Evaluation of antiretroviral treatment programme monitoring in Eastern Cape, South Africa

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Introduction The provision of antiretroviral treatment (ART) for HIV infection is a key strategy in addressing the high burden of HIV/AIDS in South Africa and improving the quality and length of life for those infected. Information produced from routine monitoring is essential for evidence-based decision-making within ART programmes. An evaluation of the ART programme data system in Eastern Cape, South Africa was conducted to determine the causes of irregular reporting and to make recommendations to improve data quality.

Methods Data audits and semi-structured interviews were performed in facilities that initiate and provide ART. Thirty-two facilities in three sub-districts were audited.

Results The number of adults receiving ART was over-reported by 36.6% (P < 0.05) on the District Health Information System. The interviews of nurses and administrators revealed various factors that contributed to the inaccuracy of the data including training, staffing levels, use of registers, data verification processes, and standardization with programme partners.

Conclusions Recommendations to address the inaccuracy of ART programme data include improving knowledge translation during training of ART programme staff, ensuring the implementation of established data verification policies and procedures, rethinking the design of the programme to reduce the burden on health facilities and personnel, and standardizing information management procedures amongst the various governmental and non-governmental stakeholders. The challenges with reporting in the Eastern Cape may be shared by other South African provinces as well as other low-middle income countries that require high quality data to inform well-designed and well-implemented interventions in the fight against HIV/AIDS.

Keywords Information management, data accuracy, routine monitoring, South Africa, antiretroviral treatment, HIV
KEY MESSAGES

- Routine monitoring data for the ART programme in three sub-districts of the Eastern Cape, South Africa was over-reported by 36.6% for the indicator Total Remaining in Care.
- Over-reporting was primarily driven by facilities with >250 ART clients.
- Inadequacies in training, staffing levels, use of registers, data verification processes, and standardization with programme partners were discovered through semi-structured interviews with nurses and administrators.
- The policy interventions recommended to improve data quality include knowledge translation, implementation of data verification processes, revised programme management and standardization of information management procedures.

Introduction

The Eastern Cape province of South Africa is one of the poorest and least-developed provinces in the country. The Eastern Cape Department of Health (ECDOH) operates under tremendous fiscal pressure and a severe skills shortage while attending to a heavy disease burden. With 6.8 million people in Eastern Cape (StatsSA 2011) and an estimated HIV prevalence of 16.8% in the adult (15–49) population (NDOH 2010b), about 600,000 people in Eastern Cape are HIV positive. According to the Annual Report of the ECDOH, 188,544 adults were on ART in March 2012 but the remaining number in need of ART is not precisely known.

In 2004, the ECDOH started the Anti-Retroviral Treatment (ART) Programme to provide Antiretroviral drugs to its citizens through designated ART clinic sites. Since that time, the department has been collecting data on the number of clients that receive ART and reporting these figures in its quarterly and annual performance reports. Two sources of data were used for this indicator—the District Health Information System (DHIS), managed by the Information Management (IM) Directorate of the ECDOH, and programme-adjusted data collected by the HIV & AIDS, Sexually Transmitted Infections and Tuberculosis (STI & TB) (HAST) Directorate. The DHIS is the information management system utilized throughout South Africa for routine data collection. Information flows from facilities to sub-districts where the bulk of the data is captured, then to districts and to the provincial IM Directorate before being submitted to the National Department of Health. The DHIS is both a paper-based and electronic database (NDOH 2011a). The ART figures for any given quarter on DHIS differ from the HAST programme estimates creating distrust in the data. In addition, the Auditor General’s audit feedback for the previous three financial years highlighted discrepancies between DHIS data for this indicator, HAST programme calculations and clinic registers.

If the ART programme was functioning as intended, the number of people on ART should increase steadily over time. The Annual Report 2010/11 (April 2010 to March 2011) reported a cumulative 152,357 clients receiving ART (a number that was deemed an underestimation due to unavailability of registers) (ECDOH 2011). However, the first quarter of 2011/12 (April to June 2011) data output from DHIS reported only 114,074 (ECDOH, 2012a). Similarly, the second quarter (July to September) 2010 Operational Plan Report showed a significant decrease in the number of clients receiving ARVs to 113,000 from 118,000 in April–June 2010. In most cases, it has been difficult to explain or account for the observed variance and fluctuations.

Changes in ART policies, especially the implementation of the Nurse Initiated Management of ART (NIMART), should also have had an impact on this indicator. In the past two years, nearly 700 facilities in Eastern Cape (mostly primary health care clinics) have been assessed and declared competent to provide ART, creating an expectation that the number of clients receiving care would rapidly and significantly increase. This expectation has not been evident in the DHIS ART client counts.

Inconsistencies and unreliability of the ART programme data have resulted in the inability of the HAST Directorate to plan activities, target high incidence areas for interventions, address the challenge of treatment defaulters through timely follow-ups, efficiently procure ARVs or establish accurate programme budgets. In addition, as a result of these data inconsistencies it is difficult for the department to account for expenditures with confidence.

Setting

South Africa has 0.7% of the world’s population but carries 17% of the global HIV/AIDS burden (Warnich et al. 2011). An estimated 5.38 million people (10.6% overall prevalence and 16.8% of the adult population aged 15–49) are living with HIV in South Africa (NDOH 2011b). The standard treatment for HIV is highly active antiretroviral treatment (HAART), at least three antiretroviral (ARV) drugs taken each day on a permanent basis. In South Africa, at present, all HIV+ adults are eligible to receive HAART if they have a CD4 count of 350 cells/mm³ or lower (National Department of Health (NDOH) 2013). At the time of this study however only pregnant women and those co-infected with tuberculosis were eligible for ART at a CD4 of 350 cells/mm³. All others became eligible when their CD4 decreased below 200 cells/mm³ (NDOH 2010a).

As a United Nations member state, South Africa has adopted the eight Millennium Development Goals (MDGs). Goal 6 is to halt and begin to reverse the HIV epidemic (WHO 2010). As a result, South Africa has agreed to submit biennial progress reports to the United Nations General Assembly Special Session on HIV/AIDS global reporting system. The antiretroviral treatment (ART) coverage information presented in those progress reports is based on routine monitoring data from the public health service (Rugg et al. 2009).

The South African government receives funding from the Global Fund to Fight AIDS, TB and Malaria such that 26% of
the national government’s HIV/AIDS budget is covered by external aid. In addition to equitable share funding that is allocated to provinces to deliver health services, provinces receive funding for HIV through the Conditional Grant for HIV and AIDS and must submit to Division of Revenue Act accountability processes through the submission of HIV data to the National Treasury (Kawonga et al., 2012). This HIV data is collected through the information management systems implemented by provincial departments of health.

ART data management in facilities ideally takes place according to the following design. When clients are initiated on ARV treatment, they are entered into the client register under their starting month, and an Adult Clinical Record (ACR) is opened for them. Each month, when they come to collect their treatment, their ACR and register row are updated with their treatment regimen. On specific months (baseline, 6, 12 and then annually) blood work is done and the results are entered into the ACR and register. If the client fails to come on their appointed date, they are followed up telephonically or in person by community health workers and encouraged to visit the clinic and avoid defaulting. If a client dies, transfers to another facility, or fails to come to collect their treatment for 90 days (lost to follow-up), they are deregistered from the clinic. Programme statistics are compiled and submitted monthly by each clinic based on the data in the registers before being captured (entered electronically) in the DHIS.

The ECDOH is currently piloting the NDOH-developed, 3-TIER HIV information system in various facilities throughout the province. In hopes of better managing client data, the system will move from paper-based data capturing (Tier 1) to an electronic database (Tier 2) and eventually to a networked, electronic database (Tier 3). This system is in its early stages and data collection, collation and transmission, as well as Information Technology challenges still need to be overcome, particularly in the rural regions of Eastern Cape province. Because this system will continue to be dependent on complete clinical records and accurate data entry, it was necessary to evaluate the current information system and ensure that the existing problems were not carried forward into the new system.

In 2011, the School of Public Health at the University of Alberta established a memorandum of understanding with the ECDOH for the provision of technical assistance in health surveillance, monitoring and evaluation. A research associate was seconded to the ECDOH in February 2011 to conduct internal programme evaluations as needed. From November 2011 to April 2012, the Monitoring & Evaluation Directorate, in conjunction with the HAST Directorate, and assisted by the School of Public Health at the University of Alberta, conducted an evaluation of the ART Programme data systems in the Eastern Cape.

This evaluation was performed:

1. To provide an accurate estimate of the extent of misreporting of the number of clients receiving ART.
2. To understand reasons for variance and fluctuations in reported data.
3. To provide recommendations for improving data collection and reporting.
4. To provide a baseline/situation analysis of factors that might have a negative impact on the implementation of the 3-TIER system.

Ethical approval to report the results of this study was granted by the University of Alberta’s Health Research Ethics Board.

**Methods**

**Sampling**

At the time of the evaluation, the ECDOH was administratively divided into six districts and one metropolitan area; these seven ‘districts’ were further broken down into 24 sub-districts. The evaluation was performed in three of these sub-districts in Eastern Cape. These three sub-districts were selected using purposive sampling to include both a rural (sub-district 1) and an urban sub-district (sub-district 3) with generally poor reporting, and a mostly rural sub-district (sub-district 2) that was believed to have higher data quality and more consistent reporting. Within each sub-district, ART facilities (n=45) were randomly selected using a random number generator. The inclusion criteria for facilities were that the facility had been assessed and approved to deliver ART services and had begun initiating ART treatment for clients.

**Tool development and data collection procedure**

A semi-structured interview tool was created by adapting the Routine Data Quality Assessment tool co-developed by The Global Fund to Fight AIDS, Tuberculosis and Malaria, Office of the Global AIDS Coordinator, President’s Emergency Plan for AIDS relief (PEPFAR), United States Agency for International Development (USAID), World Health Organization (WHO), United Nations AIDS (UNAIDS), and MEASURE Evaluation (Global Fund et al., 2008). The interview covered areas such as data verification procedures prior to reporting, training on data management and data collection, access to information flow policies, data element definitions and the allocation of duties.

Facility visits followed a consistent pattern. The evaluation in facilities consisted of two parts: a semi-structured interview with the person primarily responsible for the ART programme in that facility and a data audit of the records in the facility. The interview was conducted using the interview tool and included an additional discussion of the challenges experienced in each ART centre.

The central data element of this evaluation was ‘Adult patients remaining on ART at month end-total’ otherwise referred to as the Total Remaining in Care (TRIC). TRIC is a cumulative total, with each month’s calculation based on the last month’s result. The formula is as follows:

\[
\text{Current month} = \text{Previous month} + (\text{New clients} + \text{Transfers In} + \text{Returns}) - (\text{Deaths} + \text{Transfers Out} + \text{Lost to Follow-up})
\]

The data audit was conducted by comparing the reported TRIC to the number of active ART patient folders. The evaluation team, with the assistance of the NIMART nurse and/or data capturers examined each and every ART client’s ACR to determine whether the client was active in that facility in November 2011. An active client was one who had started ART treatment during or before November 2011, and had not...
died, been transferred out, or been lost to follow-up by 30 November 2011. The folders of active clients were then counted and recorded as the audited total.

Additional discussions held with District and Provincial programme managers and the Regional Training Centre provided further clarity on the use of information, challenges with system compliance and training on data management.

Data analysis
Statistical analysis was completed using Stata and Statistical Package for the Social Sciences (SPSS) Version 19. Analysis of variance and linear regression were performed with $\alpha = 0.05$. Conventional content analysis of the interview notes from 56 interviews was done to identify themes and allocate these to emergent categories. To maintain a high standard of validity throughout the qualitative component of the evaluation Lincoln and Guba’s (1985) concept of trustworthiness, and the criteria of credibility, transferability, dependability, and confirmability were employed. Credibility was established through regular peer debriefing, prolonged engagement, persistent observation and member checking (Manning 1997). Transferability was sought by randomly selecting facilities for inclusion. Dependability and confirmability were sought by creating a comprehensive audit trail. The principal investigator maintained a journal detailing the assumptions, reactions, and reflections experienced throughout the data collection process.

Results
Audit
The audit results show that in November 2011, the reported number of ‘Adult patients remaining on ART at month end-total’ on the DHIS had a 27% difference when compared to the audit total ($n = 32$, $P < 0.05$). In total, 11 592 clients were reported in the 32 facilities audited but records could only account for 8 489 clients, an over-reporting of 36.6% (Table 1). This means that in November 2011, these facilities were treating only 73% of the number of patients reported on DHIS. While the facilities that reported tended to over-report, seven of 32 facilities under-reported and one facility did not report at all (Figure 1). Two facilities in sub-district 2 could not be audited due to missing registers and client records.

It was noted during the evaluation that small Public Health Clinics facilities appeared to have more accurate data than large ART clinics in hospitals. This observation was examined by plotting reported patient totals against audited patient totals. A logarithmic transformation was performed on both totals, and a simple linear regression was performed. The resulting model was highly significant ($F = 448$, degrees of freedom (df) = 1,29, $P < 0.0001$). Adding dummy variables to represent the districts to the regression model did not result in any improvement in the fit. As the number of patients reported increased, the size of the discrepancy also increased. Figure 2 shows the (back transformed) discrepancies predicted by the model against the reported totals.

There is a natural break point in the current data at a reported number of 250 clients. In clinics reporting less than 250 clients, there was a difference of only 4.8% ($P < 0.05$) whereas in those reporting more than 250 clients, the difference was 32.5% ($P < 0.05$). In both cases the reported total was higher than the audited total. In facilities with <250 ART clients, the difference between the reported and audited values ranged from under-reporting by 124 (did not report) to

<table>
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<th>Sub-district</th>
<th>DHIS (number of clients reported)</th>
<th>TRIC-Audit (number of client records)</th>
<th>Difference (number)</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3852</td>
<td>2706</td>
<td>1146</td>
<td>30%</td>
</tr>
<tr>
<td>2</td>
<td>1413</td>
<td>871</td>
<td>542</td>
<td>38%</td>
</tr>
<tr>
<td>3</td>
<td>6327</td>
<td>4912</td>
<td>1415</td>
<td>22%</td>
</tr>
<tr>
<td>Total</td>
<td>11592</td>
<td>8489</td>
<td>3103</td>
<td>27%</td>
</tr>
</tbody>
</table>

Table 1. Results of TRIC Audit by sub-district showing DHIS data in comparison to the audited number of client records in the facility

Figure 1. Comparison of reported client statistics on DHIS with audit figures for facilities in three sub-districts in Eastern Cape

Figure 2. Discrepancies between reported and audited totals by reported totals
over-reporting by 17 clients, with 14/25 over-reporting. In the larger facilities, all facilities over-reported with error ranging from 163 to 894 clients. Although there are fewer large facilities, they account for the majority of the patients and therefore account for the majority of the error in the reported TRIC data.

Interviews
Various themes emerged through the interviews and site observations related to the high degree of data error including inadequacies in: training, staffing levels, use of registers, data verification processes, and standardization with programme partners.

Training
In 33 of the 34 facilities visited, the sisters in charge of the ART programme reported that they had not received training on the completion of ART registers, data element definitions or monthly reporting requirements during their Nurse Initiated Management of Anti-Retroviral Therapy (NIMART) training. Many also reported that they had not received training on the proper way to fill in Adult Clinical Records (ACRs). The Regional Training Centre (RTC), an external service provider contracted by the ECDOH, conducts the NIMART training courses (3 days) that are intended to prepare nurses to initiate clients on ART. The training must prepare the nurses to run ART programmes in primary health care clinics that do not have regular physician-support. RTC is confident however, that training is provided on the registers and ACRs and that nurses are also mentored on these topics for six months after their trainings. The disparity between RTC’s curriculum and what the nurses report having been trained on is dramatic and requires further examination. Certainly, if the nurses are trained, there remains a low level of understanding of recording and reporting methods indicating a lack of knowledge translation from classroom to practice. Without an understanding of data management, the nurses are ill equipped to complete their non-clinical duties on which the Department of Health relies for service delivery information and decision-making. The result of this lack of understanding is that there are frequent errors in multiple ART indicators.

Comprehensive training on the use of ART registers is lacking across the province. The provincial ART programme performs sporadic in-servicing but largely depends on the four pages of instructions contained in the front of each register to guide nurses in the completion of ART registers. This dependence presumes that the nurses are willing and able to take the time to read the instructions and understand them well enough to use the registers properly. However, the instructions deal only with the ‘ideal case’, provide few examples and assume some degree of prior experience with the ART register. That is, they may be beneficial for refreshing knowledge but are insufficient as the sole source of direction.

There are NIMART mentors and clinic supervisors to assist the NIMART nurses with practical issues that arise in facilities and to provide in-services. However, the mentor and supervision programmes do not generally address data management. The mentors reported that they provide primarily clinical support.

Use of registers and statistics forms
For accurate record keeping, it is essential that all facilities have three ART registers; one for initiated patients, one for transfers-in (TFI) and one for children. Unfortunately, there are still facilities that do not have three registers, received the registers late or are using outdated registers that do not line up with reporting requirements. Facilities and sub-districts frequently complained that they have difficulty procuring registers due to a shortage of ART registers in Eastern Cape province.

In those facilities that have three ART registers, they are frequently incomplete and/or filled in incorrectly so they are not beneficial in calculating programme statistics on the monthly reports. In addition, the lack of accurate registers is affecting the quality of patient care. Blood work is not being completed according to the guidelines because the staff are not aware of how long a patient has been on treatment. Also, follow-ups for patients that have defaulted on treatment are frequently neglected because the clinic is unaware that a patient has not come for treatment as scheduled. A properly organized and complete register could prevent both of these examples of clinical mismanagement.

In addition, incomplete registers result in a situation where the clinic does not know at any given time, how many clients are active on treatment, have defaulted, have transferred to other facilities, are lost to follow-up, or have died. They are unable to track their clients over time in an efficient manner and are therefore unable to accurately compile monthly statistics forms that are captured into the DHIS. While this evaluation was primarily focused on the TRIC indicator, various indicators on the monthly input forms were also examined for accuracy based on the registers. It was found that the indicators for CD4 and viral load tests taken and results at baseline, 6, 12 and 24 months were highly inaccurate and unreliable as well as the number continuing in care for the same time periods. Patients that were lost to follow-up (LTF) (that is, had not collected their treatment for 90 days) and transfers out (TFO) were not deregistered or subtracted from the TRIC indicator, contributing to the high levels of over-reporting.

While the registers are clinical records of services delivered, in larger facilities, data capturers without clinical training or understanding of clinical terminology are often responsible for completing them. The lack of clinical supervision of this process also contributes to errors in capturing and statistics compilation.

Data verification
Before submission of the monthly statistics forms to the sub-district for capturing, the information is supposed to be compiled by a nurse and then verified by the Operational Manager (OM) or another nurse in the facility according to the Information Flow Policy (ECDOH 2012b). Statistics verifications are not being completed in facilities. The OM generally does not compare the data in any way to what is found in the registers or ACRs, signing off on the data as is. Those OMs that may verify other sections of the input forms often skip over the ART section because they lack understanding of the data elements required. Once the input form reaches the sub-district office it is captured onto the DHIS by data capturers that are also not well versed in the ART programme and are unable to recognize errors that would be apparent to someone with programme knowledge. As a result, blatant errors that could have easily been fixed in the facility make their way into the DHIS.
Staffing

In most clinics there are only one or two NIMART nurses who are allocated responsibility for tending to clients, maintaining registers and reporting statistics monthly. In some facilities, it was noted that additional NIMART trained nurses were not working with ART clients at all because they had been assigned to other units in hospitals or other programmes in clinics. Others were on shift rotations that required them to work nights, leaving the ART clinic without a NIMART nurse knowledgeable in data management.

Standardization

At present, each sub-district and most facilities have distinct interpretations of how data should be managed especially regarding the completion of registers. Different responses are given within the department regarding the ‘right way’ to manage information in the clinic and report. In addition, non-governmental organizations (NGOs) that support department clinics also have their own interpretations and recommendations. This leads to a great deal of confusion and frustration amongst already overworked programme staff and reduced confidence in completing non-clinical duties.

Discussion

Extensive and pervasive over-reporting of ART clients in care in large treatment facilities undermines confidence in the stated HIV programme achievements and accountability within the Eastern Cape. In general, larger facilities have been providing ART for a longer period of time suggesting that the longer a facility has been providing ART, the less accurate their data is. This appears to be due to:

1. The way in which the indicator is calculated
2. Poor record keeping, and
3. Inattentive reporting.

As noted, the TRIC indicator is a cumulative total, with each month’s calculation based on the last month’s result. In a cumulative indicator, if the process is biased, error will accumulate over time, as errors are carried over from month to month. Without conscientious calculation and attentive reporting, it is easier to determine the number of patients that have transferred into a facility or initiated treatment than it is to determine those that may have left. Therefore, the bias will be toward over-reporting. While the same three conditions exist in small facilities that have only recently begun to provide ART, the error margins are currently smaller due to the shorter bias accumulation time. In addition, the smaller numbers in the clinics do not affect the overall error margins to the same extent as the larger facilities based solely on patient volume. This presents an opportunity to intervene in the newer facilities to prevent them from following the same path of increasingly inaccurate reporting that is widespread in the older and larger ART units. Large facilities will also need to be audited and accurate programme statistics calculated to correct for years of error accumulation.

Though Sub District 2 (SD2) was included in the evaluation based on the expectation of better information management performance, the extensive over-reporting of its largest facility (67%) significantly altered its error margins such that its over-reporting was not significantly different from the other sub-districts. There were however differences in terms of policy enforcement and data validation in SD2’s smaller facilities that informed the qualitative assessment and policy recommendations.

The following policy changes are recommended to improve reporting in both small and large facilities:

1. Knowledge translation

The need for training on data management at the clinical level cannot be over-emphasized and policies to ensure this are essential. The national NIMART curriculum needs to be supplemented by additional non-clinical training on the filling in of ACRs and registers and the compilation of statistics. Only once nurses have been trained effectively can they be held accountable for proper recording and reporting. Additionally, provincial, district and sub-district programme management needs to be trained on proper completion of registers and statistics forms so that consistent messaging is delivered across the province at all levels on every support visit.

2. Data verification

While data verification processes have been established, their implementation and enforcement are key to preventing bad data from entering the DHIS. Data verification cannot be done in the absence of source documents. A culture of accountability and care must be developed to promote quality record keeping and accurate reporting from health facilities. In addition, understanding must be developed in data capturers of the information that they collect so that they are able to critically assess data before capturing is completed.

3. Programme management

The ART Programme has been decentralized in the Eastern Cape in order to increase client access to treatment. Internationally, the shifting of care from hospital ART clinics to PHC facilities has been recommended (WHO 2006) and its implementation has assisted in bringing services closer to the point of need (Bedelu et al. 2007). However, shifting of the workload in Eastern Cape was done without a simultaneous shift of personnel and resources. The ART programme requires lengthy and frequent client visits, the completion of multiple records and frequent reporting but lacks dedicated staff to attend to the programme requirements. Integration of the ART Programme into the PHC service package is very important and ART nurses must continue to treat non-ART clients and attend to other clinic responsibilities. Having dedicated ART nurses is not the answer to reducing workload as this can contribute to stigma in communities if a client’s HIV status can be determined based on the nurse who treats them. The health department is moving away from vertical programmes; however, creative solutions are needed to ensure that PHC facilities can handle the burden of the ART Programme. A balance must be found between service provision and good information management (Cornell et al. 2010). Further policy development to promote the strengthening of PHC facilities through infrastructure, improved staffing mix and resources would contribute to better management of all chronic diseases, not only HIV (van Rensburg-Bnthuyzen et al. 2008).
Another possible way to reduce workload is to move away from monthly client visits to bi-monthly or tri-monthly visits for clients who are stable on treatment and have demonstrated treatment adherence. This is rarely done in the Eastern Cape and its benefits and risks require further examination.

4. Standardization

The production of a NIMART manual or an ART Programme manual that includes both clinical and non-clinical responsibilities is necessary to standardize the ART programme. Without comprehensive documentation outlining the programme requirements, confusion will likely continue to persist at the facility level and data quality will continue to suffer. Non-governmental organizations would also benefit greatly from the production of such a manual as it would allow them to align with ECDOH practices and better support their identified facilities.

While policy development and enforcement are necessary, changes to policy and advancements in care provision must also be communicated comprehensively with all stakeholders, internal and external, to ensure both a high level of service provision and quality data management.

It is important that the challenges listed here be addressed so that they do not impede the implementation of the 3-TIER data management system. While the automation of statistics compilation and discontinuation of the paper-based registers may prevent some amount of error in the data, the system remains dependent on accurate client records, conscientious data capturing and appropriate interpretation of the resulting information. The 3-TIER system is not a silver bullet for improving HIV information in the Eastern Cape.

South Africa has the largest antiretroviral therapy programme in the world (WHO 2007) and has undergone a process of rapid scale up of service provision and treatment since 2004 (Cornell et al. 2010). The challenges identified within the South African system might not be generalizable, but may occur in similar public health systems in low and middle-income countries. If so, extensive over-reporting of ART treatment provision we identified is unlikely to be unique to the Eastern Cape and calls into question progress reports on international initiatives such as the Millennium Development Goals. The accuracy of information from other health programmes may also be affected by the same challenges (Mate et al. 2009) and should be examined thoroughly. Further investigation into the accuracy of routine monitoring data is needed to ensure that interventions to address the HIV epidemic are well planned, targeted and appropriately funded based on the availability of accurate and reliable information.

The limitations of this study include an inability to randomly select sub-districts for inclusion reducing overall generalizability. In addition, recording and transcription of semi-structured interviews was not possible; as such the qualitative analysis was dependent on detailed interview notes taken during and immediately following each interview. Finally, this study focused on the systems and structures relevant to information management and did not examine individual’s motivation for compliance. Further investigation is needed to fully understand what might motivate individual reporting compliance.

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