evaluation period, 34 facilities were included. Holo Dispensary, Mashambani Dispensary, and Koru Dispensary were excluded from analyses due to later program initiation. Additionally, data from the first quarter of reporting (October 1, 2008 – December 31, 2008) were excluded to remove spurious values that are common during the start-up phase of reporting.

The 34 health facilities comprise three health networks within Nyando District—Muhoroni, Nyakach, and Nyando networks. Each health network comprises one higher-level (central) facility and multiple lower-level (satellite) facilities. Central facilities include district or sub-district hospitals, while satellite facilities include health centers or dispensaries.

Analysis
Decentralization of services between central and satellite facilities for each health network was examined in two programmatic areas—HIV care and treatment and integration of TB/HIV services. First, key facility characteristics such as laboratory services and staffing patterns across networks and by facility type were described. Second, trends in enrollment and transfers of patients across networks and by facility type were graphically examined. Third, selected patient outcomes were examined across all networks and by facility type over the three-year evaluation period; these patient outcomes included documented CD4+ cell count coverage, median CD4+ cell count, patient attrition, TB screening among those newly enrolled in HIV care, and TB case finding among those newly enrolled in HIV care. Two out of five ICAP priority indicators related to HIV care and treatment and TB/HIV services were also examined as outcomes. ICAP priority indicators are used to assess the quality of care at ICAP-supported facilities by comparing their outcomes to annual target levels. The two priority indicators examined were the proportion of patients 0 to 1 year of age receiving ART among those who were HIV-infected (target: 95%) and the proportion of patients in HIV care who received TB screening at enrollment (target: 95%). Generalized estimating equations were used to model the average difference in proportions of these patient outcomes over time between cohorts of patients enrolled in the central facility and those in the satellite facilities over the three-year evaluation period. For a more detailed description of indicators and calculations in analyses, please refer to Definitions and Calculations in the Appendix.
RESULTS

Over the nearly three-year evaluation period from January 1, 2009 to September 30, 2011, the number of ICAP-supported health facilities increased from 29 to 34 facilities across Muhoroni, Nyakach, and Nyando health networks (Figure 1). There were 13 satellite facilities within Muhoroni network, 12 satellite facilities within Nyakach network, and six satellite facilities within Nyando network by the end of September 2011.

Comprehensiveness of Services

Across all networks, central facilities were equipped to deliver more comprehensive HIV care services than satellite facilities. As of September 30, 2011, all central facilities in Nyando District provided on-site CD4 testing, while no satellite facilities did (Table 1). TB sputum smears were also available at all central facilities, whereas only 33% to 50% of satellite facilities provided TB sputum smears across the three networks. Only the central facility in Nyakach network provided chest X-rays on-site for suspected TB patients; referrals for chest X-rays were made in all other facilities. Eight percent to 23% of satellite facilities were equipped to perform CD4 testing on-site.

Table 1. Characteristics of supported care and treatment clinics by network, July - September 2011.

<table>
<thead>
<tr>
<th></th>
<th>MUHORONI</th>
<th>NYAKACH</th>
<th>NYANDO</th>
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<tbody>
<tr>
<td></td>
<td>Central (n=1)</td>
<td>Satellite (n=13)</td>
<td>Central (n=1)</td>
</tr>
<tr>
<td>On-site CD4 testing</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>On-site TB sputum smears</td>
<td>100%</td>
<td>38%</td>
<td>100%</td>
</tr>
<tr>
<td>On-site chest X-ray</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Nutritional counseling for adults</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Nutritional treatment for severely malnourished adults</td>
<td>0%</td>
<td>31%</td>
<td>100%</td>
</tr>
<tr>
<td>Nutritional treatment for severely malnourished children &lt;5 years of age</td>
<td>0%</td>
<td>38%</td>
<td>100%</td>
</tr>
<tr>
<td>Outreach program for missed appointments</td>
<td>100%</td>
<td>81%</td>
<td>100%</td>
</tr>
<tr>
<td>Nurse prescription of ARVs at ART initiation</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Number of physicians FTE</td>
<td>0 (NA)</td>
<td>0 (0-2)</td>
<td>0 (NA)</td>
</tr>
<tr>
<td>Number of nurses FTE</td>
<td>1 (NA)</td>
<td>0.5 (0-2)</td>
<td>2 (NA)</td>
</tr>
<tr>
<td>Number of clinical officer FTE</td>
<td>1 (NA)</td>
<td>1 (0-2)</td>
<td>2 (NA)</td>
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lite facilities in each network processed blood glucose testing and 62% to 100% of satellite facilities in each network processed hemoglobin and hematocrit testing on-site, while these services were processed on-site for all central facilities (data not shown). Other laboratory services such as liver enzyme testing, hepatitis B antigen testing, creatinine testing, and lactic testing were also processed on-site for all central facilities, while these services were processed off-site for 97% of satellite facilities in the three networks (data not shown). Nutritional counseling for adults was available for all facilities across all networks. However, nutritional treatment for severely malnourished adults and children—which includes provision of ready-to-use therapeutic foods such as plumpynut, tube feeding, IV—were available mainly in central facilities. Food rations for ART adherence were provided for adults and children in the central facility and up to 23% of satellite facilities in Muhoroni network only (data not shown). Almost all facilities across the three networks had an outreach program for missed appointments among patients who were in HIV care or who have initiated ART. Home visits to patients with missed appointments were primarily made by HIV outreach staff workers at all facilities across the three networks (data not shown).

**Staffing Patterns**

As of September 30, 2011, services in clinics across all networks were primarily provided by nurses and clinical officers; no physicians were on-staff at the HIV clinic in either the central or satellite facilities. The central facility in Muhoroni network had an average of one nurse and one clinical officer working full-time, while the central facilities in Nyakach and Nyando networks had an average of two nurses and two clinical officers working full-time. The average number of nurses and clinical officers working full-time in satellite facilities was equal to or less than that of central facilities in each network. Satellite facilities in Muhoroni network had an average of less than one nurse (range: 0-2) and an average of one clinical officer (range: 0-2) working full-time; in Nyakach network, more than one nurse (range: 1-3) and one clinical officer working full-time; and in Nyando network, one nurse (range: 0-2) and more than one clinical officer (range: 1-2) working full-time.

Across all networks, central facilities were equipped to deliver more comprehensive HIV care services than satellite facilities.
RESULTS

Enrollment Trends

Between January 1, 2009 and September 30, 2011, the number of patients ever enrolling into HIV care across all facilities in Nyando District increased from 8,458 to 33,128 patients, and the number of patients ever initiating ART across all facilities in Nyando District increased from 3,387 to 14,753 patients. Figure 3 shows spatially the growth in the number of satellite facilities as well as the patient load in the satellite facilities over the nearly three-year evaluation period. Patient enrollment into HIV care and ART sharply increased in satellite facilities; the number of patients ever enrolling into HIV care increased by more than 10,000 patients, and the number of patients ever initiating ART increased by almost 6,800 patients (Figure 2). On the other hand, the increase was more gradual in central facilities, where the number of patients ever enrolling into HIV care increased by approximately 7,300 patients, and the number of patients ever initiating ART increased by approximately 3,800 patients over the three-year evaluation period.

Figure 3. Decentralization of ART services in Nyando District of Nyanza Province, Kenya, April 2009 – June 2011.

Patient enrollment into HIV care and ART sharply increased in satellite facilities. On the other hand, the increase was more gradual in central facilities.
When examining cumulative enrollment trends by network, the majority of patients in Muhoroni and Nyakach networks were receiving HIV care and initiating ART in satellite facilities by the end of September 2011. Approximately 67% of patients were receiving HIV care and initiating ART in satellite facilities in Muhoroni network by the end of September 2011, while approximately 60% of patients were receiving HIV care and initiating ART in satellite facilities in Nyakach network by the end of September 2011. In contrast, the majority of patients in Nyando network were still receiving HIV care and initiating ART in the central facility, with only 32% of patients receiving HIV care and 21% initiating ART in satellite facilities by the end of September 2011. Similar trends were observed in the number of new patients receiving HIV care and those newly initiating ART per quarter. Across all three networks, the majority of patients who newly initiated ART each quarter did so at satellite facilities from April 2009 to September 2011 (Figures 5 and 6). A consistent decreasing trend was observed for patients newly initiating ART in central facilities, while a consistent increasing trend was observed for patients newly initiating ART in satellite facilities during the three-year evaluation period. During the last quarter, at least 75% of patients newly initiated ART in satellite facilities across all three networks (Figure 6). Similar trends were seen for patients newly receiving HIV care (data not shown).

Pediatric patients 0 to 14 years of age were also increasingly initiating ART predominantly in satellite facilities (Figure 7). During the last quarter of the evaluation period, 84%, 81%, and 69% of pediatric patients newly initiating ART did so in satellite facilities in Muhoroni, Nyakach, and Nyando networks, respectively, while a decreasing trend was observed in pediatric patients initiating ART in the central facility. Similar trends were seen for pediatric patients newly receiving HIV care (data not shown).
No clear trend was observed in the proportion of patients 0 to 1 year of age newly initiating ART among those who were HIV-infected (ICAP priority indicator) by facility type. During the evaluation period, the proportion of HIV-infected children 0 to 1 year of age newly initiating ART fluctuated notably from quarter to quarter, especially in Nyando network (Figure 8). The proportion increased from 0% to 88% for satellite facilities in Muhoroni network and from 17% to 80% in Nyakach network over the evaluation period. By the end of September 2011, at least 80% of children 0 to 1 year of age were initiating ART in satellite facilities across all three networks. Though the overall proportion of HIV-infected children 0 to 1 year of age initiating ART significantly differed between central and satellite facilities in Muhoroni and Nyando network, the observed fluctuating trends, especially for Nyando network, may indicate challenges in documentation, and thus should be interpreted with caution.
Overall, over the nearly three-year evaluation period, the difference in the proportion of patients enrolling into central versus satellite facilities has widened across all three networks, showing that as services decentralize, fewer patients are seeking services at central facilities and more are seeking services at satellite facilities.
RESULTS

Transfer Trends

Over the three-year evaluation period, patients increasingly transferred out of central facilities and into satellite facilities (Figures 9 and 10). The number of patients transferring into satellite facilities gradually increased from 126 per quarter to 289 per quarter in Muhoroni network, from 14 to 46 in Nyakach network, and from 16 to 244 in Nyando network over the evaluation period. In addition, documented transfers into satellite facilities tracked well with documented transfers out from central facilities in Nyakach network, where a similar number of patients transferred out from central facilities and into satellite facilities every quarter, suggestive of a trend of down-referrals (Figure 9). On the other hand, tracking of transfers out from central facilities and into satellite facilities was less apparent for Muhoroni and Nyando networks. While both the number of patients transferring out from central facilities and transferring into satellite facilities increased, gaps in these numbers remained.

Across all three networks, patients increasingly transferred out from satellite facilities, but the number of transfers into central facilities remained small.

Figure 9. Number of documented transfers out from central versus transfers into satellite facilities by network.

Figure 10. Number of documented transfers out from satellite versus transfers into central facilities by network.
Across all three networks, patients increasingly transferred out from satellite facilities but the number of transfers into central facilities remained small (Figure 10). No patients were transferring into central facilities by the end of September 30, 2011 in Nyakach and Nyando networks. The number of patients transferring out from satellite facilities, however, steadily increased from 4 per quarter to 116 per quarter in Muhoroni network, from 34 to 277 in Nyakach network, and from 0 to 109 in Nyando network over the evaluation period (Figure 10). The rate of increase was greatest after 2010.

Overall, more female than male patients transferred in and out of facilities (Figure 11). In particular, females accounted for approximately 70% of documented transfers out from central facilities and into satellite facilities across all networks.

**Figure 11.** Proportion of females among documented transfers versus newly initiating on ART by network, January 2009 - September 2011.
RESULTS

PATIENT OUTCOMES

With geographic expansion of HIV services, the number of patients enrolling and transferring into lower-level facilities has increased. While these trends may indicate decentralization of services to patients, successful decentralization of services would also provide comparable quality of care for patients who receive HIV services in lower-level facilities compared to those who receive services in higher-level facilities. Selected patient outcomes were thus compared between central and satellite facilities.

Documented CD4+ Cell Count Coverage

Overall, among successive cohorts of patients initiating ART across all three networks, the proportion of patients with a CD4+ cell count at ART initiation remained high with a median of 89% (Figure 12). By the end of September 2011, over 90% of patients in both central and satellite facilities in Nyakach and Nyando networks had a CD4+ cell count at ART initiation. At the same time, the proportion increased over time for Muhoroni and Nyakach networks (Figure 12). There was no significant difference in the proportion of patients with a CD4+ cell count at ART initiation among cohorts of patients between central and satellite facilities across all three networks (p>0.05).

CD4+ cell count coverage was lower at 6 and 12 month follow-up visits than at ART initiation. After 6 months of ART, an overall median of 74% of patients had a CD4+ cell count, and after 12 months of ART, an overall median of 67% of patients had a CD4+ cell count (data not shown). Trends throughout the evaluation period for these cohorts of patients at follow-up were also inconsistent; the proportion of patients with a CD4+ cell count notably fluctuated from quarter to quarter, especially in Nyando network. Significant differences were observed in CD4+ cell count coverage 6 months after ART initiation between cohorts of patients in central and satellite facilities in Muhoroni network (p<0.05); patients in the central facility (82%) had higher CD4+ cell count coverage than those in satellite facilities (75%). There was also a significant difference in CD4+ cell count coverage 12 months after ART initiation by facility type in Muhoroni and Nyakach networks (p<0.05), with higher coverage among patients on ART in satellite facilities. In Muhoroni network, 79% of patients in satellite facilities had a CD4+ cell count compared to 70% patients in the central facility; in Nyakach network, 77% patients in satellite facilities had a CD4+ cell count compared to 57% of patients in the central facility.

Figure 12. Proportion of persons in cohort with documented CD4+ cell count at ART initiation by facility type and network.

<table>
<thead>
<tr>
<th>Network</th>
<th>Central Coverage</th>
<th>Satellite Coverage</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Muhoroni</td>
<td>88.4%</td>
<td>94.1%</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Nyakach</td>
<td>85.5%</td>
<td>88.2%</td>
<td>0.07</td>
</tr>
<tr>
<td>Nyando</td>
<td>85.7%</td>
<td>93.3%</td>
<td>0.76</td>
</tr>
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</table>

Nyakach

Muhoroni

Nyando

Red: Satellite  Blue: Central
Median CD4+ Cell Count

Overall, the average median CD4+ cell count at ART initiation among cohorts of patients greater than 6 years of age across all networks was 174 cells/μL in central facilities and 184 cells/μL in satellite facilities. There was a higher CD4+ cell response at follow-up visits 6 months and 12 months after ART initiation. At follow-up visits 6 months after ART initiation, the average median CD4+ cell count increased to 281 cells/μL for central facilities and to 310 cells/μL for satellite facilities. At follow-up visits 12 months after ART initiation, the average median CD4+ cell count increased to 317 cells/μL for central facilities and to 318 cells/μL for satellite facilities by the end of the evaluation period. There was no significant difference in overall median CD4+ cell count between cohorts of patients in central and satellite facilities at ART initiation and at follow-up visits 6 and 12 months after ART initiation ($p>0.05$).

When examining by network, there was no significant difference in median CD4+ cell count between cohorts of patients in central and satellite facilities across all three networks at ART initiation (Figure 13) and at follow-up visits 12 months after ART initiation. However, there was a significant difference in median CD4+ cell count between cohorts of patients in central and satellite facilities at follow-up visits 6 months after ART initiation (data not shown). Patients in satellite facilities had a significantly higher average median CD4+ cell count than those at central facilities across all three networks ($p<0.05$). The average median CD4+ cell count was 279 cells/μL for those at central facilities and 317 cells/μL for those at satellite facilities in Muhoroni network, 252 cells/μL for central facilities and 302 cells/μL for satellite facilities in Nyakach network, and 305 cells/μL for central facilities and 313 cells/μL for satellite facilities in Nyando network. Though substantial fluctuations existed in CD4+ cell count between quarters, CD4+ cell count increased for both central and satellite facilities during the later quarters for all networks at all points of CD4+ cell count testing (i.e. ART initiation, 6-month follow-up visit, 12-month follow-up visit) (Figure 13).

There was no significant difference in overall median CD4+ cell count between cohorts of patients in central and satellite facilities at ART initiation and at follow-up visits 6 and 12 months after ART initiation.
**RESULTS**

**Patient Attrition**

There was no significant difference in patient attrition after 6 months of ART between central and satellite facilities across all three networks (p>0.05) (Figure 14). By the end of September 2011, approximately 30% of cohorts of patients were not retained in care for at least 6 months in central and satellite facilities across all networks. While trends were less apparent for Nyakach and Nyando networks, attrition after 6 months of ART decreased for both central and satellite facilities in Muhoroni network. Similar trends were seen for patient attrition after 12 months of ART (data not shown).

**TB Screening**

Trends in TB screening were less comparable than trends in HIV care and treatment between patients in central and satellite facilities. Patients who newly enrolled in HIV care were increasingly screened for active TB across the three networks, especially toward the later quarters when there was a more intensive focus on implementing a standardized TB-screening questionnaire across facilities (Figure 15). By the end of September 2011, 92% of patients newly enrolling in HIV care at Nyakach network and 100% of patients newly enrolling in HIV care at Muhoroni and Nyando networks were receiving TB screening. There was no significant difference in TB

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**Figure 14.** Proportion of cohort attrition after 6 months of ART by facility type and network.

**Figure 15.** Proportion of new enrollees in HIV care screened for TB by facility type and network.
screening among patients between central and satellite facilities in Muhoroni and Nyakach networks, but significant difference in TB screening among patients between central and satellite facilities was detected for Nyando network.

TB Case Finding

There were no clear time trends in TB case finding across networks and between central and satellite facilities (Figure 16). The proportion of newly enrolling patients subsequently diagnosed and treated with active TB fluctuated between quarters, especially for central facilities. Significant differences in overall TB case finding between central and satellite facilities were found in Muhoroni network, where a higher proportion of patients were found to have active TB in satellite facilities. By contrast, in Nyando network, a significantly higher proportion of patients were found to have active TB in central facilities. As facilities were slow in beginning to report TB indicators, TB data quality must be further assessed.

Data Quality and Reporting Completeness

Overall, reporting for HIV care and treatment indicators—CD4+ cell count coverage, median CD4+ cell count, and proportion of cohort attrition after 6 months of ART—were suboptimal over the evaluation period. However, data completeness increased over time; while less than 50% of facilities in Nyando District reported these indicators in 2009, about 60% of facilities reported in 2010, and more than 75% of facilities reported in 2011. Data completeness was consistently higher for Muhoroni network (42%) when compared to Nyakach network (32%) and Nyando network (28%). Moreover, in all three networks, when compared to central facilities, satellite facilities had less complete data. Overall, 38% of reports for the above cited indicators were not complete in satellite facilities compared to 6% for central facilities.

Figure 16. TB case finding among new enrollees in HIV care by facility type and network.

Data completeness increased over time.... About 60% of facilities reported in 2010, and more than 75% of facilities reported in 2011 [in Nyando District].
Decentralization of comprehensive HIV services has been extensive in Nyando District of Nyanza Province, Kenya over the nearly three-year period from January 1, 2009 to September 30, 2011. Expansion of services to lower-level health facilities in Nyando District of Nyanza Province in Kenya has been demonstrated across three distinct health networks by an increasing number of patients enrolling in lower-level health facilities for HIV care and treatment services. The success of decentralization was particularly evident in Muhoroni and Nyakach networks as over 60% of patients ever enrolled in HIV care and at least 75% of patients newly initiated ART in lower-level facilities by the end of the evaluation period. These data suggest that PLWH are increasingly seeking services at lower-level facilities.

Decentralization of HIV services has also been demonstrated by an increasing number of patients transferring into lower-level health facilities. Strong tracking of transfers was found in Nyakach network, where the number of patients transferring out from higher-level facilities was similar to the number of patients transferring into lower-level facilities. This may be due to good record-keeping or may be indicative of the general lack of mobility of patients to other clinics outside of the network. Patients were also increasingly transferring out of lower-level facilities while a small number of patients were transferring into higher-level facilities—a consistent trend throughout the three-year evaluation period. These trends may suggest increasing patient movement among lower-level facilities but little up-referrals to higher-level facilities as services are further decentralized.

Over the three-year evaluation period, female patients were also more likely to transfer into lower-level facilities than male patients even after accounting for the fact that the majority of patients initiating ART at ICAP facilities were female. This disproportionate representation of females among transfers may reflect that males are more likely to be lost to follow-up compared to females [5-7]. Several studies show that men are more likely to be at a more advanced stage of disease at ART enrollment that may contribute to a higher proportion of loss to follow-up than women [8-10]. At the same time, women may be less likely to be lost to follow-up or may enroll for ART initiation earlier than men when they test for HIV at ANC clinics or seek care for a dependent [5].

Despite increasing transfers and enrollment of patients in lower-level facilities, the majority of HIV-related services were still being performed at higher-level facilities by the end of the three-year evaluation period. Central facilities had the full capacity to perform laboratory tests including CD4+ cell count and sputum smear microscopy, while lower-level facilities were limited in these capacities with many services being performed off-site.

HIV services were also administered by non-physician staff in both higher-level and lower-level facilities across all health networks; nurses were the primary care providers for clients in all facilities in Nyando District. As human-resource capacity and funding are limited, non-physician-led delivery of HIV services has become customary in such resource-constrained settings [11]. While concerns have been raised that the use of less specialized health workers may result in higher patient attrition, reduced quality of care, and overburdening of health systems that are short on staff, substantial evidence shows that non-physician-led services are a cost-effective way to address staff-shortage and produce favorable outcomes in pa-
patient retention, program efficiency, and access to care given appropriate training and supervision [11-17].

Accordingly, scale-up of HIV services in Nyando District—operationalized through decentralization and delegation of HIV care to nurses and non-physician staff—has provided quality of care in lower-level facilities that is comparable to that in higher-level facilities. Overall, patients receiving care in lower-level health facilities yielded similar short-term outcomes to those receiving care in higher-level health facilities. There was no difference in documented CD4+ cell count coverage at ART initiation between cohorts of patients at lower- and higher-level facilities despite the lack of on-site CD4 testing machines at lower-level facilities. There was also no difference in overall median CD4+ cell count and patient attrition 6 and 12 months after ART initiation between lower- and higher-level facilities. Moreover, patient outcomes in HIV care steadily improved among lower-level facilities over the evaluation period. Similar results were also reported in previous studies, where comparable or even better outcomes among patients receiving HIV care were found in decentralized facilities than in centralized health facilities [18-26]. In studies in rural Malawi and South Africa, for example, better patient retention was found in decentralized facilities than centralized facilities and no statistically significant differences in one-year clinical outcomes were observed between the two facility types [18,19].

Though outcomes among HIV-positive patients receiving TB services were less comparable between lower- and higher-level facilities than that of HIV care and treatment services—most likely due to the differential availability of TB laboratory services between lower- and higher-level facilities—the proportion of patients in HIV care receiving TB screening steadily increased over the three-year evaluation period. Previous studies also support positive outcomes with decentralization of TB services and care, where a higher rate of treatment success and lower rate of patient loss-to-follow-up were found in lower-level health facilities than in higher-level health facilities [27-30]. This may be because access to services is especially crucial for TB control programs to ensure that patients adhere to their treatment and patients receive full course of treatment [29]. Moreover, expansion of laboratory services in lower-level facilities would improve timely TB diagnosis and treatment for PLWH [31]. Therefore, though further evaluation of TB/HIV services in Nyando District is needed, we expect positive patient outcomes following decentralization of TB/HIV services that are consistent with previous findings.

This mid-term evaluation has several strengths. This was the first analysis conducted by ICAP that describes the process of decentralization in defined networks with central and associated satellite facilities. At an ecologic level, the analysis was able to compare and contrast trends observed in central and associated facilities. In addition, the availability of data for multiple years from all supported sites has allowed analysis of trends as the decentralization process took place over the study period. Finally, the analysis used service delivery as opposed to research data, allowing us to draw programmatically relevant conclusions.

Several limitations should also be noted. As the evaluation used data from one district, results are not generalizable to the rest of the province. The data used in the analyses are also aggregate-level data such that conclusions cannot be drawn to individuals. Patient-level factors that may influence outcomes were also not assessed in this evaluation. Additionally, analyses are based on the quality of reported data; lack of completeness in data, especially for TB data and for satellite facilities, significantly challenges the ability to appropriately evaluate the program.
Recommendations

Service Provision

As HIV care and treatment services are continuing to expand into lower-level facilities in Nyanza Province, health systems and laboratory capacity should be further strengthened. Many lower-level facilities in Nyando District lacked laboratory infrastructure to deliver timely HIV care and treatment services as many needed to access off-site laboratory services. Thus, strengthening laboratory capacity (e.g. procuring on-site CD4 testing machines and increasing availability of sputum smear microscopy) at lower-level facilities should be a priority as patients are increasingly accessing care at lower-level facilities. At the same time, delivery of HIV care and treatment services in Nyando District was found to be led by nurses and non-physician clinical officers. Given the potential for favorable outcomes from non-physician-led HIV care, training and supervision of new nurses and non-physician health care workers should be continued.

As the majority of newly enrolling and transfer patients are female, appropriate strategies to support female patients should be developed. HIV care and treatment services for infants less than one year of age for ART initiation should also be closely monitored, as 50% of those will die by two years of age if untreated [32]. Moreover, strategies to further incorporate nutritional treatment, especially for pediatric patients, should be investigated, as the majority of facilities did not provide nutritional treatment for severely malnourished children less than five years of age.

Achievements in patient outcomes, especially in CD4+ cell count coverage at ART initiation, are commendable. However, additional efforts must be made to increase CD4+ cell count test coverage 6 and 12 months after ART initiation in both lower- and higher-level facilities. In addition, late ART initiation remains a challenge across all networks regardless of facility level in which patients, on average, are initiating ART well below the WHO recommended CD4+ cell count [33]. Efforts to more efficiently identify and link HIV positive patients to HIV clinics are needed, including routine HIV testing and community and home HIV testing [34-38]. Short-term patient attrition 6 and 12 months after ART initiation also remains a challenge in Nyando District, affecting a third of patients initiating ART. Interventions such as adherence support, active outreach, and food support that specifically target patients in the early phase of ART are needed to increase retention in care during this critical period [39]. For integrated TB services, TB screening should be prioritized for all patients in care, not only at enrollment but also at subsequent visits. As the proportion of newly enrolling patients who were subsequently diagnosed and treated with active TB fluctuated between quarters, mentoring health care workers on TB screening, diagnosis, and management should be present, and TB data collection should be improved.

M&E

Facilities have been increasingly reporting indicators in the areas of HIV care and TB/HIV over the three-year evaluation period. However, continued mentorship of M&E, particularly at lower-level facilities, is required to further strengthen reporting and recording to ensure completeness, accuracy, and high quality of data. Documentation of transfers in particular should be improved. Additionally, as ART cohort reporting is a uniquely challenging requirement, technical assistance to improve clinical care and completeness of documentation in this area across lower-level facilities should continue.
DEFINITIONS

- Central facility: District or sub-district hospital.
- Satellite facility: Health centers or dispensaries.
- Attrition is defined as the proportion of patients not retained 6 or 12 months after ART initiation at their site of initiation among those initiating in a given quarter. The measure includes lost to follow-up and death but excludes known transfers.
- Values in the x-axis in graphs refer to the starting month of every other reporting quarter.

CALCULATIONS

Figure 6. Proportion of newly initiating ART patients by facility type and network.
Central: \[\frac{\text{Number of patients who newly initiated ART in central facilities during quarter}}{\text{total number of patients who newly initiated ART during quarter}}\], weighed by the denominator.
Satellite: \[\frac{\text{Number of patients who newly initiated ART in satellite facilities during quarter}}{\text{total number of patients who newly initiated ART during quarter}}\], weighed by the denominator.

Figure 7. Proportion of patients 0 to 14 years of age newly initiating ART by facility type and network.
Central: \[\frac{\text{Number of patients 0 to 14 years of age who newly initiated ART in central facilities during quarter}}{\text{total number of patients 0 to 14 years of age who newly initiated ART during quarter}}\], weighed by the denominator.
Satellite: \[\frac{\text{Number of patients 0 to 14 years of age who newly initiated ART in satellite facilities during quarter}}{\text{total number of patients 0 to 14 years of age who newly initiated ART during quarter}}\], weighed by the denominator.

Figure 8. Proportion of HIV-infected children 0 to 1 year of age receiving ART by facility type and network.
Central: \[\frac{\text{Number of patients 0 to 1 year of age who newly initiated ART in central facilities during quarter}}{\text{total number of patients 0 to 1 year of age who newly enrolled in HIV care during quarter}}\], weighed by the denominator.
Satellite: \[\frac{\text{Number of patients 0 to 1 year of age who newly initiated ART in satellite facilities during quarter}}{\text{total number of patients 0 to 1 year of age who newly initiated ART during quarter}}\], weighed by the denominator.

Figure 9. Number of documented transfers out from central versus transfers into satellite facilities by network.
Due to possible incomplete documentation of transfer data, newly initiating patients were included with transfers-in to satellite facilities (i.e. transfers in=documented transfers in and newly initiating patients) in the analyses for Muhoroni and Nyando networks.

Figure 11. Proportion of females among documented transfers versus newly initiating on ART by network, January 2009-September 2011.
Reference: \[\frac{\text{Number of female patients who newly initiated on ART}}{\text{total number of patients who newly initiated on ART}}\], weighed by the denominator.
Central: \[\frac{\text{Number of females among documented transfers out of central facilities}}{\text{total number of patients among documented transfers out of central facilities}}\], weighed by the denominator.
Satellite: \[\frac{\text{Number of females among documented transfers into satellite facilities}}{\text{total number of patients among documented transfers into satellite facilities}}\].

Figure 12. Proportion of persons in cohort with documented CD4+ cell count at ART initiation by facility type and network.
Median of \[\frac{\text{(number in cohort who have CD4 counts at ART initiation)}}{\text{number of persons in cohort at ART initiation)\], weighed by the denominator.\]

Figure 13. Median CD4+ cell count at ART initiation by facility type and network.
Mean of median CD4 count at ART initiation per quarter.

Figure 14. Proportion of cohort attrition after 6 months of ART by facility type and network.
\[\frac{\text{(Number of persons in cohort at ART initiation}}{\text{number of persons in cohort at 6 months of ART)\]/(number of persons in cohort at ART initiation), weighed by the denominator.\]

Figure 15. Proportion of new enrollees in HIV care screened for TB by facility type and network.
Median of \[\frac{\text{(Number of new patients screened for active TB at enrollment into HIV care)\]/(number of new patients enrolled in HIV care – patients who were already on TB treatment and were newly enrolled in HIV care during the reporting quarter)\], weighed by the denominator.

Figure 16. TB case finding among new enrollees in HIV care by facility type and network.
\[\frac{\text{(Number of new patients enrolled in HIV care with TB)\]/(Number of new patients enrolled in HIV care), weighed by the denominator.\]


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