

**INTEGRATION OF HIV SERVICES INTO PRIMARY HEALTH CARE:
A HEALTH SYSTEM APPROACH IN FREE STATE SOUTH AFRICA**

by

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Abstract

Improving access to antiretroviral therapy (ART) for HIV has improved life expectancy and reduced HIV transmission. The integration or decentralisation of HIV care into primary health care (PHC) clinics is a widely promoted strategy to expand access to ART. In South Africa, a national policy to integrate HIV care into PHC services was implemented in April 2010. Comprehensive HIV care, from testing to the initiation and management of ART, was provided largely by nurses in PHC clinics. Little evidence exists on the impact of integration on: 1) patients 2) health care workers and 3) PHC clinic function and service delivery. By examining this question in Free State, South Africa through a health systems approach, I aimed to understand the benefits and challenges of integrating HIV care into PHC services.

A mixed methods approach was employed utilising quantitative (i.e. patient surveys and longitudinal analysis of administrative data across 4 years) and qualitative (i.e. key informant interviews and focus group discussions) methods. Statistical analysis included t-tests and linear regressions (patient survey data) and interrupted times series analysis and linear mixed effect modelling (longitudinal data). Qualitative data were inductively and deductively thematically coded, and applied to a health systems framework.

Concerning patients, advantages of integration were the provision of comprehensive care at PHC clinics (including HIV care), maintaining quality of care (QoC) as integration progressed, improved care across the continuum, family and community engagement. However, increased wait times, decreased QoC for chronic disease patients and concerns about retention were identified. For health care workers, despite increased workload with staff shortages, integration positively influenced job satisfaction, morale, the promotion of teamwork and mentoring. Concerning PHC service delivery, notwithstanding an increase of nearly 60, 000 patients on ART in the 131 PHC clinics in our four year study, service delivery was mostly unchanged, except for decreased immunisation coverages. In conclusion, expansion of ART through integration to PHC clinics is a viable strategy with wide health system benefits. However, care must be taken to provide adequate support for health systems to ensure the provision of equitable patient-centred PHC, especially in highly HIV prevalent contexts.

Preface

The author's contribution includes the identification and design of the research study, data collection, and the analysis of collected data. A statistician was hired for the analysis of the data in Chapter 5, and a statistician was consulted for analysis in Chapter 3. Ethics approval was obtained from the Behavioural Review Ethics Board at the University of British Columbia in Vancouver, Canada (Certificate number H11-02259) and the Health Sciences Ethics Board at the University of the Free State in Bloemfontein, South Africa (Rec reference number 230408-011, IRB number 00006240). Written permission for the study was obtained from the Head of the Free State Department of Health. No parts of this dissertation have been previously published.

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List of Abbreviations

- (AIDS) Acquired Immunodeficiency Syndrome
- (ANC) Antenatal Care
- (ART) Antiretroviral Therapy
- (ARV) Antiretroviral Drugs
- (FGD) Focus Group Discussion
- (HCW) Health Care Worker
- (HIV) Human Immunodeficiency Virus
- (ITS) Interrupted Time Series
- (KIs) Key Informants
- (KIIs) Key Informant Interviews
- (LME) Linear Mixed Effects Model
- (LMICs) Low and Middle Income Countries
- (NCDs) Non-Communicable Diseases
- (PMTCT) Prevention of Mother to Child Transmission of HIV
- (PHC) Primary Health Care
- (PYLL) Potential Years of Life Lost
- (QoC) Quality of Care
- (SwS) Satisfaction with Staff
- (SSA) Sub Saharan Africa
- (TB) Tuberculosis

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This work is dedicated to:

The people around the world struggling to access high-quality healthcare and

Mom and Dad and Brad

For a lifetime of love, support and encouragement,

Even as I choose to pursue my wildest dreams.

Chapter 1: Background, significance and rationale

1.1 Worldwide HIV/AIDS pandemic and antiretroviral therapy

In 2013, 35 million people worldwide were living with Human Immunodeficiency Virus (HIV), with 2.1 million new infections having been reported that year (1). HIV has been one of the greatest global public health challenges. By 2002, the virus had become the leading global cause of death for those between 15-49 years of age (2). Although Acquired Immune Deficiency Syndrome (AIDS)-related deaths have decreased by 30% since peaking in 2005, 1.5 million people worldwide died from HIV-related illnesses in 2013 (3). In 2011, an estimated 23.5 million infections (69% of the global HIV burden) were reported in Sub-Saharan Africa (SSA) (4), with a large number of these occurring in Southern Africa (5).

South Africa is the country with the highest number of people living with HIV in the world. With a population of 54 million (2014), it is estimated that 6.4 million people, or approximately 12.2% of the total population, were living with HIV(6). South Africa is experiencing a generalised HIV epidemic that is driven by heterosexual sex (7). Disparities in HIV prevalence exist, and are marked by racial and socio-demographic factors. This can be seen by its high prevalence among black South Africans (15.0%), that is higher than that in coloured South Africans (3.1%) and white South Africans (0.3%) (6). Furthermore, those living in informal urban areas (19.9%) (6) have one of the highest rates of prevalence. HIV has had a detrimental effect on South Africa's economic development, and has accounted for 3.4 million HIV-related deaths between 2002 and 2014 (8). The majority of these deaths were from among the most economically viable age groups (9). Although this number has decreased substantially since the peak in 2005 when HIV accounted for 50.8% of the total deaths, it accounted for 31.1% (171, 733 people) of the deaths in 2014 (8). In South Africa, much of this decrease can be attributed to the provision of antiretroviral therapy (ART), which has reduced deaths by 43% and 20% in adults and children, respectively (10), as well as increased life expectancy at birth from 52 years in 2005 to 61 years in 2014 (8).

Globally, the provision of ART has dramatically reduced HIV-related mortality rates by 90% (11) and shifted HIV from being a terminal illness to a manageable, treatable condition. Although by the mid-90s, ART had succeeded in reversing death rates in high-income countries, it was not widely available in SSA until early to mid-2000s. Treatment costs (12,13), as well as health system challenges (to be further discussed below), posed major barriers to expanding access in low and middle income countries (LMICs). Around the year 2000, with support from donor funding and the amalgamation of the global efforts of activists, multilateral organisations, pharmaceutical companies and governments, a commitment was made to reduce the price of ART (13,14). Therefore, between 2003-2006 the majority of first-line drug therapies dropped in price by 37-53% in LMICs (15) and generic drugs became available at a fraction of the price of their branded versions (16). With the increase in accessibility to ART in LMICs, HIV patient outcomes, when treated with ART in resource-poor regions (e.g. SSA), became equivalent, if not better, than that of their counterparts in higher income countries (17). This evidence highlighted the need for an urgent response to expand access to ART, especially in high HIV-burdened contexts.

1.2 Strategies and challenges to expanding access to ART within health systems

Despite a global call for “Health for All by the year 2000” that was made in at the World Health Organisation Alma Ata conference in 1978, whereby comprehensive primary health care was to be made available to populations worldwide, the reality was that widespread neglect of marginalised populations resulted in a circumstance where marginal services tended to be available to populations in need (18). In many settings, it was in this context that the initial response to expanding ART coverage in 2003 was implemented in the form of disease-specific (i.e. vertical) programmes that were supported by international funding. International funding was considered necessary in order to rapidly roll out a complex treatment schedule in the context of struggling health systems (13)(19). Major international donor support (20) for HIV-specific programmes dominated health development assistance in SSA. As such, in 2007, almost 50% of all health development assistance was for HIV (20). This level of funding at times exceeded that of entire national health budgets (21). This situation fostered a “vertical” (i.e. disease specific)

response with disease-specific reporting requirements (22), specialised training for complex treatment schedules, and the need to monitor HIV-related outcomes and spending (23). Following this strategy, a dramatic expansion of ART coverage occurred that undoubtedly would not have been possible without this turn of events (23). However in SSA, it was recognised that health systems would not easily be able to support these disease-specific programmes, which at times resulted in the creation of parallel HIV-specific components of health systems, and it was acknowledged that this situation could potentially provoke the further fracturing of already weak health systems (24).

Health systems, as defined by the World Health Organization (WHO), “*compris[e] of all the organizations, institutions and resources that are devoted to producing health actions*” (25). The goal of the health system is “*the delivery of effective preventive and curative health services to the full population, equitably and efficiently, while protecting individuals from catastrophic health care costs*” (25). Health systems are complex adaptive systems which do not operate in isolation to geo-political contexts and require innovative solutions to meet the needs of populations (26). Weaknesses in health systems create barriers to expanding access to ART (11,13,27). Specifically, weaknesses such as a lack of, and an inadequate mix of, health care workers (HCWs), insufficient infrastructure, poor referral networks, weak drug delivery systems, a deficiency in managerial capacities and poor governance (15,28–30) are especially problematic. Considering these challenges, the debate regarding how to best expand access to ART revived the discussion weighing the benefits of “horizontal” (i.e. cross system) versus vertical interventions within a health system, especially with respect to their wider influence on health systems in LMICs.

The debate regarding the merits of horizontal versus vertical programming is not new (31,32). Additionally, the debate lacks transparency as many definitions of horizontal and vertical programs exist, as well as the way that they interact with health systems (33). Horizontal approaches have also been referred to as integrated health services, and they generally speak of interventions that results in the strengthening of the health system as a whole (31). In contrast, vertical interventions, which have also been called “categorical” or “free standing” programmes,

usually refer to “stand alone” programmes with disease-specific results (34). As discussed by Atun et al. (33), there exists a false dichotomy between characterising an intervention as either purely horizontal or vertical. In fact, this challenge has led to the use of the term “diagonal”, which has been described as using a disease-specific intervention (e.g. HIV) to strengthen a general health system (34) and provide interconnected, and comprehensive care where vertical programmes have a natural overlap (e.g. maternal and child health, reproductive health, and family planning for women) (35).

The debate on whether or not the provision of HIV care via vertical systems has helped or harmed health systems has flourished in the literature for years (16)(15)(34). With HIV-specific investments came improved laboratory capacity and infrastructure, investments in human resources, increased non-HIV service utilisation, and strengthened drug delivery systems (36)(37)(38). However, concerns voiced by the global community of researchers (20,21,39) cautioned that the vertical approach exacerbated inequities between those with HIV/AIDS and those without, and that the situation has contributed to the migration of HCWs to higher paying posts that focused on HIV/AIDS (40)(41). For example, in 2008 in the vertical system in South Africa, 80% of HIV-specific new nurse posts were filled by nurses transferring from the same facility or district at a higher pay scale (42). The HCWs remaining experienced worse working conditions with an influx of demands for health services, especially in the public-sector (41). This is particularly important given the severe deficit of 2.4 million doctors and nurses in SSA. This number translates to 2 doctors per 100, 000 population compared to 19 and 32 in the Americas and Europe, respectively (43). Furthermore, although HIV-related laboratory services were expanded, they were not equitable (i.e. they were located in geographic areas prioritised by international funding partners and not where the local need was greatest) (24). This situation often resulted in duplicative referral and laboratory systems (24). The prioritisation of HIV-related services had the potential to shift the focus from other important health priorities within a health system (23) and undermined local programme ownership (20) with unknown ramifications. According to a study by Grepin et al. examining HIV-specific aid from 2003-10 in SSA (20), increased HIV-specific aid resulted in a negative association with vaccine provisions,

especially in human resource constrained settings, but did have positive effects on maternal health services. Despite differences in opinions on this debate, it became clear that the vertical approach was neither sustainable, due to duplicate health system components and the reliance of external funding, nor could it successfully reach the large numbers of people in need of treatment (44). Strengthening primary health care (PHC) focused health systems while expanding access to ART was seen as a necessary strategy (44).

As outlined in Table 1, many global strategies to expand access to ART emerged between 2003 and 2013. These strategies have sought to improve health outcomes for those with HIV by improving timely access to ART while working within the constraints of health systems. Three main changes occurred across this decade, namely, changes in: 1) clinical eligibility for ART initiation 2) the number of people in need of ART and 3) operational protocols that were streamlined with shifts towards integration into PHC.

Firstly, the WHO's recommendations for eligibility to begin antiretroviral drug therapy (i.e. based on CD4 cell count criterion) changed considerably. In 2006, those with a CD4 test result of below 200 cells/ μ L were recommended for the initiation of treatment. The guidelines were revised as a result of increasing evidence that earlier treatment reduced HIV-related morbidity and mortality (45) and increased the likelihood of patients being retained in care (46). By 2010, the WHO guidelines for initiating people with HIV on treatment was set at 350 CD4 cells/ μ L or less, and the immediate initiation of treatment was recommended for those co-infected with tuberculosis or hepatitis B, irrespective of CD4 cell count. As further evidence surfaced regarding earlier treatment initiations increasing life expectancy, reducing the risk of transmission of HIV, and allowing those with HIV-infection to lead healthier lives (47–49), in 2013 the guidelines were amended with the recommendation that all patients whose CD4 count fell below 500 cells/ μ L were to begin on treatment (50). Furthermore, the 2013 recommendations also included treatment, regardless of CD4 cell count, for all HIV-positive children under 5 years old, as well as all pregnant and breastfeeding women. The WHO estimated that by 2025, the change in guidelines, if implemented, could prevent 3.5 million new infections and 3 million deaths (51).

Secondly, the aforementioned changes in ART eligibility criteria resulted in an increased number of people in need of treatment and revealed gaps in coverage. In 2003, ART coverage encompassed merely 7% of the 5.9 million people in need globally, and an even lower percentage in Africa, with only 2% of the 4.4 million in need of treatment (52). The 2010 guidelines increased the number of HIV patients eligible for treatment from 10 to 15 million globally while the number of people living with HIV was increasing due to reduced mortality rates relative to the incidence (53). In countries such as South Africa, the implementation of the 2010 guidelines resulted in an increase from 1.7 million to 2.5 million adults in need of treatment (15)(54). By the end of 2012, a total of 10.6 million people were receiving ART worldwide (48). With the recommended increase in CD4 threshold for ART initiation according to the 2013 guidelines, an estimated 28.6 million people worldwide were in need of ART, 21.2 million of whom resided in Africa (55). For South Africa, this translated to an additional 1.6 to 2 million people eligible for ART (56). These figures further highlighted geographical differences in the need for coverage. Additionally, only 24% of eligible children were receiving ART (1). As of June 2014, 13.6 million people have accessed ART globally (1). However, with large numbers of new infections each year in countries like South Africa and existing gaps in coverage (6), innovative, streamlined strategies are needed in order to continue to expand ART.

Thirdly, changes in the operationalisation of HIV treatment and care while working within health system constraints has allowed for the development of alternative models of human resource requirements and drug delivery systems (51). Streamlining and simplifying operational protocols has paved the way for task-shifting or sharing essential components of HIV care from doctors to a combination of nurses and community health workers (57). With evidence that outcomes were comparable in patients managed by, or initiated by, nurses compared with doctors (58,59), ART could be expanded utilising alternative models of care that were less physician-dependent. Additionally, streamlined drug regimens for simplified first-line treatment resulted in less side effects and drug interactions, and simplified drug delivery allowed for the task-shifting of dispensation to pharmacy assistants and community health workers (60). These factors facilitated the provision of HIV treatment and care closer to patients' homes, thus

increasing accessibility. In fact, a decreased probability of ART initiation exists at 3% per km from health facilities (61). Furthermore, adults and children accessing treatment near their homes were more likely to remain in care across the continuum (62,63). The integration of HIV care into PHC clinics was thought to capitalise on existing and HIV-specific resources for the broader health benefits of the general population, improve geographic accessibility to ART, and mobilise communities (49). However, integration is a very broad concept with many different definitions, and there is little evidence regarding “how” to best implement the integration of health services (33)(64).

Table 1. Global strategies to expanding antiretroviral therapy, 2003 to 2013

Year	WHO CD4 guidelines cells/ μ l	Initiative (Target Date)	Guiding Principles	Specific to ART decentralisation /operationalization	People in need of ART
2003	---	<i>Public Health Approach</i>	<ul style="list-style-type: none"> -Simplification of treatment protocols -Integration of management of adult and childhood illnesses -Task-shifting 	-Decentralisation of treatment to primary care	5.9 million
		<i>3 by 5 (2005)</i>	<ul style="list-style-type: none"> -Implementation of global leadership, partnerships and advocacy -Urgent, sustained country support -simplification/standardisation of tools for ART delivery -Provision of effective and continuous medication supplies and diagnostics -Identification and reapplication of new knowledge 	-Delivery at facility level via validated operational models	5.9 million
2006	<200	<i>Universal Access (2009)</i>	<ul style="list-style-type: none"> -Increasing voluntary testing and counselling -Prevention activities in health care setting -Prevention of mother to child transmission -Treatment, care and support -Strengthening of health system -Use of evidence to guide scale-up 	-Decentralisation of care to the facility level and integration of HIV care with other priority health concerns to promote community-based and family-based care	10 million
2010	<350 and those w/ tuberculosis and hepatitis C	<i>Treatment 2.0</i>	<ul style="list-style-type: none"> -Optimisation of drug regimens -Point-of-care diagnostics -Reduction of costs -Mobilisation of communities -Adaptation of drug delivery systems 	<ul style="list-style-type: none"> -Decentralisation and building of communities -Leveraging health system capacities -Strengthening chronic care 	15 million
2013	<500 and children under 5 and breastfeeding and pregnant women, HIV positive partners in sero-discordant couples, those w/ tuberculosis and Hepatitis B	<i>Consolidated Guidelines on the Use of ARV Drugs for Treating and Preventing HIV Infection</i>	<ul style="list-style-type: none"> -Community-based testing and counselling with linkage to care -Use of mobile phone technology for adherence support -Task shifting -Dispensing of ART by community health workers between visits 	<ul style="list-style-type: none"> -Initiation and maintenance of ART by non-physician health workers at peripheral level health centres -Integration and decentralisation of service delivery to primary health care 	28.6 million

Integration of health services and primary health care

Currently, a common conceptual understanding of the elements of integration does not exist (65). The term “integration” has been employed in various ways including reference to: a) how integration is conducted at the point of delivery b) the integration of 2 programmes (e.g. child immunisation programme with prevention of maternal to child transmission of HIV, or HIV and tuberculosis), and c) the integration of governance. Atun et al. (33) defines integration as “*the extent, pattern, and rate of adoption and eventual assimilation of health interventions into each of the critical functions of a health system.*” As discussed by the authors, the urgency of specific public health problems may require a rapid response with minimal integration into an overall health system. As the problem becomes more controlled however, integration can eventually occur (66). Other definitions and terminologies exist, and these capture elements of integration such as co-location (i.e. placing two services, which were once provided separately, in the same space), decentralisation (i.e. providing local authority for health services) and mainstreaming (i.e. providing services as part of the package of care at PHC facilities). However, the WHO and many others have noted there is a weak empirical evidence base regarding integration, and that the current research focus within the literature is on binary integration (e.g. integrating family planning or reproductive health or tuberculosis with HIV), with little evidence being provided with respect to PHC and HIV care integration (40,45,58,59). Specifically, there is scant evidence on the wider impact on PHC (64,70) resulting from integration of HIV care.

While a global commitment was made to the revitalisation of PHC in the historically-important 1978 Alma Ata, Kazakhstan conference (71), funding and the prioritisation of PHC did not align (64). As such, a shift towards disease-specific, easily measurable programmes dominated the health development agendas for the following 20 years. PHC has been defined using both a broad definition (i.e. mobilisation of societies towards health with a focuses on solidarity, equity and participation) (72) and a narrow one (i.e. first point of contact in a health system, a.k.a. primary care) (13). For the purposes of this discussion, the following definition of PHC is used provided by Stender et al. (24): “*Primary Health Care is a comprehensive multi-disciplinary health system approach to ensuring patient-centred care, extending from community*

to clinics, with an emphasis on equitable access to essential services close to where people live.”

Despite the need for PHC to be patient-centred (i.e. viewing PHC from the patient perspective rather than a service delivery vantage point) (24), the effects of integrated HIV care in PHC on patients from multiple perspectives in a health system, including patients, are largely underrepresented in the current evidence base.

Effect of integration on patients

Current evidence suggests that there are many advantages for patients with the integration of HIV care into PHC services in SSA. Integration has resulted in the provision of comprehensive care within one clinic (73), decreased HIV-related mortality (74), reduced referrals (75), improved access to care and improved quality of care (74) and improved retention in care for HIV patients (76,77), although the evidence on retention is mixed (78,79). However, few studies have examined the perspectives of patients on integration with respect to quality of care. Quality of care is an important determinant of patient satisfaction, and it influences health service utilisation, adherence, and patient-provider relationships (27,80,81).

A study in Zambia (67) of patients' perceptions of integrated care found that vertical models were potentially stigmatising but allowed patients to network and support each other, while integrated models increased equity between HIV and non-HIV patients but did not adequately protect confidentiality. In a study in Soweto, South Africa (82), HIV patients who had been referred to local clinics once stable, reported reduced transport time and cost but also lack of specialised and doctor care, poor services, incidences of mistreatment by the staff, self-perceived stigma and a lack of confidentiality at the clinic. A study (73) in Swaziland of HIV patients' perspectives of integrated HIV and sexual/reproductive health services found satisfaction was highest in the vertical model when compared with partially integrated or fully integrated service delivery systems. A study in Kenya (80) regarding the satisfaction levels of HIV patients and their perceived stigmatisation in integrated health centres at a sub-district hospital showed a decrease in satisfaction in the first 3-months post-integration, but by 12 months post-integration, satisfaction with services had increased. System-level positive effects

regarding the integration of HIV care into PHC have been identified (78,83,84), and potential benefits to patients such as improved access to care have been noted. However whether the reorganisation of health service delivery in contexts with staff shortages disrupts service provision or leads to reduced patient satisfaction has not been well researched (23,27,85).

Effect of integration on health care workers

The health care workforce is an essential component of any health system, and retaining HCWs in resource-constrained contexts is especially challenging. Factors related to public-sector nurse retention include job satisfaction, workload, safety, availability of occupational resources, work hours and salaries (86). HCW job satisfaction has been shown to be an important determinant of productivity and clinical outcomes for patients (86).

Integration has resulted in many advantages for HCWs, both directly and indirectly through investments that have increased efficiencies. In integrated PHC settings, improvements in drug supply chains, diagnostic services, monitoring and data management, staff training, mentoring, supervision, support and infrastructure have been noted (67,76,83,84,87,88). In a study conducted in Zambia (67), integration of HIV care into PHC (defined as the amalgamation of physical space and patient flow, standardisation of records and forms, and the introduction of provider initiated HIV testing and counseling) resulted in the more efficient use and a more equitable distribution of space and staff. Integration also improved staff morale, provided a sense of teamwork and resulted in a reduction of administrative responsibilities leading to standardised service delivery. However, the authors caution that integration is not a solution for overall staff shortages. Major challenges to integration exist, including inadequate human resources, lack of managerial capacity and infrastructure, and inadequate laboratory services (65,76,83). Although PHC clinics where HIV care was integrated in Kwa-Zulu Natal, South Africa had better infrastructure and human resources compared to non-integrated clinics, concerns exist regarding whether deficiencies in reporting structures, physical space, and human resources in PHC clinics would hinder the provision of high-quality integrated care (85).

Nurse-initiated management of ART (NIMART) has been an essential strategy to enable integration into PHC clinics in South Africa (58,89). NIMART, which began in April 2010, involved training nurses regarding the management of HIV care within PHC settings (75). However, whether the addition of HIV care to an overstretched PHC system negatively or positively impacts staff remains to be seen (83), especially from the perspectives of HCWs. Of the evidence that captures HCWs perspectives, one study examined the factors that influenced various models of integration in South Africa (87). Nurses' desires to treat HIV and address patients' concerns around increased stigma in a vertical system fostered integration, while challenges included nurses' preferences for being specialised in a specific area of PHC, the vertical nature of reporting structures, lack of support staff at the clinic level, and high workloads. In another study in South Africa (90), nurses and managers reported feeling empowered by the provision of ART and reported how integration facilitated creative problem solving and teamwork. However, staff shortages and the pressure to balance quality care with increasing patient numbers were also reported. They also felt that the way in that it had been implemented undermined the ability to build long term capacity at the clinic level. Further evidence is needed to capture the perspectives of a wider range of HCWs, in addition to those of nurses and managers, in integrated PHC settings as integration progresses. This would serve to better identify the places where PHC capacity can be built and how staff could be further supported so as to ensure that no compromises are made in the provision of PHC.

Effect of integration on primary health care service delivery

Given the lack of resources and capacity within public-sector health systems, there is fairly weak evidence as to whether or not integration of HIV care into PHC clinics influences PHC service delivery (64,91,92). This is complicated by the persistence of poorly designed studies with low quality of data (64). As such, there exists a need for longitudinal studies that allow for the easy comparison of outcomes (64). Additionally, much of the evidence examining non-HIV services has been heavily focused on outcomes related to the integration of tuberculosis (93,94), sexual/reproductive health and maternal/child health with HIV (95), and the studies have been conducted in low-income countries with large investments from international donors

(38,88,95). Advantages of integration in PHC settings have been seen in Rwanda (88), where increases in preventative services related to reproductive health and antenatal care, as well as increases in non-HIV services within six months after integration in PHC were both noted. However, the impact from ART provision was not specifically measured as integration in this context was defined as the provision of voluntary HIV testing and counselling, cotrimoxazole, and the prevention of mother-to-child transmission of HIV services within the PHC clinics, and only nine of the 30 clinics in the study offered ART. Matsubayashi et al. (95) found an increase in non-HIV service utilisation, namely increased immunisations, laboratory testing and diagnosis related to tuberculosis and malaria after the international donor supported integration of HIV care into PHC in six urban clinics in Uganda. This was demonstrated by increased provision of care, testing and diagnoses in these areas. Integration in this context was defined by expanded HIV and tuberculosis (TB) programmes, management training and salary supplements for staff, improved infrastructure and improvements in laboratory function and drug supply chains. Pfeiffer and colleagues conducted a study in two provinces in Mozambique (83) that identified improved PHC infrastructure, investments in the health workforce, and supervision resulting from integration as factors that could benefit broader PHC programmes. Integration in this context was defined by the provision of ART and the integration of HIV and antenatal care services, strengthened laboratory and referral systems, improved district level management and staff training and improved HIV testing in TB wards. With the recognition that HIV can be managed within PHC systems, it has been noted that HIV care shares more in common with chronic disease models, and HIV care can be leveraged to address upcoming non-communicable disease epidemics while ensuring quality PHC (27,83,96). This is an especially important strategy for contexts where a large proportion of the population is HIV-infected, such as in South Africa.

1.3 South Africa

1.3.1 Health needs of the population and current health system challenges

As South Africa entered its first decade of existence as a majority-rule state, the health system was faced with the requirement to respond to the complex needs of the population.

HIV/AIDS has dramatically shifted health service utilisation patterns in South Africa. The total number of people living with HIV/AIDS increased from 4.09 million in 2002 to 5.51 million in 2014 (8). Therefore, health care was needed for populations who would otherwise be relatively healthy (i.e. young adults and children) and were now more vulnerable to opportunistic infections. South Africa is in a unique position in SSA where domestic expenditure currently accounts for over 80% of spending for ART (54) but HIV is not the only priority for the health system to address. The four leading causes of potential years of life lost (PYLL) in 2011 included tuberculosis (15.1%), HIV/AIDS (13.8%), lower respiratory infections (10.5%) and diarrhoeal diseases (6.4%). These statistics demonstrated the large role HIV plays in contributing to PYLL (97). However, these are not the only contributors to PYLL. When examining the top ten leading causes of PYLL across South Africa, other priorities exist for the health system to address including PYLL for cerebrovascular diseases (5.1%), ischaemic heart disease (3.6%), diabetes (2.4%), road injuries (2.2%), interpersonal violence (2.1%) and hypertensive heart disease (2.1%) (97). In 2010, four priority areas were identified in what has been termed the “quadruple burden of disease” in South Africa: 1) maternal, women and child health, 2) HIV and TB, 3) chronic, non-communicable disease, as well as 4) violence and injury (98). These multiple disease burdens place unprecedented strain on the public-sector health system and have necessitated complex health system responses to these “colliding epidemics” (99).

Firstly, South Africa has been ranked one of only a dozen countries globally that experienced an increase in child mortality rates and its maternal mortality ratio subsequent to the baseline measurement for the Millennium Development Goals (MDGs) in 1990. This has been largely due to HIV (100). HIV/AIDS is the leading cause of death for mothers and children (100), with an antenatal HIV prevalence of 29.5% (2012) and women aged 30-34 having the highest prevalence of any age or gender group at 42.8% (101). Although 81.6% of the antenatal clients who tested positive for HIV at the public-sector facilities were initiated on ART in 2012, this is below the national target of 85% (97). Postnatal feeding support is also low, with only 8% of women exclusively breastfeeding in the first 6 months after their child’s birth (10). Calls have been made to expand and integrate all prevention of mother to child transmission of HIV

(PMTCT) services and almost full coverage (98%) of ART prophylaxis for HIV positive pregnant women has been achieved. However, challenges remain, especially in places where the health system could be more responsive, as discussed below.

Many health system-related factors have contributed to poorer health outcomes for mothers and children. Chopra et al. (100) have pointed to poor quality clinical care, administrative shortcomings and what the authors term as “avoidable factors within the community” (e.g. inadequate antenatal care, delay in seeking care during labour or not recognising the gravity of an illness). Additionally, they note the importance of addressing the social determinants of poverty and inadequate environmental conditions. The authors discuss the assessment of audits in South Africa that evaluated the direct causes of mortality from 2005-2007 where 30% of maternal deaths were linked to modifiable health systems factors (e.g. lack of blood for transfusions, lack of transport etc.), and 58% were related to actions of HCWs at the primary health care level (e.g. not following standardised protocols). Concerning child deaths, the authors estimate that 22% of modifiable factors were related to administrative actions (e.g. inadequate availability of senior physicians or nurses and scarce paediatric beds) and 53% of modifiable factors were related to HCW actions (e.g. poor assessment in clinics and lack of integrated management). The current health system faces additional burdens from both HIV and TB.

Secondly, the twin epidemics of HIV/AIDS and TB have resulted in a heavy burden on the health system. With merely 0.7% of the world’s population but 17% of the global HIV burden (102), South Africa is one of the most highly HIV-affected countries. Furthermore, with a 400% increase in new TB infections in the previous 15 years, South Africa has the 3rd highest TB burden in the world (103). The TB incidence rate is also one of the highest in the world at 1000 per 100 000 people (2013) (104) compared to 10 per 100 000 people in parts of the Americas and Western Europe. However, the average tuberculosis cure rate is 75.8% (2012), which is below the government target of 80%, and the WHO target of 85% (97). High interrelations exist between HIV and TB, with over 50% of new TB cases occurring in HIV positive patients, and undiagnosed TB is the main cause of death among HIV-positive patients (104). Additionally,

over 70% of TB patients are co-infected with HIV (103). Despite the interrelationship of the two diseases, health systems do not adequately respond to the needs of co-infected patients (102,105).

The health system challenges related to HIV and TB are numerous. Shortages of staff have been well documented (27,42,106) and it is estimated that it would require tripling the number of HCWs to provide adequate care for those who are HIV infected (106). Additionally, as discussed by Karim et al. (102), disparities exist between retention and adherence rates for ART and TB treatment, with much higher defaulters in tuberculosis care due to differences in patient education provided and lack of staff. Another identified challenge is the lack of diagnostic capacity (107) to successfully identify and treat Multidrug Resistant (MDR) and Extremely Drug Resistant (XDR) TB. Additionally, HIV and TB have separate provincial and national coordinating and reporting systems, thus leading to governance challenges. In order to achieve control of HIV and TB, the integration and coordination of these programmes must occur at the PHC level (108).

Thirdly, chronic, non-communicable diseases (NCDs) account for 37% of all-cause mortality and 16% of disability adjusted life years lost in 2011 (109), and recent trends indicate that the burden from NCDs is increasing (98). Ischaemic heart disease and stroke each account for approximately 6.5% of all deaths, while diabetes and chronic obstructive pulmonary disease (COPD) account for around 2.5% (107). Data are limited with respect to objectively defined measures for these diseases, but self-reported prevalence in adults over 50 years old (2008) has been found to be 30.3% for hypertension, and as high as 63.8% in women. This same survey found that 9.2% of adults self-reported having been diagnosed with diabetes (110). Risk factors for diabetes include lifestyle transitions, where increased consumption of processed food and inactivity are considered determinants of obesity, which in turn is a determinant of NCDs. Much like with HIV, socio-demographic determinants increase the risks for those who are poor and urban dwellers. As such, poor, urban dwellers are at higher risk for NCDs as a result of structural factors (110). The government has committed to reducing premature deaths from NCDs by 25% and increasing the proportion of people receiving treatment for hypertension and diabetes by

30%, while also addressing upstream factors such as obesity and diet (98). Nevertheless, health system challenges remain.

Health system challenges for NCD response overlap greatly with many other health service needs. The current NCD strategy is heavily focused on the provision of treatment, with minimal attention to prevention (107) and screening (98) at PHC clinics. PHC clinics are ill-equipped to handle NCDs due to staff shortages and lack of skills, especially in rural areas where the social determinants of these conditions are also prevalent (111). Disease surveillance systems for these conditions are also inadequate (111). With increased life expectancy among HIV infected individuals from the expanded provision of ART, as well as the intensifying disease burden from NCDs, which are expected to increase and reach unprecedented levels, strong PHC-based health systems would be required to respond to the needs of the population (98).

Fourthly, the incidence of violence and injuries in South Africa is nearly double the global average (112). Although the majority of these are not treated within the PHC context as they require higher level trauma centres and emergency services, there is an opportunity to address some of the determinants such as alcohol use or mental health disorders within the PHC setting. However, a lack of staff, training and supervision of mental health disorders have all been identified as barriers to addressing these determinants at the PHC level (113).

1.3.2 The national response to HIV

Given the complex health needs of the population, and with HIV contributing largely to the disease burden, South Africa's HIV response began its implementation slowly. The effects of both colonialism and apartheid have left a legacy of a fractured public health system, with large disparities in service provision across racial, class and geographic lines (114). This situation continues to perpetuate inequities in the social determinants of health for specific populations (114) with income disparities between the rich and the poor some of the worst in the world (115). With the election of the first fully democratic government under the newly elected President Mandela in 1994, the strategy to combat HIV was focused primarily on prevention (116). In the

late 1990s however, the government's response to HIV was characterised by litigation, inaction, and denial, as well as a lack of political commitment and funding despite scientific evidence supporting the need (7,102). By 1999, the government perpetuated AIDS denialist theories, which resulted in clashes with the scientific community and the public regarding the causes of AIDS, the safety of treatment options and the efficacy of alternative treatments (102). As a result of pressure from patient activist groups, clinicians, researchers and the international community over the next 4 years, the South African government finally committed to moving forward with strategies to provide publically-funded ART via a dramatic policy change in 2003 (117). This delay in providing access to ART is estimated to have resulted in the deaths of approximately 330 000 HIV-positive South Africans between 2000 and 2003 (102).

In 2003, the *Operational Plan for Comprehensive HIV and AIDS Care, Management, Treatment and Support for South Africa* (118) introduced a vertical approach to ART provision, limiting HIV care to nationally accredited antiretroviral (ARV) sites. This plan resulted in increasing budgets for HIV treatment and care and decreasing budgets for HIV prevention (7). In 2007, the *HIV & AIDS and STI Strategic Plan for South Africa 2007-2011* (119) announced the aim of reducing new infections by 50% and expanding access to HIV treatment, care and support to 80% of the people who needed it. The plan described two main strategies through which to expand access to HIV care: the integration of HIV care into all PHC services, and task-shifting ART initiation from doctors to PHC nurses and HIV testing to lay counsellors. The plan provided no detail on how the aims were to be achieved, and consequently the integration of HIV care into PHC or task shifting did not occur. Therefore the provision of ART remained primarily the responsibility of the 362 (2008) vertically structured ART sites (117).

April 2010 marked a critical juncture in the South African approach to providing ART by the commencement of the implementation of a policy to integrate HIV care into PHC clinics and a national HIV testing campaign. In 2010, 2.4 million people (120) were in need of ART and the integration of HIV care into PHC clinics was critical to expanding access to ART. In this context, integration refers to patients being able to access comprehensive HIV care (i.e. from prevention, to treatment initiation, to follow-up) at public-sector PHC clinics. This has also been

referred to as “mainstreaming” (74). In practice, integration into clinic settings has been diverse; ranging from disease-specific nurses and consultation rooms in the same clinics (i.e. co-location), to each nurse providing comprehensive care in one consultation room. Also in 2010, the government launched the largest campaign in the world for HIV testing and counselling. This campaign aimed to test 15 million people by June 2011, and also provided screening for tuberculosis, diabetes, and hypertension. It also announced an ambitious plan to roll out ART to all PHC clinics through nurse initiation and management of ART (NIMART), and put in place funding and training to implement both the new HIV testing campaign and the NIMART programme. The policy emphasised that patients who were identified as having TB, HIV, hypertension or diabetes were to be linked to their nearest PHC clinics where a nurse could provide them with comprehensive care (10). By 2011, 13 million people had been tested for HIV and over 650,000 people had been newly initiated on ART compared to 2010, bringing the total to 1.6 million people in South Africa having access to ART. However, it was noted that there were gaps in linking those who were identified in the testing campaign as needing care for HIV, TB, hypertension, or diabetes to continued prevention and care services in PHC clinics.

As of 2011, the targets of a 50% reduction in new HIV infections and 80% ART coverage have not been met (121). In December 2011, the *National Strategic Plan on HIV, STIs and TB 2012-2016* (103) affirmed the need for a combined HIV and TB strategy. This strategy highlighted the interconnectedness of HIV and TB and called for the integration of chronic care patients and HIV and tuberculosis patients into PHC clinics to ensure greater efficiency and to reduce burdens on patients. It also called for expanding clinic hours to include weekends and to streamline registries to eliminate vertical reporting structures. Lastly, a strategy was announced to re-engineer PHC through multi-skilled teams with a focus on community-based care.

1.3.3 Primary health care

Many factors have influenced the South African government’s capacity to provide adequate PHC services to the population. The legacy of the apartheid, coupled with macro-economic pro-privatisation policies, have resulted in a population with large socio-economic

disparities and a diversion of resources away from investing in the public-sector health system (114). However, within this context, the country committed to implementing free, community based PHC in 1994, as discussed below.

The first declaration of free health services in South Africa (1994) focused on a PHC approach wherein specialist-based hospital care was shifted to community-based PHC, resulting in the birth of the district health system (122). Theoretically, this decentralisation allowed the health system to address more of the local health needs with a focus on equity in service provision. However, local autonomy regarding health decisions and resource allocation were lacking (123). Additionally, the prioritisation of disease-specific programmes had resulted in the underdevelopment of district-based primary health care systems (124). Reorientation towards PHC and the revitalisation of the health system followed with increased per capita expenditures on PHC and strengthened district management (122). In 2001, the first package for PHC (125) was introduced. This package focused on integrated PHC, defined by the provision of all basic services at primary health care clinics. These were to be complemented at various levels of the health system ranging from mobile clinics, community health centres, to district hospitals. These services were to be rendered according to a team-based approach by nurses (e.g. professional, enrolled, assistant and PHC nurses), support staff, visiting medical officers and visiting specialists. All cadres were to be supported by community-based health workers (e.g. community health workers, health promoters and social workers). Despite variations between and within provinces, successes included improved quality of care, access to, and availability of “new” services such as ART, increased clinic supervision and outreach visits, availability of essential drugs, training of nurses and the increased allocation of financial resources to PHC (122). However, challenges related to HCW shortages, as characterised by high staff turnover rates, were identified both in number and skills mix of staff, as well as with respect to the difficulty in recruiting and retaining staff (122). Infrastructure problems, namely lack of space, outdated clinics and equipment, and poor roads were also identified as challenges (122). Furthermore, inadequate budgets, referral systems from district hospitals, along with patients bypassing PHC facilities for care and a lack of health promotion and prevention were also noted (122). In 2010, a revised PHC package and set of norms was introduced. This focused on the need for adequate

resources (i.e. financial, infrastructure and human), inter-sectoral collaboration, on-going monitoring and evaluation, disease prevention activities, efficient referral systems between all levels of the health system and a flexible package of services to meet local needs (122). With the largest public-sector ART programme in the world, the integration into PHC clinics became a necessity in order to reach the number of people in need of ART and to provide them with life-long care.

1.3.4 The Free State province: expansion of ART through the public sector

The Free State province is centrally located in South Africa. It has a population of 2.8 million people- 5.2% of the total South African population (109). Economic activities are largely agricultural and mining, and it encompasses 2 former homelands from the previous apartheid structure (126). Males have an average life expectancy of 50.7 years, whereas for females it is 53.6 years (2014). This is lower than the national figures that are at 59.1 years and 63.1 years respectively (8). With regard to the burden of disease in 2009 (102), the largest contributors to percentage of PYLL were: maternal, perinatal and nutrition causes was 37.7%, HIV and tuberculosis was 25.5%, non-communicable disease was 29.0 %, and injuries was 7.7%. The HIV prevalence among adults aged 15-49 years old is the third highest in the country at 20.4% (2012) (127), and the antenatal HIV prevalence is 32.0% (101). The Free State province has the highest HIV prevalence in the country among people who are 50 years old and older, at 13.9% in 2012 (6). At the end of 2012, there were 124 221 adults and 2 384 children (under 15 years old) receiving ART through the public-sector system (109). In 2012, the province spent 61.1% of district health service expenditures on PHC. This number is higher than the national average of 52.6% (109). Health care services for women and children vary significantly, with a high immunisation coverage under 1 year old (95.1% in 2012), but defaulters between the 1st and 3rd measles vaccine are higher (6.8%) than the national average (6.3%) in 2012 (109). Just over half of antenatal clients seek care before 20 week of pregnancy, and almost 40% of couples are protected against pregnancy through contraception or sterilisation (109). The incidence of tuberculosis is 724 per 100 000, which is lower than the national average. The TB cure rate is

73.5%, which is below the government target of 80% (97). Lastly, the pulmonary TB case finding index is slightly higher (2.7%) than the national average (2.4%) (97).

Provincial response to HIV

In 2004, the provision of ART through the public-sector health system began as a vertical programme with nurse-run ARV assessment sites located within existing PHC clinics, and doctor-led ARV treatment sites located in district hospitals where patients were initiated on ARVs. Those not yet eligible for treatment were instructed to return every 6-12 months for repeat blood tests and TB screening. This process was associated with a high 12 month mortality at 53% while waiting for treatment (128). In mid-2007, there were 57 treatment and assessment sites in the province, with less than 25% of PHC clinics having the capacity to offer ART (129). Gaps were identified in ART coverage and it was found that those who were most economically impoverished were not accessing treatment (130). By mid-2008, only 25% of patients in the province who were eligible for ART were receiving it. This was much lower than the national average of 40% (131). From 2007-2010 the Free State was the site of a randomised controlled trial called Streamlining Tasks and Roles to Expand Treatment and Care for HIV (STRETCH) that piloted NIMART and the integration of HIV care into primary care from 2008 to 2010 (58). This trial demonstrated that ART managed by nurses in PHC clinics was safe and beneficial for patients and resulted in a national policy change promoting NIMART in PHC clinics. At the inception of the expansion of NIMART into PHC clinics in April of 2010, staff were added to PHC clinics prior to integration (e.g. pharmacy assistants and data entry clerks). Additionally, professional nurses were trained in the comprehensive management of HIV patients via the Practical Approach to Lung Health in South Africa (PALSA plus) guidelines (132). Where possible, the Free State Department of Health (FSDOH) attempted to remedy space concerns via modular structures and pharmacy renovations. By April 2013, the FSDOH reported that comprehensive HIV care had been integrated at over 90% of the 226 PHC clinics.

1.4 Objectives of the research

1.4.1 Aims

The aim of this research is to understand the ways that the implementation of the policy of integrating comprehensive HIV care into PHC clinics (defined as the ability to initiate and manage a patient on ART at that clinic) impacts patients, health care workers, and PHC service delivery. At the same time, this study also endeavours to better understand this aim within the context of key elements of health systems. Free State province in South Africa was chosen as the setting for this study because it was the site of an established research collaboration, as well as the pilot site for the nurse-initiated management of ART. As such, there existed an opportunity to document changes as the policy was implemented. Additionally, with a decrease in global financing for HIV, and the need to increase national autonomy with respect to HIV programmes, the Free State province had experienced minimal involvement from international donors and as such, provided us with a unique opportunity to document a nationally financed strategy to expand access to ART via PHC clinics.

1.4.2 Objectives

The three main objectives of this study are to:

1. Understand the effects of the integration of HIV care into PHC services on patients attending PHC clinics, both before and after integration, and over time after integration was implemented.
2. Understand the effects of the integration on HCWs at PHC clinics, with a comparison of their situations both before and after integration.
3. Assess the impact of integration on PHC service delivery before and after integration.

1.4.3 Hypotheses

The overall hypothesis of this study is that the integration of HIV care into PHC services would introduce both positive and negative effects on patients, health workers, and the delivery of PHC services in public-sector PHC clinics.

Hypothesis 1: In comparison with pre-integration, integrated HIV care at PHC clinics would result in advantages for patients, but quality of care in the post-integration context would be reduced from Year 1 to Year 2 as a result of the increased HIV-related workloads at PHC clinics.

Hypothesis 2: Health care workers would hold diverse views regarding integration when they compare pre and post-integration situations.

Hypothesis 3: The integration of HIV care in PHC would result in the deterioration of PHC service provision at PHC clinics when pre versus post-integration scenarios are compared.

1.4.4 Conceptual framework

As seen in Figure 1, the framework underpinning this study is an adaptation of the health systems performance framework that was developed by Kruk and Freedman in 2008 (133) to analyse health systems in LMICs. The framework focuses on three main dimensions of health system performance: 1) Effectiveness 2) Equity and 3) Efficiency. In this adaptation of the Kruk-Freedman model, the policy to integrate comprehensive HIV care into the PHC level of the health system, and specifically at the PHC clinics, constitutes the key input area under review, recognising that “policy” itself is complementary to “organisational” and “funding / financing” considerations in health system analysis. We chose specifically to examine the implementation of the policy to integrate HIV care into PHC clinics as the implementation occurred with no additional funding allocation or universal organisational changes.

Kruk and Freedman define effectiveness as “*access to the full array of needed services, efficacious and safe care leading to improvement in health, continuity of care and respect.*” Outputs/process indicators related to this domain include access to care and quality of care. Access to care was further delineated to include availability, timeliness and utilisation. This study evaluated quality of care based on efficacy, continuity of care, holistic treatment of patients, confidentiality, psychosocial support and health education, with a specific emphasis on the quality of primary health care programmes. The outcome/impact in this domain is measured by health status improvement and patient satisfaction, and this study focused on the quality of the

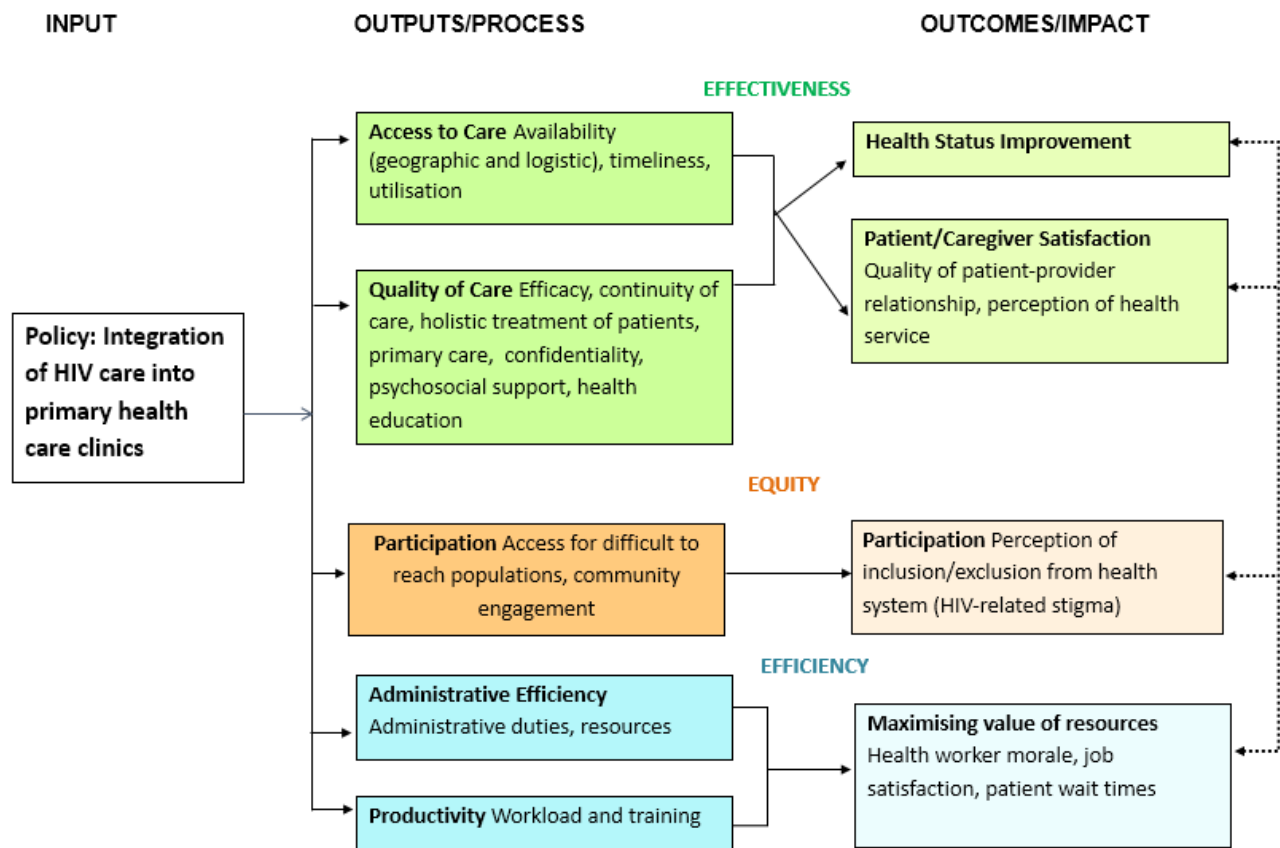
health care worker-patient relationship and patients' and caregivers' perceptions regarding services.

Equity, as defined by the WHO, is “*the absence of avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically*” (134). This study focused on the impact/outcome of the inclusion/exclusion in the health system, specifically with respect to HIV-related stigma as it is connected to participation in the health system. Additionally, the study focused on access to services for difficult-to-reach populations and community engagement.

Efficiency was defined by Kruk and Freedman as “*extracting the greatest health gains from a set of inputs.*” This study focused on administrative efficiency and productivity. In addition to the commonly-used definition of administrative efficiency related to maximising financial resources, the authors discuss the importance of the maximum value for the HCWs' and patients' time. They discuss poor management and financial resources as being related to health worker attrition rates and reduced quality and demand of, and for, services. This study focused on the outputs/process of productivity as it relates to workload and training for HCWs. Administrative efficiency includes output/process indicators such as administrative duties and adequate resources for service provision (e.g. supplies and financial). All these have direct impacts on patient wait times, HCW morale and job satisfaction.

The dashed line seen in Figure 1 has been added in this adaptation of the Kruk-Freedman framework to indicate the interrelated nature of the framework and underscore the interplay between health status improvement, patient/caregiver satisfaction, participation in the health system and maximising the value of resources, especially as it relates to HCWs' job satisfaction and morale, wait times, etc.

Figure 1. Adapted* framework for health systems performance

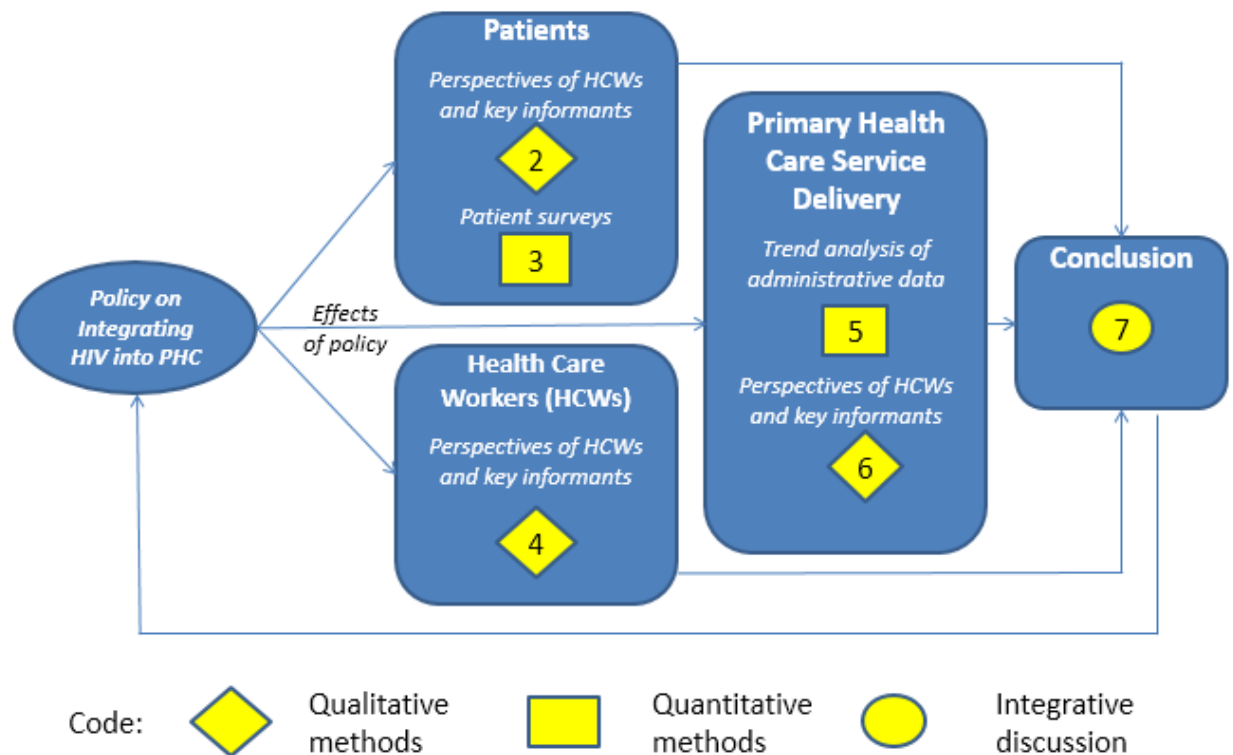


*Note: *indicates adaptation from Kruk and Freedman framework (133)*

1.4.5 Structure of the dissertation

The structure of the dissertation addresses three main gaps in the evidence related to the impact of the integration of HIV care into PHC clinics on patients, health care workers and the provision of PHC. Chapter 2 through Chapter 6 are in article format and therefore aspects of the backgrounds and methods are repeated. As seen in Figure 2, chapter numbers in yellow denote the method utilised to elucidate the research objectives.

Figure 2. Summary of mixed methods study design



Impact of Integration of HIV Care on Patients

The objective of **Chapter 2** is to understand how HCWs and other key informants perceived the benefits and challenges of integration with respect to patients attending PHC clinics. The study utilised Focus Group Discussions (FGDs) with HCWs at eight clinics in 2012 and 2013 (n=114) and Key Informant Interviews (KIIs) with 49 participants to obtain qualitative data focusing on pre versus post-integration changes. The results are coded thematically.

The objective of **Chapter 3** is to understand if patients' perceptions of Quality of Care (QoC) and Satisfaction with Staff (SwS) were compromised in the post-integration context between 2012 and 2013 in 4 PHC clinics, and to describe the differences that existed. This chapter uses findings from a patient and caregiver survey (n=910) which solicited respondents' perceptions on domains of QoC and SwS utilising a Likert scale survey. The survey also contains

a section soliciting free responses to open-ended questions. Regression analyses were conducted on the quantitative survey data and responses to the questions were coded thematically.

Impact of integration of HIV care on health care workers

The objective of **Chapter 4** is to understand the perception of HCWs' and other key informants regarding how integration has impacted HCWs at PHC clinics and to compare their reflections of pre versus post-integration. The methodology encompasses FGDs with HCWs in eight PHC clinics (n=114) and KIIs (n=49). The results are coded thematically to better understand both the positive and negative factors that exist within a health systems performance framework.

Impact of integration of HIV care on primary health care service delivery

The objective of **Chapter 5** is to identify changes pre compared to post-integration in PHC service provision across the province in PHC clinics. Trend analysis (i.e. interrupted time series and linear mixed effect regression analysis) was conducted on administrative data collected from 131 PHC clinics from April 2009 to March 2013 on 15 indicators of PHC. Changes in trends are described, and their relationships with the HIV indicators in the models are considered.

The objective of **Chapter 6** is to understand, from the perspectives of HCWs and other KIs, how PHC service delivery and clinic functions have changed from pre to post-integration. FGDs and KII were utilised to collect qualitative data to meet the objectives. Data from these were coded thematically.

In conclusion, **Chapter 7** discusses the major findings of the study, its strengths and limitations, and provides recommendations.

Chapter 2: The effect of integration of HIV care into PHC on patients' experiences of care - perspectives from health workers and key informants

Background: Expanding access to antiretroviral therapy (ART) in high HIV-prevalence settings has been challenging in the face of weak health systems, especially given the existing resource constraints. The integration of HIV care into primary health care (PHC) clinics is a strategy that has been employed in order to expand access while maximising available health system resources. However, little is known regarding the effects of integration on patients attending PHC clinics. The objective of this study was to understand the impact integration has had on patients who have attended PHC clinics.

Methods: Focus group discussions (FGDs) with HCWs were conducted in 2012 in four PHC clinics in Free State South Africa, where integration had already taken place. FGDs were held again in these same four PHCs in 2013. As well, FGDs were also conducted in 2013 in four additional clinics, for a total of eight clinics. Key informant interviews (KIIs) were conducted with a variety of health system officials including managers within the health system, non-governmental organisations, academics and policy makers. FGDs and KIIs were recorded and transcribed, the results were thematically coded using ATLAS TI and analysed utilising a health systems framework incorporating the domains of effectiveness and equity.

Results: A total of 114 HCWs (2012: n=38, 2013: n=76) participated in 14 focus groups in the eight clinics. Forty-nine key informant interviews were also conducted (2012: n=24, 2013: n=25). Several positive themes were identified in relation to “effectiveness.” These were improved access to ART and HIV testing, and the related improvements to patients’ health, improved comprehensive care across the HIV-care continuum, and improved relationships among HCWs, families, communities and patients. Negative themes included decreased focus on HIV prevention and health education, decreased non-HIV service utilisation and an increase in HIV treatment defaulters as workload increased. The positive impacts related to “equity” were increased access of ART to farm workers, improved psycho-social and community support, and reduced stigma by way of normalising HIV. Negative impacts were remaining gaps in access to

ART for men, issues with confidentiality, and fear of the disclosure of HIV status in the local community.

Discussion: The integration of HIV care into PHC has had many positive, and some negative consequences for patients attending PHC clinics. Overall, integration can be seen to be beneficial for patients attending PHC clinics and can lead to more effective and equitable service provision.

2.1 Background

In 2013, 35 million people worldwide, most of whom lived in Sub-Saharan Africa (1), were living with Human Immunodeficiency Virus (HIV). One strategy, promoted by the World Health Organisation and others (48,64,96,135,136), to rapidly expand access to ART has been the integration or decentralisation of HIV care into primary health care (PHC) facilities. Improved access to ART is resulting in longer life expectancies for people living with HIV (PLWH) (70). Patient-centred healthcare systems – where patients are viewed holistically as a person, not as a “visit”- are gaining recognition as an optimal strategy through which to retain patients in care and to ensure that their needs are met within the peripheral level of a health system (24,64).

Potential benefits to patients that result from integrating HIV into PHC include increased and earlier access to ART (74), greater engagement in care (96,135) and increased non-HIV service utilisation (88). Broadly speaking, proponents of integration have highlighted expected improvements in community support (137), less financial and time burdens on patients for travelling to access ART, and improved clinic infrastructure and sharing of resources (84,88). However, others have raised concerns regarding increased wait times for patients (84), reductions in the quality of care due to increased workload (138), less focus on non-HIV conditions, reduced access to specialists (36), the potential for compromised patient confidentiality and increasing HIV-related stigmatisation (67).

Previous research in rural South Africa in has identified a decrease in the likelihood of ART initiation of 3% per km between patients’ residence and the health facility (61).

Furthermore, both adults and children accessing treatment near their homes have been shown to be more likely to remain in care (62,63). A study of patients' and HCWs perceptions of integrated care conducted in two clinics in Zambia (11) found that although vertical models were potentially stigmatising, they allowed patients to network and support each other. In contrast, although integrated models increased equity between HIV and non-HIV patients, they were not found to adequately protect confidentiality. In a study conducted in Soweto, South Africa (82), HIV patients who had been referred to local clinics once stable reported reduced transport time and cost, but also a lack of specialised and doctor care, poor services and incidences of mistreatment by staff, self-perceived stigma and lack of confidentiality at the clinic. A study (73) conducted in Swaziland of HIV patients' perspectives regarding integrated HIV and sexual/reproductive health services found satisfaction was highest in the vertical model when comparing stand-alone, with partially or fully integrated service delivery. Another study of HIV patient satisfaction and perceived stigma in integrated health centres and a sub-district hospital in Kenya (80) revealed a decrease in satisfaction in the first 3-months post-integration, but by 12 months post-integration, satisfaction with services had increased.

The bulk of research that has examined the impact of integration has focused primarily on epidemiological patient outcomes, and very little to no research has examined multiple perspectives with respect to health systems, including frontline health care workers (HCWs). These perspectives are important since health care workers' attitudes and experiences can have a dramatic impact on how successfully integration can proceed. Additionally, HCWs witness patient experiences first-hand and understand the health system factors that influence the patient experience. Furthermore, little data have been gleaned from high-HIV prevalent settings where HIV care is fully integrated in PHC clinics. Furthermore, there has been scant documentation regarding the impact on patients after integration has been implemented. This is especially important in contexts where a generalised epidemic results in a large HIV-related burden on public health systems, such as in South Africa.

South Africa has an estimated 6.4 million people living with HIV (116), the largest number of people living with HIV in any country in the world. South Africa also has the largest public-sector ART programme in the world (139). The national prevalence of HIV in 2012 was estimated at 18.8% (15-49 years old) of the population (101) with HIV/AIDS accounting for 32% of deaths (107). The public health system in South Africa is marked by a lack of HCWs (both in terms of skill mix and distribution), inadequate referral systems, insufficient monitoring and evaluation, and discontinuous drug supplies (30,42,116,140). Highly prevalent diseases such as HIV, tuberculosis, and non-communicable diseases place an unprecedented strain on the public-sector health system, necessitating complex health system responses to these “colliding epidemics” (99). South Africa’s ART treatment programme was initiated in 2004 through a vertical system where patients accessed testing, treatment and care at separate sites (141). From 2010 on, in an effort to improve access to comprehensive care, HIV care was integrated into all PHC clinics, and PHC nurses were trained in Nurse Initiated Management of ART (NIMART). As the majority of the responsibility for caring for the complex disease burden in South Africa lies within the PHC system, it is therefore critical to ensure that high quality care is accessible to all South Africans through PHC clinics. In this circumstance, the aim of this study is to understand from the perspectives of HCWs and managers, how the integration of HIV care into PHC clinics impacts patients attending public-sector PHC clinics. We chose to investigate this question within the context of the province-wide implementation of NIMART in the Free State province of South Africa, which has a population of 2.8 million, and which makes up 5.2% of the total South African population (97). In 2012, there were 91 public-sector professional nurses in the Free State per 100, 000 in the population (107). This statistic was the lowest in the country. The Free State province is largely rural, and includes 2 former homelands from the previous apartheid government (126). The estimated HIV prevalence among 15-49 year olds was 20.4% (2012) (101). HIV prevalence among antenatal clients was the 3rd highest in the country at 32% compared to the national average of 29.5% (2012) (101).

2.2 Methods

To better understand the effects on patients associated with the integration of HIV care into PHC clinics, I designed a qualitative study using data that were collected both through focus group discussions (FGDs) with HCWs, and through in-depth key informant interviews (KII) with multiple health system officials. These perspectives were chosen in order to gain multiple perspectives regarding the research question from various levels within the health system. We conducted FGDs and KIIs in two waves of approximately 10 months apart in order to identify changes as integration was implemented.

Four clinics were chosen for FGDs in Year 1, and represented a diversity in districts, size, catchment population and months since integration. Clinic selection for FGDs began with the identification of clinics that had, as indicated in the District Health Information System (DHIS) in June 2011 (n=219), at least one professional nurse. Exclusion criteria encompassed clinics that were: 1) “priority sites,” identified by key informants as clinics that had been designated as ART clinics under the previous vertical programme and had thus received extra resources to provide HIV care (i.e. additional staff or financial resources) (n=39); 2) not yet integrated (i.e. that were not able to initiate patients on ART at the clinic) by the first FGD (n=62) and 3) atypical (e.g. catered to specific populations) (n=3). A total of 115 clinics met the inclusion criteria and were stratified by district, catchment population and geography. The catchment population was classified as: small - less than 25, 000 (n=38), medium - 25, 000 to 50, 000 (n=46) and large - over 50, 000 people (n=31). Of the 115 clinics, geographic characteristics consisted of urban (n=39), rural (n=57) or former homeland (n=19), and the year integration began (2010: n=33, 2011: n=66, 2012: n=16). Four clinics were selected through purposive sampling (3.5% of the clinics met the inclusion criteria). These represented a diversity of the strata. The four clinics represented four of the five districts - two were large, urban clinics, one was a large clinic in a former homeland, and one was a small, rural clinic. Two of the clinics began integration in November 2010, one in May 2011, and one in February 2012.

The study was designed to sample all participants until a saturation of themes was reached. We estimated that this criterion would be met by enrolling 80% of staff at the four clinics (n=41). Because, as demonstrated by the absence of convergent themes, Year 1 FGDs did not reach saturation, we selected an additional five clinics for Year 2, representing a diversity in size and geography of the catchment population. We excluded clinics that had not integrated at least six months prior to FGDs (n=35) and clinics that had participated in the previous year (n=4). Of the 28 clinics that met the inclusion criteria, all had integrated between March and June 2012. Upon further stratification on size (small: n=7, medium: n=17, large: n=4), and the geography of the catchment population (rural: n=10, urban: n=4, former homeland: n=14), five clinics (3.6% of the 138) were purposively selected based on key informant input to represent diversity in the strata in order to further elucidate the research objectives. Of the five clinics, two were medium sized urban clinics, two were small rural clinics, and one was a small clinic in the former homeland.

Clinic recruitment began by obtaining permission and inputs from district and local area managers regarding whether the selected clinics could accommodate a research team. All staff members were invited to participate by the PI, who introduced the study along with the Provincial NIMART mentoring and support specialist. During clinic recruitment phase, the study's aims and the voluntary nature of participation were discussed with all staff. One week later, clinic managers were contacted to enquire whether or not staff consensus had been obtained regarding the decision to have their PHC clinic participate in FGDs. In cases where the clinic had decided to participate in FGDs but where some staff could not attend the focus group due to scheduling issues, separate interviews were arranged. Clinic managers were interviewed individually.

Key Informants (KIs) were purposively selected to capture diverse perspectives from key players across the health system from multiple viewpoints/levels including: 1) Clinic 2) District and Local Area 3) Provincial 4) employees of non-governmental organisation (NGO) and 5) Expert/Academic and Policy Maker. Snowball sampling technique was used to identify KIs until saturation was reached

For both FGDs and KIIs, the consent process included obtaining written, informed consent and permission to audio record. As seen in Appendix A, topic guides were developed from emerging themes in the literature, and guided discussions and interviews that were conducted in English. Ethics approvals were obtained from the University of British Columbia, Canada and the University of the Free State, South Africa. Permission from the Head of the Department of the Free State Department of Health was also obtained.

The following questions were posed in order to better understand the impact of integration on patients attending PHC clinics from the perspectives of the study participants:

For Health Care Workers: “When thinking of before and after offering ART we are interested in what effect integration has had on patients and caregivers. What are some of the good comments you may have heard from patients or caregivers? What have been some of the problems?”

For Clinic Managers: “Do you think ART integration has been positive for patients? If so please discuss. What have been some negatives?”

For Other Key Informants: “What do you think the impacts (both positive and negative) are on patients and caregivers (both with HIV/AIDS and without)?”

Probes included: HIV patients, non-HIV patients, stigma, (*and for Year 2 only*): family and communities.

Analysis was grounded in a critical realism approach (142) and interpretive description (143) methodologies guided the analysis. First, themes emerging from the data were inductively and deductively coded in ATLAS TI ® (version 7.5.2, Thousand Oaks, CA: SAGE Publication) based on the guides. Random excerpts of codes were reviewed by a second researcher for congruency. Committee members were consulted to resolve discrepancies. Second, initial codes were combined into fewer categories and the themes were applied to a health systems framework

(133). Codes that did not fall into an element of the framework were considered new and emerging. Committee members were consulted on their relevance to the research question and adaptations of the framework to incorporate these themes. That resulted in emerging themes that in turn, fell into two domains: Effectiveness and Equity. These two domains related most closely to the patients' experiences of health care.

2.3 Results

2.3.1 Participants

As seen in Table 2, a total of 114 HCWs (2012: n=38, 2013: n=76) participated in 14 focus groups in eight clinics. In 2012, all four selected clinics participated. However, in 2013, four of the five clinics selected participated, with one clinic unable to participate on the scheduled day of the FGD due to an audit. Due to travel logistics, the visit could not be rescheduled. Of the participants, 47 (41%) were professional nurses, 17 (15%) were other categories of nurses (e.g. enrolled nurses or assistant nurses), 6 (5.3%) were pharmacy assistants, one (1%) was a nutritionist, 13 (11%) were data entry staff, 12 (11%) were security guards, general assistants or cleaners, and 18 (16%) were outreach workers (i.e. volunteer lay counsellors, home-based carers, DOTS supporters for tuberculosis, or community health workers). Although participants came from a variety of language groups the interviews were conducted in English as this is the predominant language of communication in health facilities. One-third (n=38) of the total participants participated in 2012, and two-thirds (n=76) in 2013. Seven interviews were conducted with participants who could not attend the FGD in 2012 (3 volunteer lay counsellors, 3 pharmacy assistants and 1 data entry staff), while 2 interviews were conducted in 2013 (2 volunteer lay counsellors). FGDs lasted approximately one hour, and interviews approximately 30 minutes.

Table 2. Characteristics of clinics and participants in 14 focus groups from 2012 and 2013 (n=114)

Focus Group	Clinic	Size	Urban, Rural, Former Homeland	Year	Integ. Mo/Yr	Months Since Integration	Total	Prof. Nurse	Nurse (Other)	Pharm. Assistant	Nutrition-ist	Data Capturer, Clerk	Security, General Assistant, Cleaner	Outreach*	
1	A	Large	Urban	2012	May-11	11	4	4	0	0	0	0	0	0	
2	A	Large	Urban	2012	May-11	11	12	4	3	0	0	1	2	2	
3	A	Large	Urban	2013	May-11	22	12	4	1	1	0	0	2	4	
4	A	Large	Urban	2013	May-11	22	7	2	2	1	0	1	0	1	
5	B	Small	Rural	2012	Nov-10	18	7	4	0	1	0	0	0	2	
6	B	Small	Rural	2013	Nov-10	28	8	4	2	0	0	1	1	0	
7	C	Large	Urban	2012	Feb-12	3	3	2	0	0	0	1	0	0	
8	C	Large	Urban	2013	Feb-12	13	6	2	0	1	1	1	0	1	
9	D	Large	F.H.	2012	Nov-10	18	12	6	1	0	0	2	3	0	
10	D	Large	F.H.	2013	Nov-10	28	10	3	1	0	0	2	2	2	
11	E	Small	Rural	2013	Apr-10	35	4	1	1	1	0	0	0	1	
12	F	Small	F.H.	2013	Jun-12	9	12	2	3	0	0	2	1	4	
13	G	Med	Urban	2013	Nov-10	28	10	5	1	1	0	2	0	1	
14	H	Med	Urban	2013	Feb-12	13	7	4	2	0	0	0	1	0	
Median(IQR)						18 (15)	TOT. 114	47	17	6	1	13	12	18	
								%	41.2%	14.9%	5.3%	0.9%	11.4%	10.5%	15.8%

*Note: Outreach workers include: Volunteer Lay Counsellor, Home Based Carer, DOTS supporter, community health worker. IQR is interquartile range, F.H.is Former Homeland

Over both years, a total of 49 key informant interviews were conducted (2012: n=24, 2013: n=25). As seen in Table 3, a total of 33 unique key informants were interviewed, of whom 19 were interviewed in both years of the study. Joint interviews (i.e. 2 people in 1 interview) were conducted twice in both years upon the request of the key informants in order to complement the KIs knowledge, where one was familiar with programmatic issues and the other was more familiar with ground-level issues. Participants included: academics, employees of non-governmental organisation (NGO), and policy makers (n=5), provincial managers (n=9) and assistant managers (n=4) from FSDOH, provincial mentors (n=2), a district manager (n=1), local area representatives (n=4), and clinic managers (n=8) from eight PHC clinics across the province.

Table 3. Description of key informants (2012 and 2013)

Position	Scope	Year	
Academic/NGO	Health System-National	2012	2013
Academic	Health Systems-Provincial	2012	-
Academic	Tuberculosis-Provincial	2012	2013
National Minister of Health	Health System-National	-	2013
Provincial Manager-NGO	NGO	2012	2013
Provincial Manager-DOH	Child Health	2012	2013
Provincial Manager-DOH	Chronic Disease	2012**	2013
Provincial Manager-DOH	HIV	2012	2013
Provincial Manager-DOH	HIV Data	2012	-
Provincial Manager-DOH	Human Resources	-	2013
Provincial Manager-DOH	Information System	2012	-
Provincial Manager-DOH	Reproductive Health	2012	2013
Provincial Manager-DOH	Sexual Health	2012	2013
Provincial Manager-DOH	Tuberculosis	2012	2013
Provincial Assistant Manager-DOH	Child Health	2012**	2013**
Provincial Assistant Manager-DOH	Chronic Disease	2012**	-
Provincial Assistant Manager-DOH	HIV	2012	2013
Provincial Assistant Manager-DOH	PMTCT	2012	2013
Provincial Mentoring-DOH	Nurse Clinical Mentor	2012	2013
Provincial Mentoring-DOH	NIMART Mentoring and support	2012	2013
District-Manager	PHC	2012	2013
Roving Data Manager	Local Area	2012	-
Local Area Manager	Local Area	-	2013**
Local Area Manager	Local Area-PHC	2012	-
Clinic Supervisor	Local Area	-	2013**
Clinic Manager-Clinic A	Clinic	2012	2013
Clinic Manager-Clinic B	Clinic	2012	2013
Clinic Manager-Clinic C	Clinic	2012	2013
Clinic Manager-Clinic D	Clinic	2012	2013
Clinic Manager-Clinic E	Clinic	-	2013
Clinic Manager-Clinic F	Clinic	-	2013
Clinic Manager-Clinic G	Clinic	-	2013
Clinic Manager-Clinic H	Clinic	-	2013

Note: DOH is Department of Health, PMTCT is Prevention of Mother to Child Transmission of HIV, PHC is Primary Health Care, NIMART is Nurse Initiated Management of Antiretroviral Therapy, NGO is Non-governmental Organisation

**Indicates Joint interview where 2 key informants were interviewed together

2.3.2 Major themes on the impact of integration on patients

Study participants identified themes that covered a wide range of issues that correspond to the Kruk and Freedman Framework for Health Systems Performance (133) and fell into subdomains of “effectiveness” and “equity” that were most related to the patient experience. Themes pertaining to “effectiveness” are summarised in Table 4 and included subdomains of access to services, health status, and quality of care. Positive themes related to “effectiveness” included improved access to ART and HIV testing and related improvements with respect to the health of patients, improved access to comprehensive care across the HIV care continuum, and improved relationships between HCWs, families and patients. Negative themes related to “effectiveness” included a low focus on HIV prevention and health education, low non-HIV service utilisation and concerns of HIV treatment defaulters. Themes related to “equity” are summarised in Table 5. “Equity” included subdomains of access to care for difficult-to-reach populations, stigma and community support. The positive themes that emerged included increased access of ART to farm workers, improved psycho-social and community support, and reduced stigma by way of normalising HIV. Negative themes included continued gaps in access to ART for men, concerns about confidentiality and fear of disclosure of HIV status in the local community.

Table 4. Integration's impact on patients attending PHC clinics - qualitative themes related to effectiveness

EFFECTIVENESS	
Access to Services	
<i>Positive</i>	<i>Negative</i>
high access to ART and HIV care	low focus on HIV prevention*
low travel time and cost to access ART	low quality health education for HIV-negative patients
quicker and earlier access to ART	low non-HIV service utilisation
high number of patients testing/retesting for HIV	low access to doctors for HIV patients*
high access to allied health professionals	
high frequency of visits from doctors*	
Health Status	
<i>Positive</i>	<i>Negative</i>
HIV infection- less advanced at treatment initiation	
fewer minor ailments	
improved overall health of population	
fewer sick children	
less babies with HIV	
less patient deaths	
Quality of Care	
<i>Positive</i>	<i>Negative</i>
increased access to comprehensive care	high number of defaulters
high continuity of care	reduced monitoring of clinical outcomes
more likely to seek care for complications ✕	less time for education for chronic care patients
high adherence and compliance	low quality of information on medications
high access to health information	Inadvertant HIV status disclosure
high monitoring of patient outcomes	low quality of services for non-HIV patients
increased detection of drug interactions	
low number of defaulters	
Improved relationship with HCW and families	
Improved patient-provider relationship	
family member can pick-up treatment	

**indicates theme from key informant interview only, not focus group discussion*

✕ indicates theme from focus group only and not key informant interview

Table 5 Integration's impact on patients at PHC clinics-qualitative themes related to equity

EQUITY	
<i>Access to care for difficult to reach populations</i>	
<i>Positive</i>	<i>Negative</i>
high access to ART via mobile clinics	low access to ART for those living on farms low access to ART for men
<i>Community Support</i>	
<i>Positive</i>	<i>Negative</i>
improved access to social support groups increased counseling increased family and community support increased community outreach programs	
<i>Stigma</i>	
<i>Positive</i>	<i>Negative</i>
reduction of stigma increased acceptance of HIV diagnosis increased disclosure of HIV status normalising HIV mixed waiting areas-high confidentiality	fear of disclosure of illness at PHC clinic mixed waiting areas-low confidentiality

2.3.2.1 Effectiveness

Access to services

Many of the HCWs and KIs expressed the opinion that a major benefit of the integration of HIV care was to improve HIV patients' access to services. Many participants recounted patients speaking about reductions in time and costs to access ART when it was provided nearer to patients' homes. Many HCWs also reported reduced expenditures for patients who had previously sought treatment in private sector clinics to avoid high travel time and costs. Additionally, both HCWs and KIs felt that integration fostered earlier and timelier access to ART. Another advantage reported by HCWs was the ability to expedite patients who were immediately eligible for ART in the PHC clinics. Also, both FGD participants and KIs felt that

the increased availability of ART led to an increased uptake of HIV testing and re-testing. This is well illustrated in the following two quotes, the first from a local area manager in 2012 and the second from a HCW at a small clinic in a former homeland commenting specifically on antenatal patients in 2012:

“Before we started with ARV treatment in this local area we counted so many deaths and the negativity of the disease rose rapidly. With the introduction of ARVs in the clinics this has decreased deaths and the clients come willingly. It's no longer a struggle. They just open themselves to be tested.”

“I think having ARVs here is really making them happy because before ARVs at the clinic, antenatal clients didn't want to test for HIV. They were afraid or they were hiding it. But since ARVs came here, I've seen only one pregnant woman who refused to test. Everybody is testing because they are looking forward to get treatment if they are positive.”

Additionally, HCWs and KIs reported increased access to the services of a number of allied health professionals such as psychologists, social workers and dieticians. KIs also commented on increased visits from doctors after integration, as reported by this nurse who was also a district-level ARV mentor in 2013:

“With the HIV and AIDS programme social workers and dieticians were employed. So now because of integration when they go to the clinics they see everybody. Even the doctors are now are rotating to the clinics and they don't see only HIV positive patients, they see every primary health care patient.”

However, some negative themes related to access to services were also reported. Key informants perceived that with the improved access to ART, there also came a decreased focus on HIV prevention. This was reported with respect to the resulting high workload and pressure to reach high targets of patients on ART. Additionally, many key informants spoke about a lack of focus on health education for patients who are HIV-negative, as mentioned in the following quote from a district-level nurse mentor in 2012:

“Patients are not informed. I think the gap is that we are only focussed on the infected ones and not the uninfected ones. Because patients who are not infected - they think that they can never be infected and that HIV is not for me. The way they talk about it you can hear they are not informed.”

Lastly, some key informants described HIV patients not seeing a physician for HIV care as a negative that had occurred after integration, and they suggested it to be a result of reduced access to specialists.

Health status

The improvements in the general health of patients attending PHC clinics were a widely reported positive theme for both HCWs and KIs. With increased access to treatment, participants felt the overall health status of HIV patients had improved. They believed that HIV patients were presenting earlier and with less severe illnesses, and that they were experiencing fewer complications with treatment. Many felt that the overall health of the population had improved with the expansion of ART, and that less patient deaths, as well as fewer minor ailments were being noted. This is reported in the following quote from a HCW in a small, rural clinic in 2013:

“I’ve never seen such sick patients like before - the skeleton you know, people are alright because of the ARVs at the clinic.”

With the expansion of treatment, both HCWs and KIs suggested that fewer babies were being diagnosed with HIV in their catchment areas and more children were accessing ART. As a result, there were improvements in the health of children attending PHC clinics. This is illustrated in the following 2013 quote from a clinic manager in a large clinic in a former homeland:

“We don’t see a lot of children with HIV now like we did before. Before we used to have to initiate many babies but now it is no longer like that because of the PMTCT [prevention of mother to child transmission of HIV].”

Concerning broader social determinants, many key informants perceived the positive economic impact of integration on patients. This was mostly spoken about in the context of patients now being less likely to lose their jobs since HIV care is more accessible from nearby clinics. A quote from an academic in 2013 illustrates the broader benefits as follows:

“It has a very positive effect on the socio-economic situation of their family. There’s just less disease in the family. There is less care necessary. In the past we had children, small children sometimes caring for their parents not going to school. Presumably almost all patients on ARVs can return to work and I’m sure there’s less travelling to the clinic which took up days.”

Quality of care

Many participants were of the opinion that the integration of HIV care provided numerous benefits towards the improvement of quality of care offered to HIV-positive patients in PHCs. Health care workers were now able to provide comprehensive and holistic services to patients conveniently at one clinic. This is illustrated in the following quote by a national policy maker in 2013:

“You are HIV-positive, you are also hypertensive or diabetic - you [are going to] many different centres. You should be regarded as one individual. In fact, patients don't regard themselves as many different people and it does frustrate them if we treat them differently. You say hey, look I'm here to treat only your HIV/AIDS you will go to the next hospital or next clinic get into a taxi that's where they are treating hypertension. It doesn't work with people. Once you integrate all those services into one we make them one thing and all of them are chronic care.”

Many participants mentioned increased engagement in HIV care across the care continuum from integrated services. HCWs felt they could provide improved health education and information, which they also believed increased treatment adherence and compliance. This is suggested in the following quote from 2013 by a HCW at a small clinic in a former homeland:

“They are not hesitating to come and take their ARVs because we are giving a good health education since having ARVs at the clinic. We usually give the health education every time and some of them come with their treatment buddies.”

Many HCWs reported the ability to easily monitor patients` adherence to treatment at PHC clinics, as seen within the following quote from a HCW in a small, rural clinic in 2012:

“You can manage and see the patient's adherence because all the information is here. Plus you have a relationship and follow-up is much easier because for the adherence part, you can see if the patient is taking the medication correctly. You can help the patient and refer [them] to a support group or back to the lay counsellor to do more counselling if the patient is not adhering well.”

Another benefit reported by many participants was the reduced likelihood of defaulters within the context of integration. A few HCWs spoke about the ability to trace defaulters within their communities as an advantage in the integrated context. This is illustrated by the following quote from a clinic manger in a large, urban clinic in 2012:

“When they default it is easier to trace them at home so they know that. They know we can trace them so the chance of them defaulting is very little.”

Additionally, both HCWs and KIs commented that since the integration of HIV care, HCWs in the PHC clinics were better able to detect complications from HIV treatment and intervene. This is reported in the following quote by a HCW in a large, urban clinic in 2013:

“We have promoted health of the people and we can detect the complications and we can refer and we give our patients health education and we are supporting them psychologically to accept themselves and their conditions.”

Many HCWs also mentioned an improved ability to address, diagnose and manage drug interactions with ARVs, and felt that patients were more likely to seek care for complications at their local clinics. This concept is illustrated by the following quote from a clinic manager in a small, rural clinic in 2012:

“You can now more easily pick up drug adverse events or drug interactions. The patients are more prone to come to the clinic now because they come in for their high blood medication and their ARV medication and their flu. It is one stop for them. So they come to the clinic easier. That is the biggest success.”

Additionally, HCWs also described a new-found ability to understand the side effects of ART and their relationship to the patient health, as well as to monitor the care received by the patient. This is reported in the following quote from a HCW in a large, urban clinic in 2012:

“It helps to treat the other patients because before we started the ARVs at the clinic, you will get a patient who is on ARVs from somewhere else. When she/he brings the complaint you don't have any idea whether it is this drug's side effects. You don't have a clue what is happening at the other institution - unlike now that you know you can pick up the effects more easily and you know how to manage [them].”

However, HCWs and KIs also reported some of the negative impacts of integration on the quality of care offered to patients. The mostly widely perceived negative impact was the number of HIV patients who are defaulting treatment. Although many were uncertain of the numbers of defaulters prior to integration in the vertical model, several HCWs expressed concerns regarding the number of patients defaulting ARVs, and often related this to the increasing numbers of patients accessing ART at the clinic. Some participants reported of cases where patients stopped their treatment because they felt better. Additionally, some HCWs

reported how HIV patients had returned to work after feeling better and were therefore unable to return to the clinic due to long wait times during working hours. This is reported by the following quote from a HCW in a large, urban clinic in 2012:

“Other challenges are defaulter rates. Some of them came in sick and then they become better. They go back to work so they cannot come to clinic to get their medication. It is quite difficult because you can't say come in and you will be served as you come because everyone must have his or her turn.”

As evidenced in the following quote from 2013, a provincial manager suggested that the increased workload, which resulted from integration, occasioned the inability of HCWs to trace defaulters:

“Because nurses are just trying to push the queues when the lab results are here they put them in the file. Part of the follow-up is also compromised in terms of looking at the patients that were supposed to come for follow-up and didn't - the defaulters. They get missed now that the workload has increased.”

As alluded to in this quote from a provincial manager in 2013, another negative aspect that was reported by provincial and district managers was a reduction in the monitoring of HIV-related clinical outcomes:

“The nurses don't properly track patients' clinical outcomes. In some cases you will find that the nurse sees the patient, the viral loads have been done, and the viral loads are not suppressed. They are supposed to do something about that but they don't because of the workloads.”

Additionally, some participants described a disparity in the quality of care for non-HIV patients compared to HIV patients. This is illustrated in the following quote from a clinic manager in a small, rural clinic in 2012:

“HIV gets the funding and the attention. Why can't a diabetic or hypertension patient also get drug readiness training because they are also not adhering? But only ARV patients are sent for drug readiness training. It just doesn't make sense. So, the ARV patient get this [much] nicer service than all the other patients - if you are not [HIV] positive you are not deserving of it.”

Furthermore, some HCWs spoke about an inability to provide comprehensive drug information on treatments for HIV patients due to increased workload. This is reported in the following quote from a HCW in a small, rural clinic in 2013:

“We don't have time to explain to the patient how to take their medication properly because you just give it, especially if the patient is been on [ARVs] for 3 months. These patients forget and will come back and then you will have to write again.”

Although most HCWs and managers recognised the importance of improved access to HIV care, many were concerned that large increases in the numbers of patients coming for HIV care had decreased the quality of care for patients accessing services for other health issues at PHC clinics. They noted decreased health education, longer waiting times and shorter consultation times through which to adequately provide care for patients with other diseases. Many participants felt that this had resulted in patients with other diseases defaulting their treatments. This is illustrated in a quote from a local area manager in 2012:

“You would find that the ARV clients were more than the ordinary primary health care clients. They were filling the space- they wanted everybody to take care of them. Other programmes like chronics, antenatal, immunisation still had to continue at the same time. So the clinic was really full to its capacity on a daily basis and PHC was really compromised. There would be more defaulters from high blood pressure, the chronics won't be coming, and with family planning you'll get complaints [about wait times]. Those are the things that will tell us that there is something wrong there.”

However, some HCWs suggested that those who were not attending the PHC clinics were seeking care from other clinics in the area. This is described the following quote from a clinic manager in 2012 in a large sized clinic in a former homeland:

“Because of the increased [HIV patient] numbers when chronic and minor ailment patients come and see so many people they have resorted to go to other nearby clinics.”

Patient-provider family relationship

Many HCWs and KIs spoke about the value of the established relationships patients have between HCWs and patients at PHC clinics, and how these relationships facilitated communication with patients when HIV care was integrated into PHC. This is illustrated in the following quote from a HCW in a large, urban clinic in 2012:

“Most of them know us. The relationship is quite good - you communicate. If you see that there are problems you are able to confront the patient because you know the patient better.”

Many participants also spoke about a strengthening of the relationships between patients and HCWs since integration, and suggested that the HCW's provision of comprehensive care resulted in the development of increased patient confidence in their HCW's skills. This is demonstrated in the following quote from a provincial health manager in 2013:

“The patients gain confidence in the sister because she can ask anything. She can talk to that sister if there's anything that she's seen that has changed - she knows that she is going to get this sister who will do everything, so she gains that confidence.”

Additionally, many HCWs and KIs spoke about improvements in the relationships between patients' families and HCWs. Specifically, many participants commented that the provision of ART nearer to patients' homes facilitated opportunities for caregivers to accompany patients to the clinics and for HCWs to counsel and test family members. This is illustrated in the following quote from a provincial manager in 2013:

“I think it is convenient for the patients and also they get to have this relationship with the care provider that will allow the provider to understand and know them in totality - in full - including their family. So I think that is a positive for the patient.”

Additionally, some HCWs described an improved ability to monitor patients' treatment progress as a result of family members being able to be more involved in their treatment. Also, many HCWs felt that access to ART nearer to patients' homes allowed for family members to pick-up medications when the patients themselves were unavailable to come during clinic hours. They reported this situation as improving access to ART and treatment adherence. Lastly, HCWs spoke about their new-found ability to counsel and educate families on HIV, thus promoting acceptance and support from families, as described in the following quote from a HCW in a large, urban clinic in 2012:

“The relatives were afraid of [HIV patients]. They didn't accept them. Now, we can talk to relatives to support them and even [tell them] what time she must take the treatment and educate them that HIV is not infecting everybody- it has its own way to infect somebody and actually it's not that contagious.”

Some negative themes emerged with respect to patient relationships. Many participants reported the fears patients had regarding the disclosure of their HIV-statuses at PHC clinics. They spoke about inadvertent status disclosure resulting from patients being seen by a community or family member, or due to a lack of confidentiality with respect to medical records. This is described in the following quote by a HCW from a medium sized, urban clinic in 2013:

“It has not improved confidentiality because others they become ashamed because they are in the same community and they come to the local clinic so the neighbours will see or a friend will see that you are taking the ARVs.”

2.3.2.2 Equity

Access to care for difficult-to-reach groups

HCWs reported that the integration of HIV care into PHC clinics had in some cases improved access to HIV care for farm workers and people living in areas with poor access to public transportation. In PHC clinics with mobile clinics visiting outlying areas and farms, the inclusion of ARVs in mobile clinics had resulted in improved access to care as reported in the following quote from a HCW in a small, rural clinic in 2012:

“We had a patient that was living on one farm. He had to come to the clinic either with a lift or with a horse. He made an effort to do drug readiness but then he just never came back for two years to start the ARVs. We are now allowed to have [ARV] stock in the mobile [clinic] and we started the patient there immediately on the farm- him and his wife.”

Notwithstanding this however, some HCWs and KIs felt that gaps remained in access to ART for farm workers where mobile services were not adequate. Participants also reported men as another difficult to reach group where the integration of HIV care into PHC had not closed gaps in access to care. This is reported in the following quote from a local area manager in 2013:

“[Patients] are very positive about this treatment and having the disease and getting on with their lives especially the females. But males, they still want to be seen privately and come when there is nobody at the clinic.”

Stigma and community support

One of the major benefits regarding the integration of HIV care into PHC that was noted by HCWs and KIs was the “normalisation” of HIV as another chronic disease managed at the PHC clinic level. Many participants felt this had resulted in several positive effects including a reduction in stigmatisation, increased numbers of patients disclosing their HIV status, and a larger transformation within communities. This is well illustrated in the following quote from a HCW in a small, rural clinic in 2012:

“With the isolation, special transport, being notified about HIV- it is still that stigma. When the ARVs came to our clinic, it became better because they don’t have to travel. The disadvantage of travelling to another town was that they have to wake up early, wait to be seen by the people as the special people who are going to special treatment. If you go for a special further investigation people will recognise that they are HIV positive. When they come to our clinic, it became much better because they were treated as other normal patients and then they don’t have to be isolated anymore.”

Furthermore, many HCWs felt that integration increased levels of psycho-social support through the establishment of patient support groups based at PHC clinics, and resulted in the unification of communities in the fight against HIV. They felt that this empowered HIV patients to disclose their statuses. A few participants also spoke about how, through social support groups, patients could share strategies for economic development. This is illustrated in the following quote from a HCW in a large, urban clinic in 2013:

“We encourage them to attend social support groups where we have been socialising them and encouraging them to come up with ideas on how to make a living.”

Additionally, as reported in the following 2013 quote from a district manager, district and clinic-level participants felt that integration had resulted in community transformations due to increased community outreach activities that they believed had improved awareness regarding HIV:

“Since having ARVs in the clinics we have campaigns where we come together with communities. We reach out to the mining areas even though the miners will access care at their employers but their wives belongs to us at the public-sector. We do outreach to them to raise awareness about HIV. We also have our community development workers. We organise dialogues with the communities per sub-district and then we display that we have put so many patients on treatment and it have been able to retain so much. The community can come up with a problem that they are facing, then we learn where we can improve.”

Overall, many participants felt that HIV-related stigma had been reduced since the integration of HIV care into PHC facilities. They believed HIV patients were open about their illnesses and that they found it easier to disclose their statuses. They ascribed this directly to the improved accessibility of ART at the clinics and the resultant normalisation of HIV. These concepts are illustrated in the following quote from a district level manager in 2013:

“Stigma yes it is there but we are really making progress. Now you can go to public-sector clinics and can get whatever you want any time any day. You are not even using a lot of money. Patients are not dying that much; we have people that are disclosing. Even if they are sitting outside the cubicle before consultation they are talking about HIV and AIDS. They are saying ‘I am positive, I have the disease, I’m on treatment, I came to fetch my ARVs’.”

However, participants also perceived some aspects of integrated HIV care models that they felt had exacerbated stigmatisation. In particular, they commented that patients were afraid of involuntary HIV status disclosure to other patients and family or community members. This was often reported as resulting from HIV patients being handled distinctively with respect to other patients (e.g. through the use of separate or easily identifiable files, unique queuing systems, HIV-specific consultation rooms or cubicles). Additionally, many participants reported inadequate protection of confidentiality in pharmacy queues, which then resulted in involuntary status disclosure, as described in the following quote from a district nurse mentor in 2012:

“With this integration, sometimes when they queue at the pharmacy if I stand after you and you're my neighbour, I see what you're getting. The [ARV] containers are so big that people are afraid to carry them because everybody is looking at what they are being given. They also carry cards that expose them because they are not used by everybody. If you are carrying that green and white card in the Free State you are HIV positive and you are on ARVs.”

Some participants believed the mixed waiting areas increased HIV-related stigma, while other participants believed it promoted equity. Stigma was perceived as increasing if patients could be identified as HIV positive. However, many participants felt that treating patients equally in the waiting areas reduced stigmatisation by allowing patients to share their experiences with each other and that it promoted openness about patients' HIV statuses. These concepts are reported in the following quote from a provincial manager in 2012:

“When you sit in the queue with the file and the patient next to you can read your file, it exposes you. But it can also create an openness about HIV and AIDS - maybe tomorrow I'm HIV positive and I remember that patient didn't mind sitting with the file there.”

Many HCWs reported the need to further reduce HIV-related stigma at PHC clinics by ensuring the visible uniformity of files, rotating the rooms where ART is provided weekly, and ensuring there are no separate queues for HIV patients. The following quote from a HCW in a small, rural clinic in 2013 illustrates the positive and negative impacts of integration on stigma for HIV patients:

“It's positive if they see that the patients are taking the treatment and they are getting better but it's negative if they put stigma on them say - ‘You see she has HIV.’”

Many HCWs also reported the continuing role that stigma played in delaying access to HIV testing or treatment for some patients due to the fear that their status would be known in their communities if they used local clinics. This was reported by a HCW in a small, rural clinic 2013:

“It is stigma because some of the patients they default because they say ‘I don't want to go to the clinic because my friend is going see that I'm taking the treatment.’ Then they do not come until they are very, very sick.”

2.4 Discussion

Health care workers and key informants in the focus group discussions and interviews identified a number of clear benefits to patients following the integration of HIV care into PHC services in the Free State, South Africa. These included improved access to HIV care, greater patient engagement across the spectrum of HIV care, improved patient outcomes, the mobilisation of families and communities, and an overall reduction in HIV-related stigma. However the participants also noted that high workloads from large numbers of HIV-infected patients may compromise the quality of care for both HIV-infected patients and patients accessing other services at the PHC level. In addition, despite perceived increases in ART coverage, participants identified continuing gaps for men and some farm workers, and raised concerns about patients defaulting treatment because of long wait times resulting from increased workload.

Our findings suggest that integrating HIV care into PHC services closer to patients' homes has resulted in increased access to ART by decreasing the time and finances needed to traveling to separate clinics. This is consistent with other findings (83,144). With the resulting increased accessibility of HIV care, our findings corroborate evidence that integrated care results in increased patient survival (74). Participants identified many health improvements in patients resulting from expanded access to ART. These would ultimately transition the health services that are needed for the population, presumably decreasing the utilisation of specific health services such as those for advanced HIV infections. Further quantitative evidence is needed to better understand how improved survival transitions the health service needs of the population, especially in contexts where there is a high HIV burden.

The provision of ART within communities was noted to bring HCWs, communities and families together around HIV, and has implications for the reduction of HIV-related stigma and improvements in psycho-social support. Community support has been shown to be positively associated with the disclosure of HIV patients around their status (145), and is an important determinant of treatment success (146). The patient-provider-family relationship was found to

improve in the integrated context, and warrants further investigation on how family-based care can be promoted in integrated contexts as this provides a major benefit of integration (147–149). Participants identified that integration of HIV care had resulted in HIV positive patients and their families and communities having a greater engagement in care. This factor may be critical in identifying alternative models of long term care for patients who need lifelong treatment for HIV in order to maintain easy access to care in PHC as well as ensuring continuity in high quality care for patients accessing all services in PHC. Understanding how best to leverage and foster these relationships to not only begin the implementation of community-based care, but to also maximise limited health system resources, will be critical in the next phase of further expanding ART.

With growing concerns regarding how health systems will be able to sustain the increasingly large numbers of HIV patients in need of long term care, continued engagement in HIV care with consideration of increasing workloads is critical to the discussion on expanding access to ART (13,150). Participants in our study acknowledged improvements in HIV testing and retesting, and the ability to identify and manage ART-related complications from integrated health service delivery. However, they were concerned that increasing HIV-related workload may be decreasing quality of care for HIV and patients with other chronic diseases and may lead to HIV care defaulters as discussed by others (149). Current evidence on retention in care in integrated PHC models is scant, with varying results (78,151) and long-term, wide scale studies are needed. Additionally, the increased workloads subsequent to integration and their effects on quality service provision and health education in integrated PHC contexts need to be better understood, especially in contexts with weak health systems. As ART programmes mature and workloads increase, initial gains of integration of HIV care, such as high retention in care and good patient and community engagement in care, may be eroded unless urgent attention is given to defining best practice models for long term HIV care and to adequate staffing levels in PHC to sustain good quality care (56,117).

Despite the many benefits related to expanding ART access, participants identified gaps for patients who live in areas that are not accessible by walking or public transport. Alternative strategies through which to deliver health care to these populations must be identified and

studied in order to promote equity in service provision. Furthermore, the unique problems in health-seeking behaviour and health needs of HIV-positive men have been well-documented (152). There is evidence to suggest that there are fewer men on ART, that they are sicker when they begin treatment, are more likely to not be retained in care, and that they have an increased risk of death on ART (153,154). Although in our study, the integration of HIV care into primary health care clinics was found to improve accessibility to ART, clinic operating hours usually coincide with regular work hours, making access to HIV care difficult particularly for working men. Further research into health service delivery models that are specifically geared to men's needs is necessary as discussed by others (108,152,154).

The strengths of this study are that it examines a wide variety of perspectives within a health system, and particularly that it engages the multiple perspectives available at the PHC clinics in order to understand the health system-related factors that have affected patients as a result of the process of integration. The study was conducted over a 10 month period after the implementation of integration of HIV care into PHC. Thus this study captured views from clinics that had recently integrated (e.g. three months previously) to those that had integrated almost three years prior (e.g. 35 months) and therefore captured short and long term perspectives of the effects on patients after integration. This is especially valuable as many settings are moving toward integrated PHC provision. However, a limitation of this study, as with most complex health interventions, is understanding how much of the benefits and challenges reported in this study can be attributed to integration (37). We provide qualitative findings that begin to elucidate some of the benefits and challenges for patients in integrated PHC settings, and can provide insights regarding where further research could be beneficial. However, we were unable to confirm the perceptions of the impact on patients with patients and therefore, we cannot be certain that patients would report the same findings. Additionally, the generalisability of our results may be limited and needs to be compared with those in other high-HIV burdened contexts with health systems similar to South Africa, and also be measured on a larger scale, both within the province of Free State and in other contexts.

In conclusion, integration of HIV care into PHC clinics holds many benefits for patients, families and communities by fostering access to care within patients' communities. However, further understanding is needed regarding the implications of integration on workload at PHC facilities, how best to keep patients engaged in care, and the identification of models through which to continue to expand access to ART to all people who need it. Nevertheless, evidence suggests that many benefits exist for patients in the integrated model of HIV care and that attention to mitigating negative effects could help further improve effectiveness and equity in implementing this approach.

Chapter 3: Patient perspectives on quality of care and satisfaction with staff following the integration of HIV care into primary health care

Background: Expanding access to antiretroviral therapy (ART) in high HIV-prevalence settings has been challenging in the face of weak health systems. Integration of HIV care into primary health care (PHC) clinics has been proposed as a strategy to expand access while maximising available health system resources. However, little is known on how patients' perspectives of their health care experiences change as integration of HIV care is implemented at PHC clinics.

Methods: We administered previously validated surveys in two cross-sectional waves ten months apart to patients and caregivers attending four PHC clinics in Free State, South Africa. Surveys included measurements of Quality of Care (QoC) and Satisfaction with Staff (SwS) using a Likert scale along with three open-ended questions. The clinics were at varying stages post-integration. We used T-tests, Pearson's χ^2 and multiple linear regression to understand potential changes in QoC and SwS that took place between years of survey administration. Regression analyses were conducted with those visiting the clinic less than 6 months excluded. We compared the median scores for QoC and SwS using Mann-Whitney tests. Qualitative data from the questions were thematically coded for dominant emerging themes.

Results: A total of 910 (2012: n=487, 2013: n=423) participants completed surveys. Adjusted regression estimates showed, no differences in mean QoC scores and SwS from 2012 to 2013. QoC scores were 1.63 points higher (CI: 0.16, 3.10) ($p<0.05$) for those 36-45 years old compared to 18-25 years old. Those attending the clinic for >10 years reported QoC to be 1.44 points lower (CI: -2.79, -0.09) ($p<0.05$) than those coming for 6 months to 1 year. Those coming every 3 months reported a 2.76 point higher QoC score (CI: 0.13, 5.39) ($p<0.05$) than those coming at least twice a month. Compared to chronic disease care patients, child health attendees reported 2.69 points lower QoC (CI: -4.49, -0.89) ($p<0.01$), those coming for ART reported 1.67 points lower QoC (CI: -3.08, -0.26) ($p<0.05$) and tuberculosis attendees reported a 3.53 points higher QoC (CI: 0.83, 6.23) ($p<0.05$). Compared to chronic care respondents, child health attendees reported a 1.77 points lower mean SwS score (CI, -2.71, -0.83) ($p<0.01$) while tuberculosis

attendees reported a 2.13 higher mean SwS score (CI: 0.74, 3.52, $p < 0.05$). The most common complaint was regarding long wait times. The most common compliment for staff was that the staff were respectful and friendly.

Conclusions: Over a 10 month period post integration of HIV care in PHC settings, we did not identify any significant changes to overall QoC and SwS as reported by patients and caregivers at PHC clinics. This suggests that the implementation of integration was done with a high concern for the provision of high-quality health care. However, variations were observed by participants' purpose of visit where tuberculosis attendees reported increases in mean QoC and SwS scores and child health attendees reported decreases in the scores. Further research is needed to understand these disparities in patient QoC and SwS to ensure excellent care experiences for all patients attending PHC clinics with integrated HIV care.

3.1 Background

Increasing access to antiretroviral therapy (ART) for HIV patients is one of the largest current international public health challenges. As a result of many Sub-Saharan African countries having established vertical (i.e. stand-alone) programmes in the early periods of ART provision. Concerns have been raised about the efficiency, sustainability, and equity of treatment provision in this model, as well as its wider impact on the health system (36,96). Additionally, as improved access to ART is resulting in longer life expectancies for people living with HIV (PLWH), providing a high quality of care (QoC) across the care continuum must be prioritised (70). One widely-promoted strategy through which to expand access to ART is to integrate or decentralise HIV care to primary health care (PHC) clinics (135,136). Although ambiguities exist with respect to the operationalisation of integration, there is evidence of positive effects of integrating HIV in PHC on patients in some settings. Some of the benefits of doing so include increased and earlier access to ART and improved survival rates (74), greater engagement in care (96,135) and increased non-HIV service utilisation (88). Broadly, proponents of integration have highlighted the advantages of expected improvements in community support (137), reduced transport time and costs to access ART, and improved clinic infrastructure and sharing of resources (84,88).

Others have raised concerns about the potential problems of increased wait times for patients (84), reductions in quality of care due to increased workloads (138), less focus on non-HIV conditions, reduced access to specialists (36), compromised patient confidentiality and increasing HIV-related stigma (67).

Patient-centred healthcare systems are gaining recognition as an optimal strategy through which to retain patients in care and to ensure that their needs are met within the peripheral level of a health system where patients are viewed holistically as a person, not as a “visit” (24,64). Patient satisfaction is increasingly recognised as a critical aspect of a well-functioning healthcare system, and can influence health service utilisation, adherence, and patient-provider relationships (27,80,81). Satisfaction with staff is particularly important in contexts with grave human resource challenges (23,27), such as in South Africa.

Of the limited evidence that is available on the impact of integration on patients, the majority of the relevant literature relates to binary integration (64) (i.e. integration of HIV and a disease-specific programme), and the results are mixed. In a 2012 study examining patient satisfaction with care in the context of integrating sexual and reproductive health (SRH) with HIV care in Swaziland, the authors examined varying models of integration (i.e. stand-alone with only HIV care, partial integration with SRH and HIV in the same building, and fully integrated care in the same consultation room). Satisfaction with care was found to be the highest in stand-alone clinics, with the odds being three times greater for perceived disclosure/exposure of HIV status in the partially integrated context compared with the stand-alone (73). A study from Kenya in 2012 (155) examined the integration of antenatal (ANC) and HIV care in a cluster randomised control trial. The authors aimed to understand if clinics where services were fully integrated (e.g. ANC, PMTCT, HIV care at the same visit) had differences in patient satisfaction when compared to non-integrated models (e.g. some aspects of care provided in one visit and others to a referral in the same health facility). Their results indicated that HIV-infected women were more satisfied with the fully integrated model than their uninfected counterparts. Another study conducted in urban South Africa (82) showed that HIV patients who had been referred to local clinics once stable, reported reduced transport time and cost, but also lack of specialised care with a doctor,

poor services, mistreatment at the clinic, and increased stigma through lack of confidentiality. A study in Kenya (80) of HIV patients' satisfaction and perceived stigma in integrated health centres and a sub-district hospital revealed a decrease in satisfaction in the first 3 months post integration, but by 12 months post-integration, satisfaction with services had increased. As discussed by Odeny et al. (80), despite system-level positive effects of integration on HIV care into PHC, whether or not the reorganisation of health service delivery may disrupt service provision or lead to a reduced satisfaction from patients is yet to be seen. However, there have been few studies documenting patient views on quality of care. Additionally, little evidence exists regarding the ways that patients' perceptions of quality of care change as integration progresses, especially in the PHC setting. The aim of this study was to gain an understanding of whether patients' perceptions of quality of care or satisfaction with staff changed from year one to year two in the post-integration context and if it did, to identify where the differences lie. We hypothesised that escalations in the numbers of HIV patients (and related workload increases) at the PHC clinics would compromise patients' perceptions of QoC and SwS. We conducted this study in public-sector primary health care clinics in the Free State, South Africa.

Study setting

South Africa has an estimated 6.4 million people living with HIV (116), and it concurrently has the largest public-sector ART programme in the world. The national prevalence of HIV in South Africa is estimated at 18.8% of the adult population (15-49 years old) (6). The public health system in South Africa is characterised by a lack of health care workers (HCWs), both in terms of skills mix and distribution, inadequate referral systems, insufficient monitoring and evaluation, and disruptions in drug supplies (30,42,116,140). Many historical relics of South Africa's apartheid system, such as the forced relocation of black South Africans to homelands, contribute to unequal access to the health system and perpetuate disparities in the social determinants of health and thus consequently contribute negatively to the health of the population (114).

This study took place in the Free State province South Africa, which has a population of 2.8 million, and makes up 5.2% of the total South African population (97). Free State is largely rural, and includes 2 former homelands from the previous apartheid government (126). The estimated prevalence of HIV among 15-49 year olds was 20.4% in 2012. This figure is greater than the national average of 18.8% (6). Among antenatal clients, HIV prevalence is the 3rd highest in the country at 32.0% when compared to the national average of 29.5% (2012) (101). The ART treatment programme began via a vertical system in 2004. According to this structure, patients accessed HIV testing, treatment and care at separate sites (141). A national policy (89) supporting the integration of HIV care through Nurse Initiated Management of ART (NIMART) in PHC facilities was implemented in April 2010. In this context, integration refers to patients' ability to access comprehensive HIV care (i.e. from prevention, to treatment initiation, to follow-up) at the public-sector primary health care clinic (a.k.a. "mainstreaming") (74). In practice, integration in the clinic setting has been revealed to be diverse; ranging from disease-specific nurses and consultation rooms in the same clinics (i.e. co-location) to each nurse providing comprehensive care in one consultation room. In many clinics, the addition of staff (e.g. pharmacy assistants and data entry staff) and training professional nurses in comprehensive management of HIV patients via the Practical Approach to Lung Health in South Africa (PALSA plus) guidelines (132) preceded integration into PHC clinics. Where possible, the Free State Department of Health (FSDOH) attempted to remedy space concerns via modular structures and pharmacy renovations. We selected four clinics through which to administer our survey. These clinics represented a total catchment area of 234, 907 patients (8% of the province).

3.2 Methods

3.2.1 Study design

After integration had begun (defined as month the PHC clinic provided comprehensive HIV care), a survey was administered to patients and caregivers. This was done in two cross-sectional waves of approximately 10 months apart at four primary health care clinics. Clinics that had at least one professional nurse were identified in the District Health Information System

(DHIS) in June 2011 (n=219). Exclusion criteria encompassed clinics that were: 1) “priority sites” identified by key informants as clinics that had been designated as ART clinics under the previous vertical programme and had thus received extra resources through which to provide HIV care (i.e. additional staff or financial resources) (n=39); 2) clinics not yet integrated (i.e. not able to initiate patients on ART at the clinic) by the administration of the first survey (n=62) or 3) atypical clinics (e.g. catered to specific populations) (n=3). A total of 115 clinics met the inclusion criteria and were further stratified into districts, catchment population and geography. Catchment population was classified as: small - less than 25, 000 (n=38), medium - 25, 000 to 50, 000 (n=46) and large - over 50, 000 people (n=31). Of the 115 clinics, geographic characteristics were also used for stratification. These included urban (n=39), rural (n=57) or former homeland (n=19), and the year integration began (2010: n=33, 2011: n=66, 2012: n=16). Purposive sampling was used to select four clinics (3.5% of clinics meeting the inclusion criteria) with the aim of capturing the diversity of the aforementioned strata. The four clinics represented four different districts. Two were large, urban clinics, one was a large clinic in a former homeland and one was a small, rural clinic. Two of the clinics began integration in November 2010, one in May 2011, and one in February 2012.

Clinic recruitment began by obtaining permission and inputs from district and local area managers regarding whether the selected clinics could accommodate a research team. All staff members were provided information about the study aims by the PI, who introduced the study along with the Provincial NIMART mentoring and support specialist. One week later, clinic managers were contacted to enquire whether or not staff consensus had been obtained regarding the decision to have their PHC clinic participate in the study. All clinics agreed to participate.

Participants were recruited daily via an announcement by the head nurse who explained the purpose of the study and emphasised the voluntary nature of participation, and that it would not impact patients’ access to care. All people present in the waiting area were approached as they queued, and were invited to participate. All participants were aged 18 years old and older, and had identified the site where the survey was being conducted as the clinic where they were receiving the majority of their care. Informed consent procedures were provided in the

participant's language of preference (i.e. seSotho, isiXhosa or English), and all participants provided written consent. Surveys were administered by a research assistant in the participant's preferred language. Participants self-identified as either the patient or the caregiver (i.e. family members or friends accompanying a patient to the clinic). Caregivers were included as proxy for the patient experience, and were asked to respond from their perception of the patient's experience. Caregivers were especially important in instances where they were more familiar with the patients' health needs than the patient (e.g. child health). The targeted sample size included all consenting patients who attended the PHC clinic over the three days that the survey was administered. Participants were surveyed in a semi-private location (where space permitted) or in the waiting area. In instances where disease-specific days of the week were assigned to patients (e.g. chronic disease care days or immunisation days), clinic visits in Year 2 were scheduled on the same days of the week.

The survey, found in Appendix A.2 and A.3 along with an administration guide, was previously validated in the province by Wouters et al (81) and applied a Likert scale to measure patients' and caregivers' perceptions of Quality of Care (QoC) for 14 dimensions and Satisfaction with Staff (SwS) for 8 dimensions. As summarised in Figure 3.

Figure 3. Dimensions of quality of care and satisfaction with staff applied in the survey

Quality of Care (QoC)	Satisfaction with Staff (SwS)
1) medical care provided 2) complaint procedure 3) cleanliness of the clinic 4) privacy during examinations 5) confidentiality of medical records 6) respect shown by nurses 7) respect shown by doctors 8) health information 9) information about medication provided by nurses 10) information about medication provided by doctors 11) opportunity to ask questions 12) language used during consultations 13) hours of clinic operation 14) wait time before consultations.	1) nurses 2) doctors 3) lay counsellors 4) pharmacist/pharmacy assistant 5) nutritionist 6) social worker/psychologist 7) clerk 8) attendant staff (e.g. cleaner)

Additional socio-demographic questions were added to capture age, sex, purpose of visit, months visiting this clinic, and frequency of visit. Purpose of visit was a categorical variable and included: prenatal care, reproductive health, multiple conditions, geriatric, child health, nutrition, ART, laboratory services only, medication pick-up only, tuberculosis, chronic conditions and “other.” Three open-ended questions were added to the survey. They were deliberately framed in the positive or negative as per input from key informants with the objective of understanding:

- 1) *General dissatisfaction around services* -“Do you have any complaints about the service you receive at the clinic?”
- 2) *Improvements in service delivery since integration* -“Have you noticed any improvements in the services since (Date of Integration)?”
- 3) *Compliments for the staff or care* -“Do you have any compliments you would like to share about the staff or care you receive here?”

With respect to the second question, if participants had not noticed any improvements since integration, they were further probed as to whether they had noticed any changes.

Analyses were conducted using SAS 9.2 ® (SAS Institute Inc., Cary, NC, USA) and STATA12 ® (College Station, Texas). A composite score was created through the summation of each valid dimension for QoC and SwS respectively. Dimensions were deemed invalid if they had more than 50% of responses as “not applicable” or “don’t know.” The data were reversed scaled in order to allow for a more intuitive interpretation. Therefore, the higher the score, the more satisfied the participant was with QoC or SwS. From herein, QoC and SwS score refers to summated scores with valid dimensions only. The purpose of visit category “other” was collapsed to include participants reporting purpose of visit as laboratory tests, medication pick-up only, and nutrition, as well as “other” due to the small number of respondents. Responses to “geriatric” were aggregated with chronic care. Qualitative data were inductively and deductively thematically coded based on the dominant emerging themes for the first three responses to each question in Excel. A second researcher coded random excerpts of responses, and congruency was

checked. The emerging codes were then collapsed into categories corresponding to the specific dimensions of quality of care or satisfaction with staff.

Student's t-tests were performed to examine differences between covariates and QoC and SwS scores, and Pearson's χ^2 was utilised to test differences in medians, where appropriate. Tukeys honest significance test was used to adjust for multiple comparisons. Multiple Linear Regression was utilised to identify factors that were independently associated with QoC and SwS scores in separate models. The regression method was carried out with robust standard errors, and heteroskedasticity was removed as identified by the White-Huber sandwich test. Variables were chosen for the final model based on the current literature. All models were checked for joint significance between interactions and interacted variables, and similar standard errors were detected. The Ramsey specification test confirmed model specifications. Variance inflation factors were checked on regression specifications in order to understand the correlation between the regressors. The highest variance inflation factor (VIF) was 5.14 for any of the regression specifications indicating none of the variables were problematically collinear. Dummy variables were used in the model for all covariates. Interactions were checked between variables. Since research has shown that patients' perceptions of health related to quality of life varies significantly within the first few months of ART initiation (156,157), a sensitivity analysis excluding participants attending the clinic for less than 6 months was conducted with the regression to understand how this influenced the outcomes. Medians were analysed for specific dimensions contributing to summated QoC and SwS scores using the Mann-Whitney U test to detect differences between years. Ethics approvals were obtained from the University of British Columbia, Canada and the University of the Free State, South Africa. Permission for the study was obtained from the Head of the Free State Department of Health.

3.3 Results

3.3.1 Clinics and survey participants

All four clinics recruited agreed to participate both years of the study. Data were collected for Year 1 in April and May 2012 and for Year 2 between February and March 2013.

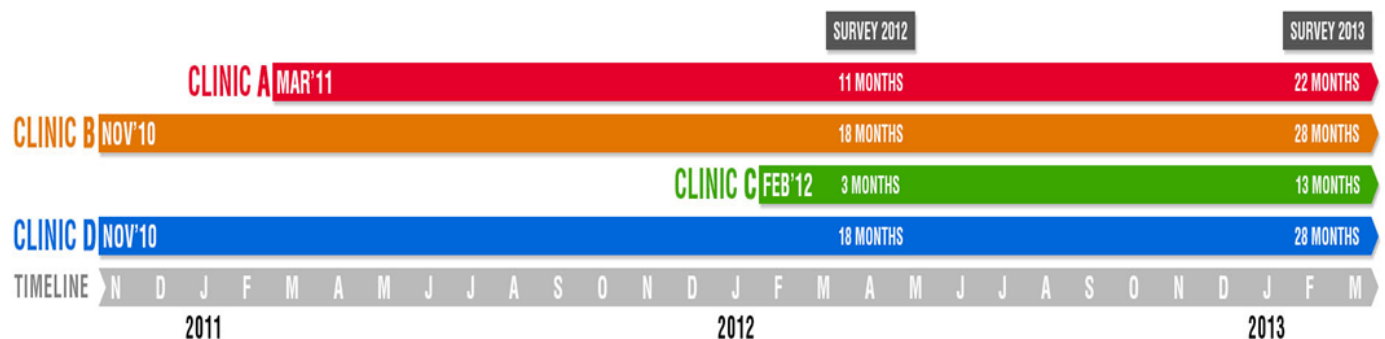
As described in Table 6, all clinics were at varying months post-integration. The median number of months since integration at the time of the survey was 18 (IQR: 25-12). Three clinics experienced an increase of adult ART patients between surveys while one decreased. Two of the clinics integrated (i.e. provided comprehensive HIV care) in November 2010, one in May 2011 and one in February 2012 as seen in Figure 4.

Table 6. Clinic attributes of the 4 clinics where patient/caregiver surveys (n=910) were collected

Clinic	Size	Catchment Population (2011)	Urban, Rural, Former Homeland	Integration (Mo-Yr)	Months Since Integration at time of survey		Number of Adults on ART in clinics at the time of survey		Number of Respondents (n)	
					2012	2013	2012	2013	2012	2013
A	Large	98,992	Urban	May-11	11	22	1077	1574	185	166
B	Small	23,013	Rural	Nov-10	18	28	248	332	88	56
C	Large	57,570	Urban	Feb-12	3	13	110	384	70	94
D	Large	55,332	F. Homeland	Nov-10	18	28	1580	910	144	107
Total		234,907		Median (IQR)	14.5 (7-18)	25 (28-17.5)	Total		487	423

Note: ART is Antiretroviral Therapy, IQR is Interquartile Range

Figure 4. Months since integration of clinics at the time of patient/caregiver survey



A total of 910 participants were surveyed in the four clinics over the study, with 487 in 2012 and 423 in 2013 as seen in Table 7. The participants were mostly female (76%). A total of 89% of participants identified themselves as patients, 9% as caregivers and less than 1% as both. The median age of participants was 40 years old (IQR: 23). The median number of months patients had been visiting the clinic was 36 months (IQR: 108). Seventy-nine percent (n=624) of

the participants visited the clinic monthly with the majority of respondents reporting the purpose of visit as chronic disease care (31%) or ART (28%) followed by child health (13%), multiple conditions (8%) and “Other” (6%). No participants reported taking the survey both years.

There were differences between participants when examined by clinic. The largest numbers of participants were from clinics A (large, urban) and D (large, former homeland) at 39% (n=351) and 28% (n=251), respectively. Clinics C (large, urban) and B (small, rural) had the smallest number with 18% (n=164) and 16% (n=144), respectively. Clinic D had a significantly lower percentage of male participants at 16% while the remaining clinics were between 26-27% ($p<0.03$). Clinics A and D had higher patient participation (91%) as opposed to caregiver when compared to Clinic C (84%) ($p<0.03$). There were also differences in the median age of participants (Pearson's χ^2 (3) = 18.59, $p<0.001$) by clinic where the Clinic B had a larger median than the rest. When examined categorically by age, Clinic A had a significantly higher percentage of participants aged 46-55 (23%) compared with all other clinics, which ranged between 13-14% ($p<0.01$). Differences existed in the median number of months patients have been visiting the clinic with the Clinics A and D having lower medians for this parameter (18.5 and 24 respectively) than Clinics B and C (60 and 84, respectively; Pearson's χ^2 (3) = 60.31, $p<0.001$). However, when examined categorically, Clinic C had the highest percentage of participants (29%) who had been visiting the clinic less than 6 months when compared with all other clinics ($p<0.001$) while Clinic B had the largest percentage of participants who had been coming for over 10 years (40%) compared with all other clinics, which ranged from 9-21% ($p<0.001$). Clinic A had the largest percentage of participants coming monthly (88%) compared to 65-79% in other clinics ($p<0.001$). Regarding the purpose of visit, the lowest percentage of participants reported coming for child health occurred in Clinic A (4%) compared to percentages between 16-19% in other clinics ($p<0.001$). Clinic B has the lowest percentage of participants reporting coming for ART at 6%; this compared to 27-33% ($p<0.001$) at other clinics. Clinics A and B had the largest percentage reporting that their visit was for chronic care at 39% and 38% respectively while clinics C and D reported 21% and 23% ($p<0.001$).

As seen in Table 7, a number of statistically significant differences were observed when characteristics of participants in the different years were compared. For example, more participants were patients as opposed to caregivers in 2013 (95%) compared 2012 (84%) ($t=-5.28$, $p<0.001$). There were more respondents in the 46-55 year old age group (20% compared to 14%; $t=-2.41$, $p<0.02$) and more participants reported visiting the clinic for the previous 2-5 year timeframe compared to 2012 (23% vs. 16%; $t=-2.43$, $p<0.02$). In 2012, significantly more participants reported coming every 3 months to the clinic compared to 2013 (11% vs 6%, $t=2.84$, $p<0.01$) while significantly more participants reporting coming “less than once per 3 months” in 2013 compared with 2012 (11% vs. 2%, $t=-5.18$, $p<0.001$). With respect to participants’ self-reported purpose of visit, 2012 encompassed significantly higher percentages of participants reporting coming to the clinic for prenatal care (5.5% vs. less than 0.5%, $t=4.65$, $p<0.001$), reproductive health (14% vs. 2%, $t=6.87$, $p<0.001$) and ART (31% vs 24%, $t=2.64$, $p=0.009$). However, 2013 saw the increase of participants reporting coming for multiple conditions (12% vs 4%, $t=-4.36$, $p<0.001$), chronic conditions (37% vs 26%, $t=-3.37$, $p=0.001$) and “Other” (9% vs 3%, $t=-3.39$, $p=0.001$). Differences in participation by clinics was noted. When comparing medians from 2012 and 2013, we found differences between median ages of participants (42 years in 2013 compared to 39; Pearson’s $\chi^2(1)=4.70$, $p=0.03$) and median months visiting the clinic (26 months in 2012 vs. 48 months in 2013; Pearson’s $\chi^2(1)=6.45$, $p=0.01$). These differences summarise how survey participants were different between years.

Table 7. Characteristics of respondents to the patient and caregiver survey 2012 and 2013 (n=910)

		YEAR		p-value
		2012 n=487 %(n)	2013 n=423 %(n)	
<i>Gender</i>	Male	24.0%(117)	25.5%(108)	0.30
	Female	76.0%(370)	75.7%(315)	0.30
<i>Patient/Caregiver/Both</i>				
	Patient	84.4%(411)	95.2%(401)	<0.001
	Caregiver	13.1%(64)	4.5%(19)	<0.001
	Both	1.6%(8)	0.2%(1)	0.02
<i>Age of Respondents (Years)</i>				
	18 to 25	13.4%(64)	14.6%(61)	0.60
	26 to 35	27.9%(133)	23.7%(99)	0.16
	36 to 45	23.7%(113)	18.5%(77)	0.06
	46 to 55	14.3%(68)	20.4%(85)	0.02
	56 and more	20.8%(99)	22.8%(95)	0.47
<i>Months Visiting the Clinic</i>				
	Upto 6 months	16.8%(82)	12.6%(53)	0.07
	6mos to 1 year	17.7%(86)	12.9%(54)	0.04
	1-2 years	12.5%(61)	12.9%(54)	0.88
	2-5 years	16.4%(80)	22.9%(96)	0.02
	5-10 years	15.6%(76)	20.2%(85)	0.07
	More than 10	21.0%(102)	18.6%(78)	0.37
<i>Frequency of Clinic Visit</i>				
	At least twice a month	7.04%(33)	4.7%(20)	0.14
	Once a month	80.0%(375)	78.9%(333)	0.70
	Every 3 months	10.9%(51)	5.7%(24)	0.01
	Less than once per 3 months	2.1%(10)	10.7%(45)	<0.001
<i>Purpose of Visit</i>				
	Prenatal Care	5.5%(27)	0.5%(2)	<0.001
	Reproductive Health	14.0%(68)	2.1%(9)	<0.001
	Multiple Conditions	4.1%(20)	12.1%(51)	<0.001
	Child Health	10.7%(52)	14.9%(63)	0.06
	ART	31.4%(153)	23.6%(100)	<0.001
	TB	4.3%(21)	1.0%(4)	<0.001
	Chronic Conditions	26.5%(129)	36.9%(156)	<0.001
	Other	3.5%(17)	9.0%(38)	<0.001
<i>Clinics</i>				
	Clinic D	29.6%(144)	25.3%(107)	0.15
	Clinic C	14.4%(70)	22.2%(94)	0.002
	Clinic B	18.1%(88)	13.2%(56)	<0.05
	Clinic A	38.0%(185)	39.2%(166)	0.698

Note: **Bolded values** indicate a higher percentage than adjacent year (95%CI, p<0.05)p-value (two-sample two-tailed t-test, equal variance not assumed), ART is Antiretroviral therapy for HIV patients

3.3.2 Quality of care

QoC was measured on 14 dimensions, of which 11 met the criteria for validity allowing for a highest possible score of 55. The three dimensions deemed invalid were (in parentheses is the number of participants with a valid response and as a percentage of total participants): quality of complaint procedure (n=221, 24%), respect shown by doctors (n=378, 42%), and quality of medical information provided by doctors (n=380, 42%).

QoC between the years when the survey was conducted utilising student's t-test among the mentioned covariates that can be found in Table 8. T-test results showed female respondents reported a decrease in their QoC in the year 2013 (45.3 to 43.9, $t=2.81$, $p=0.003$). Additionally, those aged 56 years old and above reported a decrease in QoC (46.2 to 44.1, $t=2.52$, $p=0.01$). Those reporting coming "Every 3 months" reported decreased QoC (47.2 to 44, $t=2.30$, $p=0.02$). When examining mean QoC by purpose of visit, child health participants reported a decrease (46.4 to 43.6, $t=2.40$, $p=0.02$). When examining QoC between the years by clinic, we observed changes in one clinic, Clinic B (small, rural), where QoC increased from 46.5 to 49.8 ($t=-3.85$, $p=0.0002$).

I found significant differences in the median scores between the years 2012 and 2013 for the components that comprised the QoC scores. The "Quality of Medical Care provided" decreased ($z = -3.29$, $p < 0.001$), with no change in the median but changes in the distribution of responses. There were fewer participants who reported being "very satisfied" or "satisfied" in this domain from 2012 (93%) to 2013 (79%), and more participants reported being "very dissatisfied" or "dissatisfied" in 2013 (13%) compared to 2012 (5%). The median for "Privacy during examinations" increased from 4 to 5 ($z = -6.25$, $p < 0.001$). The "Confidentiality of the medical record" decreased ($z = -2.72$, $p < 0.001$), with no change in the median but a decreases in participants being "very satisfied" or "satisfied" from 2012 (95%) to 2013 (85%). The median for "Respect shown by nurses" increased from 4 to 5 ($z = -3.22$, $p < 0.001$). The "Language used

during consultations” increased ($z = -9.41$, $p < 0.001$) where the medians were the same but 81% of participants reported being “very satisfied” in 2013 compared to 50% in 2012. Concerning “Waiting time before consultations,” a decrease in medians from 4 to 2 ($z = 10.95$, $p < 0.001$) was noted, with an increase of being “very dissatisfied” or “dissatisfied” from 2012 (27%) to 2013 (69%). These differences between years highlight which components of QoC and SwS may contribute to differences in overall scores between the years.

Table 8. Mean quality of care scores by year for survey participants (n=910)

QoC Score (max. 55)								
		2012			2013			p-value
		Mean	sd	n	Mean	sd	n	
Respondents								
	<i>Male</i>	45.9	5.3	112	45.5	8.2	101	0.20
	<i>Female</i>	45.3**	5.8	370	44.0	6.9	315	>0.001
Age of Respondent (years)								
	<i>18 to 25</i>	45.5	5.5	63	43.8	8.2	61	0.33
	<i>26 to 35</i>	44.3	6.6	133	45.2	6.9	99	0.30
	<i>36 to 45</i>	46.2	4.2	113	45.0	8.0	77	0.97
	<i>46 to 55</i>	44.7	7.1	68	43.3	6.9	85	0.06
	<i>56 and above</i>	46.2**	4.8	99	44.1	6.5	95	0.02
Months Visiting the Clinic								
	<i>Up to 6 months</i>	46.6	4.8	82	44.2	9.5	53	0.57
	<i>6 months to 1 year</i>	45.9	4.5	86	45.3	6.6	54	0.71
	<i>1-2 years</i>	45.5	5.6	60	45.1	7.2	54	0.97
	<i>2-5 years</i>	44.8	6.3	80	44.9	5.8	96	0.53
	<i>5-10 years</i>	44.4	6.8	76	43.2	7.6	85	0.22
	<i>More than 10</i>	45.2	5.9	102	44.3	7.2	78	0.57
Frequency of Clinic Visit								
	<i>At least twice a month</i>	46.5	4.6	33	46.5	4.6	33	0.46
	<i>Once a month</i>	45.2	5.8	374	44.4	7.0	333	0.14
	<i>Every 3 months</i>	47.3**	4.9	51	44.0	7.0	24	0.03
	<i>Less than once per 3 mos.</i>	41.8	6.1	10	44.7	8.2	45	0.11
Purpose of Visit								
	<i>Prenatal Care</i>	44.1	7.5	27	45.0	4.2	2	0.90
	<i>Reproductive Health</i>	45.5	5.2	68	39.9	13.4	9	0.29
	<i>Multiple Conditions</i>	45.5	3.9	20	47.2	5.8	51	0.07
	<i>Child Health</i>	46.4**	4.9	52	43.6	7.3	63	0.03
	<i>ART</i>	44.5	6.2	153	43.6	7.8	100	0.35
	<i>Tuberculosis</i>	48.7	3.0	20	51.0	5.4	4	0.10
	<i>Chronic Conditions</i>	45.7	5.6	129	44.3	6.3	156	0.06
	<i>Other</i>	45.1	5.2	17	44.8	7.8	38	0.95

**** Indicates Statistical Significance $p < 0.05$ using t-test**

ART is antiretroviral therapy

3.3.3 Satisfaction with staff

The SwS summated score was out of 8 dimensions, 4 of which were deemed valid, thus allowing for a highest possible score to be 20. The following dimensions did not meet the criteria for validity and were not included in the summation of SwS score (in parentheses is the number of participants with a valid response and percentage of total participants): satisfaction with doctors (n=339, 37%), satisfaction with lay counsellors (n=234, 26%), satisfaction with nutritionist (n=16, 18%), and satisfaction with social worker or psychologist (n=61, 7%).

No differences were noted in the mean SwS scores between 2012 and 2013. However, when examining SwS between the years 2012 and 2013 among the clinics, we observed increases in three of the four clinics: Clinic C (15.7 to 17.1, $t=-2.55$, $p=0.01$), Clinic A (13.7 to 15; $t=-3.74$, $p<0.001$) and in Clinic B (17.6 to 19.0, $t=-3.18$, $p=0.001$). However, in Clinic D, the SwS decreased (17.6 to 14.7, $t= 9.63$, $p<0.001$) and therefore overall, the SwS did not change between 2012 and 2013. No differences were found when comparing the SwS for any of the other covariates.

When examining medians of the individual components of the SwS, score differences were identified between the years of survey administration. “Satisfaction with nurse” decreased from 2013 to 2012 ($z = 3.755$, $p<0.001$). Although no change in the medians was seen, less participants reported “very good” in 2013 (38%) versus 2012 (47%). Also, more participants reported “Satisfaction with nurse” to be “poor” in 2013 (8%) compared to 2012 (1%). The median score for “Satisfaction with pharmacist/pharmacy assistant” decreased from 5 to 4 ($z = 5.291$, $p<0.001$) with more participants reporting “poor” or “very poor” in 2013 (10%) compared to 2012 (4%). Also, fewer participants reported “good” or “very good” in 2013 (83%) compared to 2012 (91%). These changes in individual scores between the years indicate where changes in individual components of the SwS score lie.

3.3.4 Regression results

Table 9 shows the linear regression estimates (adjusted for clinic differences) and their 95% confidence intervals for mean QoC scores (n=872). Additionally, it shows the regression results excluding participants who reported coming to the clinic for less than 6 months, termed the “excluded” model (n=747). Since significant differences were identified between clinics, the following results will be discussed adjusted for clinic differences. Covariates included in the models are sex, year surveyed, age of respondent, years visiting clinic, frequency visiting clinic, and purpose of visit.

When holding all factors constant, no differences were detected for mean QoC scores for the years that the survey was conducted (2012 vs. 2013). On average, patients 36-45 years old reported a score that was 1.63 points higher (CI: 0.16, 3.10) ($p<0.05$) when compared to patients 18-25 years old, and when other factors were controlled for. This increase was also observed in the model that excluded clients with <6 months of clinic participation with a score 1.86 points higher (CI: 0.19, 3.53) ($p<0.05$). Patients reporting coming to the clinic for more than 10 years reported a QoC score that was on average 1.44 points lower (CI: -2.79, -0.09) ($p<0.05$) than those who reported coming to the clinic for 6 months to 1 year, while all other factors were held constant. This reduction was also present in the excluded model. Participants who said they had been coming every 3 months reported a 2.76 point higher mean QoC score (CI: 0.13, 5.39) ($p<0.05$) compared to those had attended at least twice a month. This was not present in the model that excluded clients of < 6 months. Concerning purpose of visit, in the excluded model, participants who had been coming to the clinic for child health reported 2.69 points lower mean QoC (CI: -4.49, -0.89) ($p<0.01$) compared to those who had been coming for chronic care. Also, in the excluded model, participants who came to the clinic for ART reported a 1.67 point lower mean QoC score (CI: -3.08, -0.26) ($p<0.05$) compared to those who came for chronic care. In both models, tuberculosis patients reported a higher mean QoC score compared to chronic care patients by 3.53 points (CI: 0.83, 6.23) ($p<0.05$) and 3.86 points (CI: 1.78, 5.94, $p<0.01$) in the excluded model. The R^2 for the adjusted model was 0.172 and 0.198 for the excluded model.

Table 9. Regression coefficients for patient survey results - quality of care

		Adjusted for Clinics		Adjusted for Clinics- <6 month excluded	
		[n=872]		[n=747]	
Covariates [reference]		B	95% CI	β	95% CI
<i>Sex</i>					
	Female	-0.51	(-1.57,0.55)	-0.5	(-1.6,0.60)
	[Male]	REF	(1.00)	REF	(1.00)
<i>Year</i>					
	2013	-0.81	(-1.73,0.11)	-0.54	(-1.5,0.42)
	[2012]	REF	(1.00)	REF	(1.00)
<i>Age Group</i>					
	[18 to 25 years old]	REF	(1.00)	REF	(1.00)
	26 to 35 years old	0.59	(-0.84,2.02)	1.21	(-0.4,2.82)
	36 to 45 years old	1.63**	(0.16,3.10)	1.86**	(0.19,3.53)
	46 to 55 years old	0.67	(-1.02,2.36)	0.72	(-1.14,2.58)
	56 years old and older	1.21	(-0.55,2.97)	1.2	(-0.78,3.18)
<i>Time Visiting Clinic</i>					
	up to 6 months	0	(-1.53,1.53)		...
	[6 months to 1 year]	REF	(1.00)	REF	(1.00)
	1 year to 2 years	-0.19	(-1.6,1.22)	-0.3	(-1.71,1.11)
	2 years to 5 years	-0.47	(-1.7,0.76)	-0.51	(-1.76,0.74)
	5 years to 10 years	-1.34	(-2.73,0.05)	-1.36	(-2.77,0.05)
	More than 10 years	-1.44**	(-2.79,-0.09)	-1.41**	(-2.78,-0.04)
<i>Frequency of Clinic Visit</i>					
	Once a month	2.21	(-0.12,4.54)	1.36	(-0.72,3.44)
	[at least twice a month]	REF	(1.00)	REF	(1.00)
	Every 3 months	2.76**	(0.13,5.39)	1.52	(-0.99,4.03)
	Less than once per 3 months	0.25	(-2.75,3.25)	-0.19	(-2.93,2.55)
<i>Purpose of Visit</i>					
	Other	-1.17	(-3.23,0.89)	-1.08	(-3.16,1)
	[Chronic care]	REF	(1.00)	REF	(1.00)
	Prenatal Care	-1.53	(-3.98,0.92)	-2.85	(-5.77,0.07)
	Reproductive Health	-1	(-2.92,0.92)	-0.73	(-2.81,1.35)
	Multiple Conditions	1.56	(-0.16,3.28)	1.43	(-0.29,3.15)
	Child Health	-1.79	(-3.59,0.01)	-2.69***	(-4.49,-0.89)
	ART	-1.21	(-2.58,0.16)	-1.67**	(-3.08,-0.26)
	Tuberculosis	3.53**	(0.83,6.23)	3.86***	(1.78,5.94)
<i>Clinic</i>					
	Clinic C	1.18	(-0.07,2.43)	0.68	(-0.59,1.95)
	(Clinic D)	REF	(1.00)	REF	(1.00)
	Clinic B	2.18***	(0.95,3.41)	1.36**	(0.14,2.58)
	Clinic A	-3.8***	(-4.86,-2.74)	-4.67***	(-5.71,-3.63)

Note: ** indicates significance at $p<0.05$, *** indicates significance at $p<0.01$, ART=antiretroviral therapy

Table 10 shows the regression estimates for Satisfaction with Staff (SwS) and reporting will be done for the model adjusted for clinic difference (n=872) and with those excluded who reported less than 6 months of clinic attendance (n=748). No differences existed in SwS scores from 2012 to 2013. Participants who were attending for a child health visit reported a 1.29 lower SwS score (CI:-2.21, -0.37) ($p<0.01$) compared to those coming for chronic care while holding all other factors constant. This was also true in the excluded model with a 1.77 points lower SwS score (CI, -2.71, -0.83) ($p<0.01$) compared to those coming for chronic care holding all factors constant. Tuberculosis patients reported a 2.01 higher SwS score (CI: 0.60, 3.42, $p<0.01$), when compared to chronic care patients in the unadjusted model. This situation was also present in the excluded model, where a 2.13 higher SwS score (CI: 0.74, 3.52, $p<0.05$) was reported while all other factors were held constant. The R^2 for the adjusted model was 0.210 and 0.247 for the excluded model.

Table 10. Regression coefficients for patient surveys - satisfaction with staff

Covariates [reference]		Adjusted for Clinics [n=872]		Adjusted for Clinics <6 month excluded [n=748]	
		β	95% CI	β	95% CI
<i>Sex</i>					
	Female [Male]	-0.46	(-0.97 , 0.05)	-0.37	(-0.90 , 0.16)
<i>Year</i>					
	2013 [2012]	0.25	(-0.24 , 0.74)	0.47	(-0.02 , 0.96)
<i>Age Group</i>					
	26 to 35 years old	0.31	(-0.4 , 1.04)	0.41	(-0.39 , 1.21)
	[18 to 25 years old]				
	36 to 45 years old	0.57	(-0.17, 1.31)	0.49	(-0.33,1.31)
	46 to 55 years old	0.51	(-0.29 ,1.31)	0.33	(-0.57 ,1.23)
	56 years old and older	0.64	(-0.22, 1.50)	0.52	(-0.44 ,1.48)
<i>Time Visiting Clinic</i>					
	up to 6 months	0.14	0.32	(-0.50 , 1.14)	...
	[6 months to 1 year]				
	1 year to 2 years	0.43	0.36	(-0.38,1.10)	0.29
	2 years to 5 years	1.25	-0.11	(-0.82 ,0.60)	-0.14
	5 years to 10 years	-0.62	-0.44	(-1.20 ,0.32)	-0.46
	More than 10 years	0.47	0.19	(-0.52 , 0.90)	0.16
<i>Frequency of Clinic Visit</i>					
	Once a month	1.2	(-0.05 , 2.45)	0.97	(-0.34 ,2.28)
	[at least twice a month]				
	Every 3 months	1.04	(-0.39 , 2.47)	0.82	(-0.73 , 2.37)
	Less than once per 3 months	0.53	(-0.96 , 2.02)	0.82	(-0.79 , 2.43)
<i>Purpose of Visit</i>					
	Other [Chronic care]	-0.7	(-1.62 ,0.22)	-1.02**	(-1.96, -0.08)
	Prenatal Care	-1.12	(-2.63,0.39)	-1.54	(-3.32, 0.24)
	Reproductive Health	-0.52	(-1.42 ,0.38)	-0.63	(-1.65, 0.39)
	Multiple Conditions	0.2	(-0.76 ,1.16)	-0.04	(-1.02 , 0.94)
	Child Health	-1.29***	(-2.21,-0.37)	-1.77***	(-2.71 , -0.83)
	ART	-0.62	(-1.29,0.05)	-0.66	(-1.33 , 0.01)
	Tuberculosis	2.01***	(0.60, 3.42)	2.13**	(0.74 , 3.52)
<i>Clinic</i>					
	Clinic C (Clinic D)	-0.05	(-0.74,0.64)	-0.24	(-1.00 ,0.52)
	Clinic B	1.69***	(1.02 ,2.36)	1.57***	(0.92, 2.22)
	Clinic A	-2.34***	(-2.8 , -1.81)	-2.70***	(-3.23,-2.17)

Note: ** indicates significance at $p<0.05$ *** indicates significance at $p<0.01$,
ART=antiretroviral therapy

3.3.5 Open-ended question responses

Of the total 910 patients, 44 % (n=398) responded that they had a complaint. Across all clinics and both years, several dominant themes emerged. The most common complaint, reported by 33% of participants was regarding long wait times prior to consultation. Staff shortage was commonly identified as a reason for this. Patient wait times were generally reported in the context of patients having to queue multiple times and long wait times, especially when accessing a pharmacist. Disorganised and long queues were often reported in the context of wait times and inefficiency. A second common complaint, was regarding confidentiality of medical records and patient information. This complaint was reported frequently especially with respect to providers identifying HIV patient files differently or placing patients with a specific disease in separate queues as shown by this quote from 47 year old female patient coming for ART to a large urban clinic in 2012:

"Those who [have] HIV, they are isolated to show the people that we are HIV".

A few reports of files being lost were reported resulting in concerns for patient confidentiality. Another common complaint, raised, was concerning clinic cleanliness and hours. Concerning hours, participants reported the clinic not opening on time and the hours not being long enough to accommodate work schedules, especially when patients are turned away and asked to return the following day. A further common complaint, was the lack of respect shown by nurses and staff in general and this was ascribed to staff being stressed. Another complaint was related to shortages or unavailability of medications and a small number complained about receiving expired or inaccurate medications.

Regarding improvements since the month and year of integration, 178 participants (20%) reported improvements. Many participants reported increased availability of comprehensive services as illustrated in the following quote by a 53 year old female patient coming for chronic disease care at a small, rural clinic in 2013:

“I feel the treatment they give us is better than before. We are seen quicker and everything is checked. I'm tested every 3 months for HIV and my glucose and blood pressure is checked every visit.”

Many participants reported an increase of HIV patients visiting the clinic after the time of integration and emphasised the value of all patients being seen equally. The following is a quote from a 58 year old female patient who came for chronic disease care to a small, rural clinic in 2013:

“HIV patients have been incorporated into the comings and goings of the other chronic patients and they are being treated the same as chronic patients in terms of the regularity they come and we sit in the same area now.”

Participants reported the mixed waiting area with both positive and negative reactions. Some felt the mixed waiting area meant all patients were equal while others had concerns about confidentiality of diagnosis if managed differently in a mixed waiting area. This was illustrated by the following quote from a 47 year old female patient coming for multiple conditions at a large, urban clinic in 2012:

“ARV patients sit with everyone else and that is not an improvement because we are called and that makes it obvious to everyone else as files are brought by this one person who is known to deal with HIV files. People with other conditions leave with their files and only HIV files are kept at the clinic.”

Concerning clinic efficiency, positive aspects of integration encompassed improved efficiency of services (e.g. quicker services), improved access of medication (both improved supply and availability), less referrals, increased access to ART and more comprehensive services. Additionally, participants noted a reduction in the number of people sent away at the end of the day, as well as increased geographic accessibility. However, wait times were reported in both positive and negative terms. Wait times were generally reported as having improved, specifically wait times to be seen by a physician and at the pharmacy. However, wait times were the most frequent complaint.

Many patients noted that medical information provided by nurses had improved, especially about HIV and common conditions. Many also commented on infrastructure improvements namely, building infrastructure, gardens and pharmacy. Regarding staff, participants reported that nurses displayed more respect since integration, that staff displayed improved skills from trainings and that the quality of counselling services had improved. Many reported observing increased numbers of staff especially counsellors, nurses, students, pharmacists and cleaners. Some reported increased frequency of visits from doctors. The organisational structure of the clinics were reported as improving and participants noted more sharing of responsibilities among staff and more organised systems. Improvement in the organisation of the queues and having clinic specific days for particular diseases were cited as examples. Lastly, participants reported increased community support (through patient support groups) and decreased HIV-related stigma through increased awareness of HIV at the community level. This was illustrated in the following quote from a 39 year old female patient coming for multiple conditions to a large, urban clinic in 2013:

"There are now often meetings regarding just ART patients and not only ART patients are invited, everyone. They have made a huge improvement towards stigma and discrimination."

When reporting compliments for the staff, 54% (n=495) responded to this question with a response other than no. The most frequently reported themes were around the value of nurses being respectful, friendly, cooperative, caring and supportive. Many reported the value of nurses providing good information and correct medication. Many participants commented about how nurses do a good job despite the staff shortages, that they work quickly and respect patient confidentiality. Concerning service provision, many reported the services being comprehensive, efficient, and affordable. A strong referral system was perceived by many. The positive impacts of staff providing community-based health information was reported frequently, as demonstrated in the following quote by a 44 year old female caregiver coming for child health to a large clinic in the former homeland in 2013:

“Every year these meetings and gatherings to uplift us and the nurses show care and acknowledgement by hosting such events. We have support groups that has built us to be better people and give out information to the patients.”

3.4 Discussion

As the integration of HIV care into PHC settings progressed in the four clinics sampled in Free State, South Africa, we did not observe any significant changes to overall QoC and SwS scores across between the two years. This is an important finding in a post-integration context because it provides evidence that quality of care and satisfaction with staff did not deteriorate during a period of the integration of HIV care into PHC clinics in a high-HIV burdened settings

A higher standard of care was reported by tuberculosis attendees between the years demonstrated by increased QoC and SwS scores, suggesting improvements. However, child health attendees reported decreases, suggesting compromises. As has been observed in other settings (94,105,108), the high QoC score and SwS scores for tuberculosis patients are most likely due to the overlap of health service needs and improved efficiencies between HIV and TB programmes. The reduction in QoC and SwS for child health attendees is of concern. This may be related to increased wait times, or staff having less time to spend on routine child visits because they are struggling to cope with increasing numbers of patients coming for HIV care. We also observed a reduction in QoC for those coming for ART, which is also concerning, and needs to be further explored. Patient preferences for stand-alone HIV care compared to integrated models have been shown in other studies where stigma, reduced access to specialised services, poor services at the PHC level, and lack of confidentiality may contribute to quality of care or preferences related to integrated or non-integrated care (73,80,82).

Our findings also point to high QoC scores for those aged 36-45 years old. This may be attributed to patients in this age group being more likely to have HIV and multiple other health needs, and as such, they may benefit greatly from the integrated model. However, a decrease in QoC scores seen in those visiting the clinic for more than 10 years may represent a large number of patients coming for chronic conditions where quality of care may have been compromised. As

evidenced by our qualitative findings, despite improved coordination for chronic disease care (e.g. diabetes and hypertension), these participants may be more likely to experience increased wait times as a result of the increased numbers of HIV patients who have been attending the clinics since integration. Therefore, these patients would be more likely to detect and report a difference in QoC. From our qualitative results, as well as from the decrease in median of the domain on wait times in the QoC score, I've identified high wait times as problematic to the provision of high quality integrated care. As discussed in the literature, patient wait times and its relationship with staff shortages, may influence patients' perceptions of QoC (67,158,159).

The perceptions regarding QoC and SwS with respect to the patient's relationship with the staff was mixed. Concerning the relationship with staff, improvements were identified in the domains of privacy during examinations, respect shown by nurses, and language used during consultations, while compromises were noted in quality of medical care, confidentiality and satisfaction with nurses between the years of the survey administration. Additionally, a decrease was identified in the domain of satisfaction with pharmacist/pharmacy assistant, suggesting that increased workload from increasing numbers of HIV patients may play a role in patient satisfaction of this domain. A major theme identified by patients in the qualitative data that were that of the value of respectful and cooperative staff. In contexts where clinics are understaffed and the workload arising from integration of service is increasing, these qualities may be compromised, especially for nurses, leading to a reduction in quality and satisfaction for patients. Efficiencies in integrated service provision must be identified, and it must be ensured that confidentiality is protected and staffing levels are maintained. Further research is needed to better understand the relationship of staffing levels and how they influence disparities in patient QoC and SwS in order to ensure that integration is implemented with high QoC and SwS for all patients attending PHC clinics.

Our qualitative findings reveal that participants have identified improvements with respect to enhanced health information, infrastructure, staff numbers and community support since integration. These suggest promising improvements for all staff working in primary health care clinics. However, the increases in wait times and lack of respect from staff may arise from

increases in workload related to the higher numbers of HIV patients attending the clinics. The decrease in ARV patients in one clinic during our study were presumably due to down-referral of HIV patients as nearby clinics integrated. This also suggests that integration of HIV care may not necessarily lead to sustained increases in HIV patients. These changes may impact patient perceptions of QoC and SwS differently.

Our study has a number of limitations. Survey administration was conducted in two cross-sectional waves on different groups of patients and therefore is not as robust as had it been a longitudinal study. However, the regression analyses was able to account for differences in participants between years. Clinic selection was purposeful and not randomised, and therefore the findings cannot be generalised to the experience of all clinics subsequent to the integration of HIV care in the Free State, nor indeed to the experience of clinics outside the Free State. We cannot speak to the quality of care or satisfaction with staff prior to integration, but our objective was to understand changes in the post-integration context and the findings represent a critical time period after integration ranging from three months to 28 months post-integration. Also, by framing our qualitative question regarding integration in a positive light in order to avoid implicitly making a connection to negative aspects of care provision and integration, we may not have adequately captured participants' negative observations related to integration. Our selection of patients and caregivers was also not randomised, but was conducted as a result of convenience sampling, and so these results cannot be generalised to all patients. However clinics were chosen to be as representative as possible of the spectrum of clinics in the Free State, and opportunities were given to as many patients as possible to come forward and record their experiences. Further studies are needed to understand if these results are similar across the province and in other provinces in South Africa. Patient surveys were at times administered in a semi-private location, thus could have possibly introduced a reporting bias for participants underreporting potentially stigmatising diagnoses. Although only 9% (n=83) of the survey participants were caregivers, their use as proxies for the patient experience may not accurately depict the patient experience. Some dimensions of QoC and SwS were excluded due to high invalid responses. Presumably, the dimensions were invalid as these services were not widely available at the clinics surveyed.

The strengths of this study include the large sample of patients and caregivers we surveyed in the 4 clinics, and that the data were collected at two time points. This allowed us to capture changes as implementation progressed. This study is unique in that it begins to address the gaps in research in order to understand the impact of integration of HIV care into PHC (64) clinics on all patients attending PHC clinics, not only HIV patients, as integration progresses.

In conclusion, quality of care and satisfaction with staff were not compromised over the course of our study despite increasing numbers of HIV patients in the majority of the clinics. The quality of TB care was perceived to be strengthened and the quality of child health care may have been compromised. However, further evidence is needed to understand these outcomes. These findings are timely as many settings are moving towards integrating HIV care through PHC clinics, and with local financing it will become increasingly important to ensure high quality, patient-centred, equitable health services in the PHC setting. For other settings moving towards integrated HIV and primary health care, caution must be taken to ensure quality care for all patients, especially child health attendees.

Chapter 4: The effect of integration of HIV care into PHC services on health care workers - perspectives from health care workers and key informants

Background: Expanding access to antiretroviral therapy (ART) in high HIV-prevalence settings has been challenging in the face of weak health systems. The integration of HIV care into the routine activities of primary health care (PHC) clinics is a strategy that has been adopted in order to expand access given human resource constraints. However, little is known regarding the impacts of integration on health care workers (HCWs). The objective of this study was therefore to analyse the impact, on the healthcare workforce, of the integration of HIV care into PHC clinics in Free State, South Africa.

Methods: Focus group discussions (FGDs) with HCWs were conducted in four PHC clinics in 2012 in which integration had occurred. FGDs were held again in these same four clinics in 2013, and FGDs were also conducted in 2013 in four additional clinics for a total of eight clinics. Key informant interviews (KIIs) were also conducted with a variety of health system officials including managers within the health system, non-governmental organisations, academics and policy makers. Results were thematically coded using ATLAS TI and analysed utilising a health systems framework.

Results: A total of 114 HCWs (2012: n=38, 2013: n=76) participated in 14 focus groups in the eight clinics, of which four clinics were surveyed both years. Forty-nine key informant interviews were also conducted (2012: n=24, 2013: n=25). Participants identified both positive and negative consequences associated with the integration of HIV care into PHC clinics for HCWs. The positive consequences included improved job satisfaction from the ability to provide comprehensive care and seeing HIV patients become healthier, improved training and mentorship, and the promotion of a team-based approach to care. The negative consequences related to increased workload in the context of health worker shortages, lack of resources and increased administrative responsibilities.

Discussion: The integration of HIV care into PHC had many positive and negative consequences for HCWs working in PHC clinics. Overall, although integration can be seen to have beneficial effects on the morale of HCWs at PHC clinics, attention must be given to workload concerns.

4.1 Background

In 2013, 35 million people, most of whom live in Sub-Saharan Africa (1), were living with Human Immunodeficiency Virus (HIV) worldwide. The lack of sufficient numbers of HCWs, their skills mixes and the distribution of health workers have been identified as barriers to expanding access to antiretroviral treatment (ART) for those who are HIV-infected (27,160). The African continent has 24% of the global disease burden, but merely 3% of the world's health workforce (161). One strategy for rapidly expanding access to ART that has been promoted by the World Health Organisation and others (48,64,96,135,136) is the integration or decentralisation of HIV care into primary health care (PHC) clinics. Task shifting (or task sharing) of elements of HIV care from hospital-based physicians to “lower” cadres of health workers (e.g. nurses) is an essential component of this strategy. However, staff shortages have been discussed as “the greatest challenge to integrated primary care”(96).

Task shifting or sharing has been shown to increase the number of people on ART and result in good patient outcomes (58,162). In integrated PHC settings, improvements in drug supply chains, diagnostic services, monitoring and data management, staff training, mentoring, supervision, support and infrastructure have been noted (67,76,83,84,87,88). In a study conducted in Zambia (67), integration of HIV care into PHC resulted in a more efficient and equitable distribution of space and staff. Integration was also found to have improved staff morale and their sense of teamwork, as well as resulted in reduced administrative workload and improvements in standardised service delivery. However, the authors caution that integration is not a solution for the overall staff shortage. Major challenges to integration exist. These include inadequate human resources, as well as a lack of managerial capacity and infrastructure, including laboratory services (65,76,83).

Nurse-initiated management of ART (NIMART) has been an essential strategy for enabling integration into PHC clinics (58,89) in South Africa. In April 2010, a national policy (89) supporting integration of HIV care through NIMART was implemented in PHC facilities. In this context, integration refers to the ability of patients to access comprehensive HIV care (i.e. from prevention, to treatment initiation, to follow-up) at the public-sector primary health care clinic (a.k.a. “mainstreaming”) (74). In practice, the model of provision of HIV care within clinic settings is diverse; ranging from disease-specific nurses and consultation rooms in the same clinics (i.e. co-location) to each nurse providing comprehensive care in one consultation room. In many clinics, the addition of support staff (e.g. pharmacy assistants and data entry staff) and training professional nurses in the comprehensive management of HIV patients via the Practical Approach to Lung Health in South Africa (PALSA plus) guidelines (132) preceded integration into PHC clinics. In general HCWs believe that NIMART has been a successful strategy (163). However, the perspectives of HCWs regarding the adequacy of the efforts that have been made, as well as their overall impacts, especially when human resources have been already stretched, have not been adequately studied.

Of the evidence that captures HCWs perspectives, one study examined factors that influenced HCWs’ preferences for various models of integration in South Africa (87). That study found that nurses’ desires to mitigate the HIV stigmatisation that occurred in a vertical (or HIV-specific) care delivery system helped to foster integration. However, challenges to integration identified in that study included nurses’ preferences for being specialised in a specific area of PHC, concerns associated with the vertical nature of reporting structures, a lack of support staff at the clinic level and high workloads. In another study conducted in South Africa (90), nurses and managers reported feeling empowered from their ability to provide ART and reported how integrating this service into their regular service provision facilitated creative problem solving and teamwork. However, staff shortages and pressure to balance the provision of quality care with attending to increasing numbers of patients were also reported. Additionally, the study suggested that the way that integration had been implemented functioned to undermine the ability to build long-term capacity at the clinic levels. Although PHC clinics where HIV care had

been integrated in South Africa had better infrastructure and human resources when compared to non-integrated clinics, concerns were expressed that deficiencies in reporting structures, physical space, and human resources in PHC clinics would hinder the provision of high-quality integrated care (85). Currently, there exists a gap in the evidence from the perspectives of all staff at PHC clinics in the post-integration context. This is especially important considering the critical role of support staff (i.e. data entry staff, community health workers, etc.) in integrated contexts. Further evidence is needed to capture the perspectives of all HCWs - as opposed to only the perceptions of nurses and managers - in order to understand where PHC capacity can be built and how staff can be further supported to ensure that no compromises in the provision of PHC are made (90,140,162).

South Africa has the largest number of patients with HIV in the world - an estimated 6.4 million people are living with HIV (116). The national prevalence is estimated at 18.8% (15-49 years old) of the population (2012) (101) and HIV/AIDS accounted for 32% of deaths in 2012 (107). The public health system in South Africa is affected by a lack of HCWs (both in terms of skills mix and distribution), inadequate referral systems, insufficient monitoring and evaluation, and interruptions in drug supplies (30,42,116,140). In South Africa, 41% of the professional nurses are employed in the private sector resulting in the availability of 141 public-sector professional nurses per 100,000 people (107). Highly prevalent diseases such as HIV, tuberculosis, and non-communicable diseases place an unprecedented strain on the public-sector health system, necessitating complex health system responses to these “colliding epidemics” (99). The ART treatment program in South Africa began via a vertical system in 2004 where patients had to access testing, treatment and care in separate sites (141). From 2010, in an effort to improve access to comprehensive care, HIV care was integrated into all PHC clinics, and PHC nurses were trained in NIMART. Prior to the implementation of NIMART in provinces such as the Free State province, the government attempted to remedy space concerns via modular structures and pharmacy renovations. The majority of the responsibility for caring for the complex disease burden in South Africa lies within the PHC system and it is critical to ensure

that high quality care is accessible to all South Africans within PHC clinics, especially given on-going staff shortages.

The aim of this study was to understand the integration of HIV care into PHC clinics from the perspective of concern for the wellbeing of the HCWs who are providing these services. We chose to understand this question in the context of the province-wide rollout of NIMART in the Free State province, South Africa, which has a population of 2.8 million, and which comprises 5.2% of the total South African population (97). In 2012, there were 91 public-sector professional nurses per 100, 000 people in the population (107) in Free State, the lowest in the country. The Free State province is largely rural with 2 former homelands from the previous apartheid government (126). The estimated HIV prevalence among 15-49 year olds was 20.4% (2012) (101). HIV prevalence among antenatal clients is the 3rd highest in the country at 32.0% compared to the national average of 29.5 % (2012) (101).

4.2 Methods

I designed a qualitative study for which data were collected through focus group discussions (FGDs) with HCWs, and through in-depth key informant interviews (KIIs) with health system officials from a variety of levels. These perspectives were chosen in order to attain a more complete understanding of the research question from multiple perspectives and from varying levels within the health system. We chose to conduct FGDs and KIIs over two waves, approximately ten months apart in order to identify changes as integration progressed. Four clinics were chosen to be sampled in Year 1. These clinics represented a diversity of districts, size, catchment population and months since integration. Clinic selection for FGDs began through the identification of clinics that had at least one professional nurse, as indicated in the District Health Information System (DHIS) in June 2011 (n=219). Exclusion criteria encompassed clinics that were: 1) “priority sites,” identified by key informants as clinics that had been designated as ART clinics under the previous vertical programme and had thus received extra resources to provide HIV care (i.e. additional staff or financial resources) (n=39); 2) not yet integrated (i.e. that were not able to initiate patients on ART at the clinic) by the first FGD

(n=62) and 3) atypical (e.g. catered to specific populations) (n=3). A total of 115 clinics met the inclusion criteria and were stratified by district, catchment population and geography. The catchment population was classified as: small - less than 25, 000 (n=38), medium - 25, 000 to 50, 000 (n=46) and large - over 50, 000 people (n=31). Of the 115 clinics, geographic characteristics consisted of urban (n=39), rural (n=57) or former homeland (n=19), and the year integration began (2010: n=33, 2011: n=66, 2012: n=16). Four clinics were selected through purposive sampling (3.5% of the clinics met the inclusion criteria). These represented a diversity of the strata. The four clinics represented four of the five districts - two were large, urban clinics, one was a large clinic in a former homeland, and one was a small, rural clinic. Two of the clinics began integration in November 2010, one in May 2011, and one in February 2012.

The study was designed to sample all participants until a saturation of themes was reached. We estimated that this criterion would be met by enrolling 80% of staff at the four clinics (n=41). Because, as demonstrated by the absence of convergent themes, Year 1 FGDs did not reach saturation, consequently, we selected an additional five clinics for Year 2, representing a diversity in size and geography of the catchment population. We excluded clinics which had not integrated at least six months prior to FGDs (n=35) and clinics which had participated in the previous year (n=4). Of the 28 clinics which met the inclusion criteria, all had integrated between March and June 2012. Upon further stratification on size (small: n=7, medium: n=17, large: n=4), and the geography of the catchment population (rural: n=10, urban: n=4, former homeland: n=14), five clinics (3.6% of the 138) were purposively selected based on key informant input to represent diversity in the strata in order to further elucidate the research objectives. Of the five clinics, two were medium sized urban clinics, two were small rural clinics, and one was a small clinic in the former homeland.

Clinic recruitment began by obtaining permission and input from district and local area managers as to whether the selected clinics could accommodate a research team. All staff was invited to participate by the PI, who along with the Provincial NIMART mentoring and support specialist, introduced the study. During clinic recruitment, the study's aims and the voluntary nature of participation were discussed with all staff. One week later, clinic managers were

contacted to obtain the consensus of the staff regarding the decision as to whether or not their PHC would participate in FGDs. In cases where the clinic had decided to participate in FGDs but where there were staff who could not attend the focus group due to scheduling issues, separate interviews were scheduled and conducted. Clinic managers were interviewed individually.

Key Informants (KIs) were purposively selected to capture diverse perspectives from key players across the health system from multiple viewpoints/levels including: 1) Clinic 2) District and Local Area 3) Provincial 4) employees of non-governmental organisation (NGO) and 5) Expert/Academic and Policy Maker. Snowball sampling technique was used to identify KIs until saturation was reached

The consent process for both FDGs and KIIs included obtaining written, informed consent and permission to audio record. Topic guides seen in Appendix A were developed from emerging themes from the literature, and guided discussions and interviews that were conducted in English. Ethics approval was obtained from the University of British Columbia, Canada and the University of the Free State, South Africa. Permission from the Head of the Department of the Free State Department of Health was also obtained.

The following questions were asked in order to understand the impact of integration on HCWs at PHC clinics from the perspectives of participants:

For Health care workers: “What are some of the benefits of offering ART at the primary care level? How has it been challenging? How has it impacted the administrative responsibilities you have?”

For Clinic Managers: “What are the positive benefits on staff of integration? Have there been any negative effects on staff?”

For other Key Informants: “What do you think the impacts (both positive and negative) are on human resources for health (please specify which cadre you are referring to)?”

Probes included: Workload, working conditions, morale/job satisfaction, stigma, attrition/staff turnover/absenteeism, and data collection.

Analysis was grounded in a critical realism approach (142) and interpretive description (143) methodologies guided the analysis. First, themes emerging from the data were inductively and deductively coded based on the guides in ATLAS TI ® (version 7.5.2, Thousand Oaks, CA: SAGE Publication). Random excerpts of codes were reviewed by a second researcher for congruency. Committee members were consulted to resolve discrepancies. Second, 148 codes were combined into fewer categories and applied to a health systems framework (133). Codes that did not fall into an element of the framework were considered new and emerging. Committee members were consulted on their relevance to the research question and adaptations of the framework to incorporate these themes. Six themes encompassing the domains of efficiency: job satisfaction and morale, workload and job performance, training, administrative responsibilities, support and infrastructure, and organisational changes emerged.

4.3 Results

4.3.1 Participants

As seen in Table 11, a total of 114 HCWs (2012: n=38, 2013: n=76) participated in 14 focus groups in eight clinics. In 2012, all four clinics that were selected agreed to participate. However, in 2013, only four of the five selected clinics participated, with one clinic unable to participate on the scheduled day of the FGD due to an audit. Due to travel logistics, the visit could not be rescheduled. Of the participants, 47 (41%) were professional nurses, 17 (15%) were other categories of nurses (e.g. enrolled nurses or assistant nurses), 6 (5.3%) were pharmacy assistants, one (1%) was a nutritionist, 13 (11%) were data entry staffs, 12 (11%) were security guards, general assistants or cleaners, and 18 (16%) were outreach workers (i.e. volunteer lay counsellors, home-based carers, DOTS supporters for tuberculosis, or community health workers). One-third (n=38) of the total participants participated in 2012, and two-thirds (n=76) in 2013.

Seven interviews were conducted with participants who could not attend the FGD in 2012 (3 volunteer lay counsellors, 3 pharmacy assistants and 1 data entry staff), while 2 interviews were conducted in 2013 (2 volunteer lay counsellors). FGDs lasted approximately 1 hour, and interviews approximately 30 minutes.

Table 11. Characteristics of clinics and participants in 14 focus groups from 2012 and 2013 (n=114)

Focus Group	Clinic	Size	Urban, Rural, Former Homeland	Year	Integ. Mo/Yr	Months Since Integration	Total	Prof. Nurse	Nurse (Other)	Pharm. Assistant	Nutrition-ist	Data Capturer, Clerk	Security, General Assistant, Cleaner	Outreach*	
1	A	Large	Urban	2012	May-11	11	4	4	0	0	0	0	0	0	
2	A	Large	Urban	2012	May-11	11	12	4	3	0	0	1	2	2	
3	A	Large	Urban	2013	May-11	22	12	4	1	1	0	0	2	4	
4	A	Large	Urban	2013	May-11	22	7	2	2	1	0	1	0	1	
5	B	Small	Rural	2012	Nov-10	18	7	4	0	1	0	0	0	2	
6	B	Small	Rural	2013	Nov-10	28	8	4	2	0	0	1	1	0	
7	C	Large	Urban	2012	Feb-12	3	3	2	0	0	0	1	0	0	
8	C	Large	Urban	2013	Feb-12	13	6	2	0	1	1	1	0	1	
9	D	Large	F.H.	2012	Nov-10	18	12	6	1	0	0	2	3	0	
10	D	Large	F.H.	2013	Nov-10	28	10	3	1	0	0	2	2	2	
11	E	Small	Rural	2013	Apr-10	35	4	1	1	1	0	0	0	1	
12	F	Small	F.H.	2013	Jun-12	9	12	2	3	0	0	2	1	4	
13	G	Med	Urban	2013	Nov-10	28	10	5	1	1	0	2	0	1	
14	H	Med	Urban	2013	Feb-12	13	7	4	2	0	0	0	1	0	
Median(IQR)						18 (15)	TOT. 114	47	17	6	1	13	12	18	
								%	41.2%	14.9%	5.3%	0.9%	11.4%	10.5%	15.8%

*Note: Outreach workers include: Volunteer Lay Counsellor, Home Based Carer, DOTS supporter, community health worker. IQR is interquartile range, F.H.is Former Homeland

Over both years, a total of 49 key informant interviews were conducted (2012: n=24, 2013: n=25). As seen in Table 12, a total of 33 unique key informants were interviewed, of whom 19 were interviewed in both years of the study. Joint interviews (i.e. 2 people in 1 interview) were conducted twice in both years upon the request of the key informants in order to complement the KIs knowledge where one was familiar with programmatic issues and the other was more familiar with ground-level issues. Participants included: academics, employees of non-governmental organisation (NGO) and policy makers (n=5), provincial managers (n=9) and assistant managers (n=4) from FSDOH, provincial mentors (n=2), a district manager (n=1), local area representatives (n=4), and clinic managers (n=8) from eight PHC clinics across the province.

Table 12. Description of key informants (2012 and 2013)

Position	Scope	Year	
Academic/NGO	Health System-National	2012	2013
Academic	Health Systems-Provincial	2012	-
Academic	Tuberculosis-Provincial	2012	2013
National Minister of Health	Health System-National	-	2013
Provincial Manager-NGO	NGO	2012	2013
Provincial Manager-DOH	Child Health	2012	2013
Provincial Manager-DOH	Chronic Disease	2012**	2013
Provincial Manager-DOH	HIV	2012	2013
Provincial Manager-DOH	HIV Data	2012	-
Provincial Manager-DOH	Human Resources	-	2013
Provincial Manager-DOH	Information System	2012	-
Provincial Manager-DOH	Reproductive Health	2012	2013
Provincial Manager-DOH	Sexual Health	2012	2013
Provincial Manager-DOH	Tuberculosis	2012	2013
Provincial Assistant Manager-DOH	Child Health	2012**	2013**
Provincial Assistant Manager-DOH	Chronic Disease	2012**	-
Provincial Assistant Manager-DOH	HIV	2012	2013
Provincial Assistant Manager-DOH	PMTCT	2012	2013
Provincial Mentoring-DOH	Nurse Clinical Mentor	2012	2013
Provincial Mentoring-DOH	NIMART Mentoring and support	2012	2013
District-Manager	PHC	2012	2013
Roving Data Manager	Local Area	2012	-
Local Area Manager	Local Area	-	2013**
Local Area Manager	Local Area-PHC	2012	-
Clinic Supervisor	Local Area	-	2013**
Clinic Manager-Clinic A	Clinic	2012	2013
Clinic Manager-Clinic B	Clinic	2012	2013
Clinic Manager-Clinic C	Clinic	2012	2013
Clinic Manager-Clinic D	Clinic	2012	2013
Clinic Manager-Clinic E	Clinic	-	2013
Clinic Manager-Clinic F	Clinic	-	2013
Clinic Manager-Clinic G	Clinic	-	2013
Clinic Manager-Clinic H	Clinic	-	2013

Note: DOH is Department of Health, PMTCT is Prevention of Mother to Child Transmission of HIV, PHC is Primary Health Care, NIMART is Nurse Initiated Management of Antiretroviral Therapy, NGO is Non-governmental Organisation
***Indicates Joint interview where 2 key informants were interviewed together*

4.3.2 Major findings on the impact of integration on HCWs

Positive and negative themes that emerged related to: job satisfaction and morale related to the provision of ART; widening of the job description, workload and job performance; training; administrative responsibilities; support and infrastructure; and organisational changes, as summarised in Table 13 at the end of this section. Positive themes included improved job satisfaction, confidence and morale, all of which were primarily gained from witnessing patients become healthier from ART. Other positive aspects participants described related to decreased workload, improved efficiencies, increased training, support from additional staff and a team-based approach to care. Negative aspects of integration cited by participants included reduced job satisfaction from increased stress of caring for HIV patients, and especially the increased workload, which was related to increased administrative requirements, especially in light of staff shortages and lack of support and resources, as well as increased patient load. These themes are all reported in detail below.

Job satisfaction and morale related to providing ART

The most widely reported positive impact on HCWs was increased job satisfaction from observing HIV-positive patients becoming healthier. This was highlighted both by the KIs and in HCW focus group discussions. The following quote from a nurse in a large urban clinic in 2012 is illustrative of this sentiment:

“For me it is motivating to see those that I have initiated [on ART] becoming better and picking up the pieces, you give yourself a pat on the shoulder and there is nothing that makes me happier”.

Additionally, many HCWs spoke about how the ability to provide ART reaffirmed their value as caregivers in the communities and in society at large, which they described as empowering. This is illustrated in the following quote from a nurse in a large, clinic in a former homeland in 2012:

“It has promoted that nurses do the care providing - they have an impact in society. So in the introduction of ARVs [antiretrovirals] in the clinic it has made us to develop this personal worth. This person was supposed to be dying but look at this patient because of ARVs; which means it has opened the door for us to say we can do something and get accepted from society itself”.

Many KIs and HCWs mentioned that integration has improved HCW confidence and empowered them by allowing them to do a job that had once been the job of a doctor or specialist. Many participants reported integration as generally positive for their job satisfaction in that it allowed them to reach more patients, as reported in the following quote from a community health worker in a large, urban clinic in 2013:

“My job is tougher than before because now I have to do counselling, drug readiness, and help with these files but when I help somebody to change his or her life- it's the only thing which satisfies me, that's my job. Now, I help more patients”.

However, at the same time both KIs and HCWs reported an additional emotional toll from working with HIV patients, as reported in the following quote from a district nurse mentor in 2012:

“HIV patients-you struggle for a person to accept their diagnosis and sometime they will stay, they will sit there, they will cry and they affect you emotionally also because now you emotionally involved, it is not like with a diabetes or asthma patient”.

Lastly, although not reported specifically as being related to integration, many HCWs were frustrated with their inability to address the social determinants of the health of their patients, especially in light of cuts in government assistance for HIV patients. For example, one nurse from a large, urban clinic in 2012 perceived the frustration of not being able to provide food assistance for HIV patients and said:

“They default because they don't take their treatment on an empty stomach. They have multiple partners so you will find yourself treating her every month for STIs [sexually transmitted infections]. If you ask her why this is she will tell you that I have to do it with different men to have food, to have clothes or to support me and I won't tell them [I'm HIV-positive] because anyway they will run away”.

Widening of job description

Another positive aspect that was frequently mentioned was the widening of HCWs' job descriptions. The ability to provide comprehensive care to the catchment population more efficiently is illustrated in the following quote from a HCW in a small, rural clinic in 2012:

“It is much easier to manage the patient because now you don't only treat the part of pneumonia at least you can go further and treat everything”.

A few other HCWs also described the integration of HIV as allowing them to fully care for those who were in their clinics' catchment population. They described the work related to integration as care they should have been providing in the first place and therefore viewed the widening of their job description as positive. Additionally, many HCWs and KIs reported reduced referrals to other clinics from integration as being positive in that it resulted in increased patient monitoring and reduced time spent related to organising referrals. However, some HCWs reported their desire to specialise in one aspect of PHC and suggested this was hindered by integration.

Training

Yet another positive aspect of integration identified in the FGD and KIs was the training nurses received as part of NIMART, specifically the PALSA plus guidelines, which they described as relevant, interesting and useful. Many nurses described feeling empowered by the training, and believed the guidelines were easy to implement. Key informants reported the increased training and skills as advantageous because it allowed HCWs to become multi-skilled, to build capacity and to face different challenges.

However, HCWs described one negative theme related to the training. With a phased training (i.e. one or two nurses at a time) at the clinics, increased workload from HIV patients after integration was not equally distributed among staff. In clinics where only one or two nurses

were NIMART trained, many staff observed a large burden on those nurses, and a few described HIV patients being sent away if the nurse was on leave or unavailable. They expressed the need for all nurses to be trained in NIMART at a clinic at the same time.

Workload

Workload was indeed the major negative theme that emerged, and went well beyond the comments related to the uneven workload imposed by some nurses being trained before others. Many HCWs perceived decreases in the workload once patients had been screened and initiated on ART as well as reduced workloads from knowing a patient was on ART. However, in general comments related to workload were predominantly negative. Many HCWs commented on the increased complexity of visits after integration and the resultant longer consultation times, especially for patients who needed to initiate ART. When asked to quantify this, respondents estimated an increase of 50 to 150% of time spent with the patient, with some reporting spending up to 90 minutes to initiate a patient on ART. The increased complexity of care is illustrated in the following quote from a participant in a medium sized, urban clinic in 2013:

“They are more complex because of the ARVs-you must go and look for side effects, you must go and look for opportunistic infections, you must screen for TB, so it’s a little bit more complex”.

Some HCWs perceived increased workloads as patients were referred from larger centres to the clinics, and some participants expressed feeling as if they are unable to cope. Many KIs and HCWs used terms such as “burned out,” “exhausted,” or “overworked” to describe the HCW work experience since integration of HIV care. This is illustrated in the following quote from a nurse in a large, former homeland clinic in 2012:

“It has added on top of what we had as a burden. It has brought with it more problems on top of what we already have”.

When probed on the cause of these feelings, the most commonly reported reason by HCWs and KIs was staff shortage. Although many acknowledged the added value of integration for the

patients, this came at the cost of their job satisfaction and morale, as reported in the following quote from a nurse in a large clinic in a former homeland in 2012:

“ARVs is not a problem, the shortage of staff is the problem. Bringing ARVs is the best thing that has ever happened for HIV now it’s the worst thing that has ever happened to the nurse”.

Many participants commented that because of increased workload and complexity of patient care, wait times had increased and increasing numbers of patients were being sent home at the end of the day without having been seen. Furthermore, many participants, especially HCWs, spoke about a reduction in the quality of care provided as a result of having less time available to provide thorough care, and the need to see all patients in the queues.

Furthermore, participants were concerned that with increased fatigue from increased workload, the safety of HCWs and quality of care they could provide was compromised. A clinic manager reported how HCWs most often sustain needle stick injuries at the end of the day when they have seen over 35 patients and are fatigued. Increased workload and staff shortages were also noted to effect quality of care with respect to the dispensing of medication at the pharmacies within the clinics. The following is a quote from a pharmacy assistant in a medium sized, urban clinic in 2013:

“The negative thing is I’m the only pharmacy assistant so I have 150 patients in the clinic who are shared by the sisters and those 150 are going to come to me and I’m alone at that time. So I’m starting to be confused when I write the medication like the dosages- really I’m getting very confused because I’m alone”.

Some themes, that were neither positive nor negative, also emerged as related to workload. A few key informants and HCWs spoke about increased workloads from greater numbers of patients as marginal since many of the same patients had been seeking care at PHC facilities prior to integration, especially considering the high TB-HIV co-infection rate. Some HCWs perceived an initially high workload following integration with hopes of it decreasing once all patients in the area had been initiated on ART or “down-referred” to other clinics and/or all appropriate testing had been completed (e.g. testing those with HIV for other illnesses and

vice versa as per treatment guidelines). As described in the following quote from a HCW in a large, urban clinic in 2013, some HCWs and KIs mentioned the initial increase in workload was due to providing services that should have been previously rendered:

“In the past we didn’t have the [ART] programme, we only had the [HIV] testing. We would just test and monitor and not do the other investigations. For example, now we know that the policy is to do pap smears and syphilis tests on patients so it’s a back log on most of the procedures that had to be done before.-Trying to catch up increases the workload”.

Participants attributed the administrative requirements of integration as having particularly negative impacts with respect to the increased workload this presented with insufficient resources to handle the additional load. Although the appointment of extra data entry staff assisted with the monthly statistics, the daily reporting needs in the post-integration context were heavily dependent on nurses. Many HCWs were frustrated with the time spent on administrative responsibilities and data collection. This was perceived as adding to their workloads and in resulting in longer work hours, as reported in a quote from a nurse in a small, rural clinic in 2012:

“Sometimes we take work home or come during the weekends. Mind you, we work five days a week and you come here during the weekend to do the paperwork you cause stress at your home - the husband and children become very angry and say you don’t have time for them; even your relatives - you don’t go to funerals. Really we are so stressed”.

However, a major positive impact of integration that was identified was indeed an increase in human resources. As reported in the following quote from a clinic manager in a small sized rural clinic in 2012, many staff reported the impact of extra support staff such as data entry staff and pharmacy assistants who were appointed at many clinics at the time of integration:

“Now we have a data capturer and it helps a lot. Now you can go to her and give her everything to her-she captures- and now you can go to her and ask her how many patients did we see?” That has helped because it has ease the burden of the professional nurses having to work with the files and looking for the patients”.

Support and infrastructure

Other negative impacts of integration identified by many HCWs as well as clinic and local area managers was what they described as the lack of material resources necessary for integration as well as lack of support. Lack of space in the clinics (e.g. waiting room and drug storage) was mentioned frequently as a problem that resulted in overcrowding and patients waiting outside in inclement weather. Lack of funds for communication, stationary, printing and equipment (e.g. weighing scales in each room) were frequently cited as sources of frustration for HCWs.

Additionally, many of community health workers described the stipend they received as not being sufficient to cover the cost of phone calls to patients. Many HCWs spoke about the need to trace HIV patients who were defaulting, but that there was a lack of communication or health workforce resources to do so. Furthermore, clinic managers and some HCWs described a lack of forms to be one of the challenges to the implementation of integration. This is well illustrated in the following quote from a clinic manager at a large, urban clinic in 2012:

“They'll take us to training and show us we'll use this stationary and when you order them [they] don't come. They tell you, you should have started with ARV but you don't have [forms].”

HCWs and KIs also spoke about the ways that programme-specific reporting requirements hindered integration. Specifically, data collection tools (i.e. logs) exist for disease-specific programmes and therefore can only be kept in one consultation room. This made it difficult for each nurse to provide comprehensive care when trying to attend to all of a patient's health needs in one visit. Another negative for many HCWs was the confusion regarding how to fill in forms because of a lack of consistent instructions on how to properly fill out the forms, as well as constantly changing forms. Participants also commented that the increased administrative responsibilities associated with increasing patient load resulted in compromised data quality. This is reported in the following quote from a physician and employee of an NGO who worked with the public-sector health system in 2012:

“Data are still a huge problem. If you work with any NIMART trained nurse, chances are they are going to follow all the steps that they should. They'll do all those things that they should be doing mostly, and then chances are most of it will not be recorded.”

Some HCWs and KIs described a lack in data quality, which consequently led to difficulty in ordering sufficient supplies and medication.

Concerning lack of support, many HCWs expressed a desire for additional resources and support from higher levels within the health system. The lack of support provided to attend to the increased workload can be seen in the following quote from a HCWs at a large clinic in the former homeland in 2012:

“You can't have shortage of staff where as you bring more people to do the job but you don't add to the resources that they need, you add to the overloaded work that people are doing without providing them support, so more often than not, what I see it is the powers that being don't really give support to clinics. At the end of the day there is a long red tape and you end up with things stuck somewhere in between.”

Organisational changes

Many key informants reported the organisational changes they perceived after integration as having been positive. They mentioned that all HCWs experienced more accountability and responsibility when they were caring for HIV patients, especially as more nurses were trained in NIMART. This is described in the following quote from a provincial manager in 2013:

“I think it is positive for the personnel that you cannot shift responsibility to say I referred you to that ARV sister, why are you still coming back to me? So you are able to say no this is my responsibility and you cannot shift responsibility. “

HCWs and KIs felt that integration allowed nurses the opportunity to mentor one another and promoted teamwork, allying nurses towards a common goal in the same clinic. This is described in the following quote from a provincial manager in 2013:

“Those that are more experienced-maybe they have to done [ARV] initiation for a while-they can now mentor new nurses and that is also form of empowerment because now they can share the experience and the expertise.”

HCWs also described this in a positive light. Many HCWs reported positive aspects of being mentored by other HCWs who have had more experience with ART at other clinics, as described in the following quote from a HCW in a large sized clinic in a former homeland in 2013:

“If we have a problem we consult our colleagues at another clinic and then they tell us what to do, especially if we are in doubt of if a patient is to be seen by a doctor. We say we have this patient- these are the findings, how do we go about it. That has really helped.”

Many HCWs described the ability to phone a provincial NIMART specialist when uncertainties arose as facilitating confidence with treating HIV patients. Additionally, further positive themes related to organisational changes were that integration fostered a team-based approach to care and improved working relationships and job performance as well as promoted problem-solving. This is described in the following quote from a physician and employee of an NGO working with the public-sector:

“Now everybody recognises that each person has a role to play, the nurse, the doctor, the social worker, whoever, everybody knows that I cannot deal with this in my own. It forces team work and that we all need each other.”

However there were negative aspects identified by HCWs that were related to the organisational structure of the implementation of integration. Many HCWs expressed frustration with the top-down implementation of the policy to integrate, and felt that management structures had unrealistic expectations of what could be achieved in the clinics. This is illustrated in the following quote from a HCW in a clinic in a former homeland in 2012:

“I think the overall feeling would be that as much as it has been very positive to the patients, the problem it is when someone wants to remote control what is happening in the field just down on the ground because whoever is making decision about ARVs is assuming that if I take the ARVs there things will be this way without actually having come here and see what is the situation on the ground.”

Many HCWs perceived the pressure to meet government targets despite the lack of availability of staff and resources as a burden. Some provincial-level key informants reported concerns at the pace of integration moving faster than the clinics’ capacities to adjust to the change, and they

raised concerns about the potential negative effects on the morale of HCWs. Furthermore, support from leaders in the health system was identified by many HCWs as an important incentive that could provide quality care despite health system challenges. This concept is well captured in the following quote from a nurse from a large, former homeland clinic in 2012:

“I believe they need to give us support - they need to encourage. There are challenges, we know but if you keep on trying and you are not encouraged seeing your leaders there with you, there is no quality.”

Many clinic managers specifically reported the difficulty of balancing supervisory duties with clinical duties after integration, especially if they were the only nurse who was NIMART trained at the clinic. They noted however that this problem had existed even before integration of HIV care. This is described in the following quote from a clinic manager in 2012 at a large sized clinic in a former homeland:

“For me really what [integration] has done is that I was unable to perform my administrative duties as a manager because of the work load -though I had a problem before but with the ARVs it made it worse.”

Table 13. Impact of integration on health care workers at primary health care clinics

	Positive	Negative
<i>Job Satisfaction and Morale</i>	<ul style="list-style-type: none"> Improved job satisfaction Improved self-worth Empowered Reaffirmation of role as caregivers in society** Increased morale from seeing HIV patients become healthier Increased confidence Recognition of the importance of each cadre 	<ul style="list-style-type: none"> Reduced job satisfaction Increased burnout Stress Exhaustion Increased burden Increased pressure to meet government targets Poor attitude Inability for HCWs to specialise** Inability to address social determinants of health**
<i>Workload and Job Performance</i>	<ul style="list-style-type: none"> Decreased as more patients are initiated on ART and screened for HIV** Improved efficiency by provision of comprehensive care to patients who were in the catchment population Decreased number of referrals to other clinics 	<ul style="list-style-type: none"> Increased due to increased patient visit frequency Increased with no increased staffing Increased responsibilities Increased working hours Increased number of patients turned away at the end of the day Increased complexity per patient leading to increased time per patient Increased time to initiate patients on ART Reduced quality of care
<i>Training</i>	<ul style="list-style-type: none"> Improved knowledge and skills Ability for staff to become multi-skilled* Interesting and easy to implement 	<ul style="list-style-type: none"> Uneven burden on staff if only one or two nurse is trained to initiate HIV patients
<i>Administrative Responsibilities</i>	<ul style="list-style-type: none"> Easier to provide clinical care with integrated data collection tools Less of a burden with more data entry staffs to assist with filing and data collection Improved technology (i.e. computers) makes data collection easier Less administrative burden from improved referral systems between clinics 	<ul style="list-style-type: none"> Increased administrative responsibilities Increased time to collect data Lack of consistent instructions to complete forms Reduced data quality leading to improper forecasting of resources Increased gaps in data due to high patient load Confusing forms/data collection tools
<i>Support and Infrastructure</i>	<ul style="list-style-type: none"> Increased number of support staff such as data entry staffs and pharmacy assistants 	<ul style="list-style-type: none"> Lack of resources to trace patients Lack of stationary, equipment and funds for communication Lack of space for waiting area and pharmacy Lack of technology
<i>Organisational Changes</i>	<ul style="list-style-type: none"> Team based approach Increased responsibility for all HCWs to treat HIV patients Promotion of nurse mentorship at the clinic levels Increased mentorship at the district and provincial levels Creative problem solving 	<ul style="list-style-type: none"> Lack of support from administrators Frustration with “top-down” implementation of integration Disconnect with the reality at the clinic levels

Note: HCWs refers to health care workers, PHC is Primary Health Care, ART is antiretroviral therapy, * indicates perspectives from Key Informants only, **indicates perspectives from HCWs only

4.4 Discussion

The integration of HIV care into PHC settings was described by participants in this study as having both many positive and negative consequences for health workers. The positive themes that emerged were related to improved job satisfaction as a result of the ability to provide comprehensive care to patients, and from seeing HIV patients become healthier. The training and mentorship opportunities, as well as the promotion of a team-based approach to care that arose through the integration process were also reported in a positive light. However, the exacerbation of health worker shortages, the lack of resources needed to adequately provide integrated care, and increased administrative responsibilities were all perceived of as negative outcomes associated with integration. The increased job satisfaction that HCWs identified from seeing patients become healthier has been a significant advantage of integration. This advantage has also been discussed in other studies (90).

As well, the widening of the job descriptions of HCWs has been reported to be another major advantage of integration. This has also been discussed in other studies (90). Additionally, opportunities for mentorship and training were also considered to be positive impacts of integration by both the participants in our study, as well as others (90). Participants spoke about the increased levels of knowledge that resulted from the provision of ART in PHC clinics as being empowering for HCWs. Our findings support those by Davies et al. (90) in Gauteng province South Africa in 2011 that affirm the need for on-going support both in the form of in-house mentoring from more senior nurses and from the local area, district and provincial levels during the implementation of NIMART. The identification of ideal mentorship strategies to foster emotional support and knowledge transfer between HCWs in resource-limited settings is crucial. The PALSA plus training modules has been documented as being successful (132) and has been successfully adapted to other settings (164), and our study furthers the evidence that HCWs hold positive impressions of its relevance and practicality for integrated PHC settings.

Many participants perceived the team-based approach to care as having created a shift towards greater equitability concerning shared responsibility among HCWs who care for HIV

positive patients. The changes in organisational structure, and the increased motivation from the provision of ART were similar to results seen elsewhere (84,90), and need to be further explored. As such, the changes in organisational culture at the clinic-level should be better understood as integration proceeds in order to ensure environments where supportive policies for HCWs foster productivity while at the same time safeguarding job satisfaction and the provision of quality care (67). Understanding the process by which teamwork is promoted and the solutions that arise could lead to the identification of strategies that are HCW-friendly in integrated contexts.

Of the negative themes perceived by participants, the our findings support the evidence from other studies (87) that the administrative responsibilities (often as a result of disease-specific programme requirements) were felt to be a hindrance to successful integration. As discussed by others (24), a patient-centred PHC would require a documentation system across multiple technical areas that would take the availability of HCW time commitments into consideration. The importance of indicators to measure targets of health outcomes and efficiencies cannot be overstated but they must be streamlined to accommodate environments where resources such as staff time are limited, and they must be designed so as to facilitate the capture of quality data within integrated care settings. As discussed by others (87,165) integration of care is hindered by disease-specific reporting requirements and programme-specific forms, especially in situations with staff shortages.

We also identified a need to engage HCWs in policy development and in the implementation of integration. As discussed by Stender and Christensen (24), policy guidelines should be developed from the ground-up and it should involve both HCWs and patient communities in order to empower all partners as equally and actively as possible. Our findings are similar to those of Davies et al. (90), where the top-down policy implementation was named as a large source of frustration. As discussed by the authors, communication between staff and implementers is critical to the successful implementation of policy. We believe that the exchange of information would foster implementers to better understand the “on the ground” issues that challenge the successful implementation of integration, and that it would identify where support

would be most beneficial. Furthermore, through the engagement of HCWs' understanding of the challenges such as lack of resources, these can be identified and rectified.

The increased complexity per consultation in integrated contexts needs to be better understood from the perspective of HCWs. Smit et al. (166) discussed challenges to integration with key informants and found that it was unrealistic to expect PHC providers to address all of a patients' needs in one consultation, especially in light of staff shortages. We feel that further research is needed regarding whether or not this is the best model, however HCWs should have broad knowledge to address many issues. Furthermore, the identification of the ideal models and ratios regarding adequate support, resources, and infrastructure are needed to better understand and integrate PHC. In fact, in light of the existing movements toward patient-centred PHC (24) where the needs of the patient are prioritised, integration may be a necessity in high-HIV burdened settings where aging and HIV (70), along with the increased prevalence of non-communicable diseases (98,111) will present new challenges to the health care workforce and to health systems.

Lastly, staff shortage was an underlying determinant of many of the negative aspects of integration that were reported by our participants. The references to fatigue, burnout, exhaustion and increased injuries such as needles-stick injuries reported by participants are consistent with what has been reported elsewhere. Burnout has been a widely reported problem among HCWs health workers who are exposed to excessive work challenges (167). Burnout not only has negative consequences for HCWs but can also have negative repercussions for patients (168,169); such as suboptimal patient care (169) and medical errors, which have been strongly linked to degree of burnout (170). Conversely, van den Hombergh and colleagues have found that more time per patient and less job stress were associated with better care and practice performance (171). In low and middle income countries, the demands on healthcare workers can be especially daunting (172); higher burdens of diseases and fewer HCWs per capita can lead not only to burnout and dissatisfaction, but also to brain drain (173). Care must be taken in the implementation of integration to ensure that the existing health workforce is cared for.

This study has several strengths and limitations. To our knowledge, this is the first study that explores the impacts of integration on HCWs after implementation by engaging a variety of perspectives within the health system. The large number and variety of HCWs from PHC clinics who participated in this study is also a strength. We were unable to directly report on working conditions prior to the integration of HIV care into PHC, and therefore, we cannot be certain that the working conditions described here were not largely similar to those prior to integration, and to what extent integration played a role in some of the identified negative consequences. However, the fact that our study was conducted over the critical period after integration occurred, and hence through which ART was expanded, can also be seen as a strength, since we may have optimally captured some of the changing dynamics of clinic function and the HCWs' impressions across a range of time periods since integration. However, a limitation is the generalisability of qualitative research, and there is a further need to measure the impact of these issues on a larger scale, both within the province of Free State and in other contexts.

In conclusion, the integration of HIV care into PHC clinics held many benefits for staff from improved morale and job satisfaction, training and mentorship and the promotion of teamwork. However, while long term strategies should be implemented to mitigate grave HCW shortages in many high HIV-burdened settings, there is a need to determine the optimum staff-to-patient ratios for integrated care and to understand where and how limited resources can be best utilised. Integration of HIV care into PHC if, well-resourced and supported, can be beneficial for HCWs at PHC clinics.

Chapter 5: The effect of integration of HIV care on primary health care service provision - trend analysis from administrative data on PHC indicators

Background: The decentralisation or integration of HIV care into primary health care (PHC) clinics in high HIV-prevalence settings has been adopted as a strategy to expand access to antiretroviral therapy (ART). However, integration may compromise PHC service delivery within weak health systems. This study aims to gain a better understanding regarding whether or not differences existed in PHC service provision (pre and post-integration) in public-sector PHC clinics in Free State, South Africa, and if changes were related to the number of HIV patients in the clinics.

Methods: Utilising a quasi-experimental design, we analysed administrative data on 15 PHC indicators. The data were collected monthly over a critical four year period as integration was implemented into 131 PHC clinics representing a catchment population of 1.5 million. We utilised interrupted time series (ITS) analysis at ± 18 and ± 30 months from HIV integration in each clinic to identify changes in trends post-integration as compared to pre-integration. We conducted a sensitivity analysis with linear mixed effect models (LME) to study the relationship between HIV service indicators and the PHC indicators.

Results: Patients receiving ART in the 131 PHC clinics studied increased from 121 (April 2009) to 57, 958 (March 2013) during our study period. Trends in population-level immunisation coverage decreased after integration by 0.98% (SE=0.25, $p<0.001$) at ± 18 months and by 1.31% (SE0.16, $p<0.001$) at ± 30 months. Clinic level immunisation coverage also decreased at 33 infants per 100,000 patients (SE=8, $p<0.001$) at ± 30 months. None of these changes were associated with the number of HIV patients at the clinics. We also observed decreases in total clinic visits per year. All other indicators of PHC service delivery remained unchanged.

Discussion: Despite an extraordinary increase in patients accessing ART in PHC clinics during our study period, the vast majority of PHC indicators remained unchanged, with a notable exception being child health service indicators. Our findings suggest that the integration of HIV

care into public-sector PHC clinics is a viable strategy through which to expand access to ART. However, further research is needed to understand how immunisation coverage is impacted.

5.1 Background

In 2013, 35 million people were living with Human Immunodeficiency Virus (HIV) worldwide, with 2.1 million new infections in 2013 alone (1). Finding the best and most efficient way to expand access to life-saving antiretroviral therapy (ART) has been one of the greatest global challenges. One widely-promoted strategy has been to integrate or decentralise HIV care to the primary health care (PHC) level (48,64,96,135,136). Although ambiguities exist on the operationalisation of integration (33), evidence has shown many positive effects of integrating HIV in PHC on health systems, particularly with respect to increased efficiencies between HIV and non-HIV service provision. Increased access to ART through integration has resulted in improved survival and greater engagement in care (74,96,135). Furthermore, increased non-HIV service utilisation (88), improved clinic infrastructure and sharing of resources (84,88), and strengthened referral systems and laboratory capacity (83) have been observed since integration. Conversely, others have raised concerns that wait times for patients may have increased (84) and that patients may experience reduced access to specialists (36). Furthermore, concerns have also been voiced that quality of care may be compromised due to increased workloads for HCWs. It has been suggested that the additional burden has resulted in a reduced focus on non-HIV conditions (138), especially in contexts with high workloads and human resource shortages (67,83).

There is little conclusive evidence regarding the ways that the integration of HIV care into PHC clinics has influenced PHC service delivery (64,91,92). Poor study designs, weak data quality and outcomes that are difficult to compare have been highlighted as particular challenges (64). Additionally, the evidence examining the effect of integration on non-HIV services has been heavily focused on outcomes related to the integration of tuberculosis (93,94), sexual/reproductive health and maternal/child health with HIV (95), and the studies were conducted in low-income countries with large investments from international donors (38,88,95).

The benefits of integrating HIV care in PHC have been demonstrated in Rwanda (88), where researchers have observed increases in preventative services related to reproductive health and antenatal care, as well as increases in the use of non-HIV services within six months after integration into PHC. However, only nine of the 30 clinics in this study offered comprehensive HIV care, including ART. A study of six urban clinics in Uganda (95) found increases in the use of non-HIV services, namely increased immunisations, laboratory testing and diagnosis related to tuberculosis and malaria. A study conducted in Malawi (174) that examined routine data after the integration of PMTCT and ART into general health services, found increases in reproductive health, antenatal and post-partum care. Another study (38) that examined data from Malawi and Ethiopia, reported increased annual outpatient visits, ANC attendance, contraceptive usage, use of bed nets for malaria prevention, TB case detection and the utilisation of child health services. With the recognition that HIV can be managed within PHC health systems, it has been noted that HIV care shares much in common with chronic disease care models, and that it could be leveraged to address impending non-communicable disease epidemics while ensuring quality PHC (27,83,96). The potential benefits and risks to quality PHC service provision from the integration of HIV care into PHC is especially important to understand for countries where a large proportion of the population are HIV-infected, such as in South Africa.

Our study was conducted to examine whether or not changes could be identified in the indicators of critical components of PHC service provision when comparing pre and post-integration in public-sector PHC clinics. If changes were identified, our aim was to understand whether or not they were related to the integration of comprehensive HIV care into PHC clinics. We hypothesised that post-integration trends in PHC indicators would demonstrate a deterioration in clinic functioning due to increased workloads for HCWs from HIV patients.

5.1.1 Setting and study design

This study was conducted in the Free State province, South Africa - a province with a total population of 2.8 million (127), comprising 5.2% of the South African population. In 2012, the HIV prevalence was 20.4% for 15-49 year olds, higher than the national prevalence of 18.8%

(6). The ART treatment programme began via a vertical system in 2004 where patients accessed testing, treatment and care at separate sites (141). A national policy (89) supporting the integration of HIV care into all PHC facilities through Nurse Initiated Management of ART (NIMART) was implemented in April 2010. All provinces began the implementation of this policy in their PHC clinics in the months following April 2010. This was done through a process of training PHC nurses, pharmacists and pharmacy assistants, and through ensuring that reliable supplies of ARVs would be available at PHC clinics. In this context, integration refers to the provision of comprehensive HIV care (i.e. from prevention, to treatment initiation, to follow-up) as part of the services provided at the public-sector PHC clinics (a.k.a. “mainstreaming”) (74). In practice, the implementation of integration was diverse, ranging from service delivery by disease-specific nurses in separate consultation rooms in the same clinics (i.e. co-location) to each nurse providing comprehensive care for HIV and other acute and chronic illnesses in one consultation room. Most clinics in the Free State were provided with additional staff (e.g. pharmacy assistants and data entry staff) and training for professional nurses in the comprehensive management of HIV patients via the Practical Approach to Lung Health in South Africa (PALSA plus) guidelines (132) prior to the integration of HIV care into PHC clinics. Where possible, the Free State Department of Health (FSDOH) attempted to remedy space concerns via modular structures and pharmacy renovations.

5.2 Methods

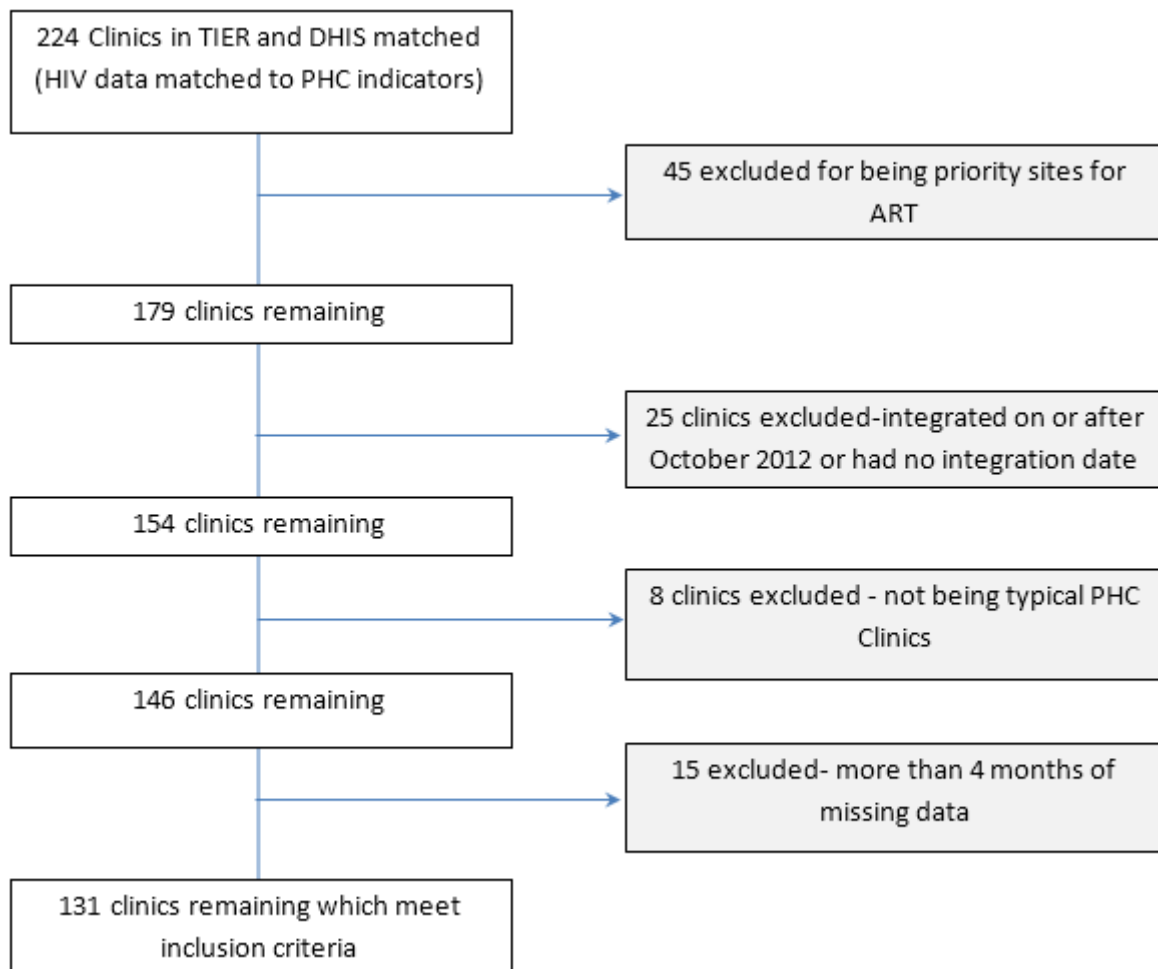
Interviews with Key Informants informed the selection of PHC service indicators that would be sensitive to how a clinic is functioning. The primary analysis was an interrupted time series (ITS) design conducted at ± 18 and ± 30 months from the month and year of HIV integration on longitudinal, administrative data of PHC indicators. We also conducted a sensitivity analysis using linear mixed effect models (LME) to further learn about the relationship between HIV services and the PHC indicators. The study period encompassed a 4 year period beginning in April 2009 -12 months prior to the implementation of the policy of integration - and continuing until April 2013 - 36 months from when the policy was first introduced. For the purposes of this study, the date of actual integration of HIV care into each

clinic refers to the month and year when clinics commenced with the initiation and management of ART.

5.2.1 Clinic selection

All PHC clinics that had at least one professional nurse in April 2009 were identified within the Department of Health Information System (DHIS) and matched to clinic names in the source data for numbers of HIV patients (n=234). The following clinics were excluded as potential clinics in our study: 1) “priority sites” identified by key informants as clinics that had been designated as ART clinics under the previous vertical programme – were excluded because the clinics received extra resources to provide HIV care (i.e. additional staff or financial resources) (n=45); 2) Clinics that integrated HIV care on or after October 2012 - were excluded for not having at least 6 months of data post-integration to contribute, or for not having an integration date (n=25); 3) atypical clinics – were excluded because the clinic catered to specific populations, were co-located with a hospital, run by non-governmental organisations, or utilised elements of the previously vertical system for treatment or assessment (n=8) and 4). Clinics missing more than four months of consecutive HIV data (n=15). As seen in Figure 5 a total of 131 (56%) clinics met the inclusion criteria.

Figure 5. Clinic selection criteria - analysis of primary health care indicators



5.2.2 Primary health care indicators

PHC indicators were selected based on the South African National Department of Health PHC package (125). In an iterative process over the study period, FSDOH managers, assistant managers and data managers were interviewed to understand data availability, reliability, potential confounders, and indicators that were most likely to be indicative of, and sensitive to, changes in clinic functioning. Preference was given to indicators that were: 1) monitored by the FSDOH, and that prompted action when an indicator changed 2) available and relatively complete over the study period 3) robust (i.e. resilient to outliers and non-HIV related changes) and 4)

important to the national goals of PHC service provision. As shown in Table 14 a total of 15 PHC indicators and 2 HIV-specific indicators of service activity were selected for analysis. Detailed descriptions, rationales, and definitions of included and excluded indicators can be found in Appendix B.

Two indicators were analysed for antenatal care (ANC). These indicators represented early ANC coverage (i.e. before 20 weeks of pregnancy) and the proportion of ANC patients tested for HIV for the first time during their current pregnancy (named ANC patient 1st HIV test coverage). One indicator was analysed for sexual and reproductive health, measuring contraception coverage at the population level. Two indicators were analysed for child health, measuring changes in immunisation coverage relative to the population, and numbers of patients attending the clinic under 5 years old. Two indicators were analysed for infectious diseases, one that measured the percentage of tuberculosis patients where the sputum was not tested at 2 months after treatment, and the other was the proportion of ANC clients whose infants had received PCR testing for HIV at 6 weeks of age (referred to as neonatal HIV testing). Four indicators were analysed for non-communicable diseases (NCDs), representing workloads with respect to new diabetes mellitus and hypertension patients relative to the population at risk and the total population over 5 years old for each PHC clinic. Four indicators were analysed to understand workload and productivity measuring PHC service utilisation (i.e. clinic visits per person each year), staff to patient ratio, and workload on nurses (i.e. patients seen by a nurse per day). Lastly, two HIV-related service indicators, which were our explanatory variables of interest, captured workload from new and existing HIV patients on ART at the PHC clinics.

Table 14. Data sources of primary health care and HIV indicators

	Source	Period	Units
Antenatal Care (ANC)			
Early ANC coverage	DHIS	April 09-13	ANC clients seen before 20 weeks of pregnancy per total ANC clients per month
ANC 1st HIV test coverage	DHIS	April 09-Feb 12	ANC clients tested for HIV (first time) in the pregnancy per clients eligible for an HIV test
Sexual and Reproductive Health			
Contraception coverage	DHIS	April 09-13	Number of women protected against pregnancy per catchment population*
Child Health			
Population level immunisation coverage	DHIS	April 09-13	Children under 1 year old fully immunised per population under 1 year old*
Clinic level immunisation coverage	DHIS	April 09-13	Children under 1 year old fully immunised per clinic visits under 5 years old
Infectious Disease (per 100,000)			
Percent of tuberculosis sputum not tested	ETR.net	April 09-Mar 13	New smear positive TB patients missing a sputum result per those diagnosed 2 months ago
Neonatal HIV testing	DHIS	April 09-13	Infants tested for HIV per HIV+ ANC client identified 6 months previous at the clinic
Non-communicable disease (per 100,000)			
Population level new diabetics on treatment	DHIS	April 09-Feb12	New Diabetes Mellitus cases on treatment per population over 30 year old*
Clinic level new diabetics on treatment	DHIS	April 09-Feb12	New Diabetes Mellitus cases on treatment per clinic visits over 5 years old
Population level new hypertensive on treatment	DHIS	April 09-13	New Hypertension cases on treatment per population over 30 year old*
Clinic level new hypertensive on treatment	DHIS	April 09-13	New Hypertension cases on treatment per clinic visits over 5 years old
Workload and productivity			
Patients seen by a nurse per day	DHIS	April 09-13	Patients seen by a professional nurse per clinical workday
Staff to patient ratio	Treasury /DHIS	April 09- Dec 12	Human Resources (health care workers) per patient visit per month
Clinic visits per person each year	DHIS	April 09-13	Visits per year per catchment population*
Under 5 years old clinic visits per year	DHIS	April 09-13	Visits under 5 years old per year per catchment population under 5 years old*
HIV			
Total ART patients	TIER.net/ DHIS	April 09-13	Patients on ART remaining in care at the end of each month
New patients initiated on ART	TIER.net/ DHIS	April 09-13	Patients newly initiated on ART during the month

**indicates a population-based denominator that is constant across a year, TB is tuberculosis, ART is antiretroviral therapy, ANC is antenatal care*

5.2.3 Data sources and collection

Secondary administrative data were obtained from the FDSOH and collected from 4 sources: 1) Three Electronic Integrated Registers (TIER.net) 2) Electronic Tuberculosis Registry (ETR.net), 3) National Department of Treasury and 4) District Health Information System (DHIS). Most indicators were collected in the source data every month, except for a few that were calculated once per year. For the latter indicators, a mid-year population estimate was divided by 12 and used as the denominator for each month. Data were aggregated to the clinic-level, and patient identifiers were removed by FSDOH prior to its provision to the research team. Detailed information on data cleaning and aggregation can be found in Appendix B.1. All data were stored electronically and were triple-password protected. The majority of the indicators were calculated using data elements available in the DHIS, with the following exceptions: indicators for tuberculosis, human resources and HIV services were extracted from ETR.net, National Treasury database, and a combination of DHIS and TIER.net, respectively. Concerning HIV service indicators, beginning in April 2012, two parallel databases (TIER.net and DHIS) housed the data across the study period. Since the TIER.net database was the primary data source for DHIS, preference was given to this data. However, for clinics that had integrated after April 2012, only DHIS-derived data were available. Therefore, for these clinics we used data obtained directly from the DHIS. None of the clinics utilised data from two sources across the study period in order to avoid detecting a change artificially due to changes in data management. Of the 131 clinics that met the inclusion criteria, for 20% of the clinics (n=26) the HIV service indicators were extracted from DHIS, and for the other 80% of clinics (n=105), HIV data were extracted from TIER.net. Information on the month and year each clinic integrated was collected by the Provincial NIMART Mentoring and Support Coordinator.

5.2.4 Analysis

All indicators were translated into Jenkins box plots and visually examined for trends and outliers. Outlier detection employed the use of interquartile range (IQR). Missing data were examined and measured in Excel. A variable for the month and year of integration was created,

and trends were examined per facility for both the pre-integration and post-integration periods. Bivariate analysis utilised paired Student's t-tests to investigate differences in indicators between pre and post-integration using data for one month at the following periods before and after integration 1) six months, 2) nine months, 3) twelve months and 4) eighteen months. Twelve month averages were tested, both for clinics that had contributed 12 complete months of data pre and post-integration, and using all data available for over 12 months, irrespective of completeness.

Interrupted time series analysis

The primary method of analysis used to understand changes in the trends of indicators pre and post-integration was Interrupted Time Series analysis (ITS or Segmented Linear Regression). It has been shown to be the “strongest quasi-experimental design to evaluate longitudinal effects of such time-delimited interventions” (175) as it allows for the measurement and analysis of baseline trends, as well as trends pre, post and at the time of intervention. Furthermore, Lagarde (176) describes the use of ITS for analysis of health policy interventions as a robust method through which to account for non-stationarity, seasonality, and auto-correlation. As described by Lagarde, the following formula was used to model the change since integration:

$$Y_t = \beta_0 + \beta_1 * time + \beta_2 * integration + \beta_3 * postslope + \varepsilon_t$$

Where Y_t is the outcome variable for an indicator of PHC, as described in Table 14, across the study period denoted as “t” for Time. A total of 15 models were run, one for each indicator of PHC. As seen above in Table 14, for 11 indicators, a time span ranging from April 2009 to March 2013 (a 48 month period) was used. However, for the following four indicators, this timeframe was reduced due to lack of data listed as follows with end of data collection in parentheses: 1) ANC Client 1st test HIV rate (April 2012) 2) Diabetes new per population over 30 years old (February 2012) 3) Diabetes new per patient over 5 years old (February 2012) and 4) Tuberculosis Missing Sputum 2 month test (March 2012). With respect to time, for each clinic

the month and year of integration was coded as 0, with months leading up to the integration coded sequentially negative for each month before integration (i.e. -1 for the month preceding integration, -2 for 2 month preceding integration, etc.) and months post-integration were coded sequentially in the positive direction (i.e. 1 for the month directly after integration, 2 for 2 months after integration, etc.). Seasonal trends were assumed to be accounted for by integration set as time zero, since the months and years clinics integrated varied across the study period. Averages were analysed across all clinics per month and per indicator. The trend at time zero (i.e. baseline) was represented by β_0 and β_1 and estimates the general trend in the indicator in the absence of integration. A sudden change at the time of integration was estimated by β_2 and β_3 , and estimated a change in the post-integration trend of the indicator when compared to its pre-integration trend. First level-autocorrelation was tested using the Durbin-Watson test. As suggested by Lagarde, where auto-correlation was identified, the Prais-Winsten method was used as a generalised least squares estimator to estimate the regression. Results are presented for two time periods: ± 18 months and ± 30 months since integration, and are adjusted for 1st level autocorrelation (AR1). These time periods were chosen to maximise the available data across the study period. The ± 18 months since integration used data from a greater number of clinics but a shorter duration of time. The ± 30 months since integration resulted in a decreased number of clinics but a longer duration of time. The number of clinics that contributed data at ± 18 months and ± 30 months for each of the indicators of PHC can be found in Appendix B.5. In summary, the mean number of clinics that contributed data for indicators during the study period can be seen below in Table 15.

Table 15. Mean number of clinics contributing to analysis across the study period

Time since integration	<i>30 months before</i>	<i>18 months before</i>	<i>At integration</i>	<i>18 months after</i>	<i>30 months after</i>
Mean number of clinics	58	110	118	53	11
(standard deviation)	(7.7)	(10.8)	(17.9)	(21.73)	(6.03)

Wagener et al. (175) discuss how behaviour prior to, and immediately following an intervention may fluctuate and influence outcomes. Therefore, sensitivity analysis was conducted to account for lead and lag times where the definition of integration was broadened to include a five month period (i.e. two months before and after the month of integration) as per key informant perspectives. We made Bonferroni adjustments to account for multiple comparisons whereby we only considered associations to be statistically significant if the p-values was <0.003 .

Linear mixed effect regression models

As an additional sensitivity analysis, we conducted linear mixed effect (LME) regression analyses to gain a more complete understanding of the impact of integration on PHC indicators. This method allows for controlling for fixed effects, seasonal trends, and 1st level autocorrelation denoted as AR (1), as well as to investigate how the addition of HIV-related explanatory variables change the outcomes. LME models use all available data, weighted for availability at clinic-level analysis compared to averages as done by ITS using ± 18 or ± 30 months of data. Models include the assumption that the trends across all clinics are the same but that they shift on the Y axis. A total of 3 models were created for each outcome of PHC: 1) in the absence of HIV-related indicators using time and integration covariates, 2) with the addition of total new patients initiated on ART per month per facility to the models and 3) with the addition of total HIV patients in care at the end of the month, per month and facility. This was done to investigate whether HIV-related patient workload influenced the PHC indicators pre and post-integration. Trends for each PHC indicator of each facility were fitted to a trend using the following equation:

$$Y_{it} = \beta_0 * time_t + \beta_2 * integration_t + \beta_3 * postslope_t + Facility + Month_{ij} + \varepsilon_{it}$$

where Y_{it} is the PHC indicator from Facility i at time t . Each time t falls into a natural month (e.g. January, February, etc.), let j denote the index of natural month at time t . In this model, *Month* is treated as a fixed effect, and *Facility* is treated as a random effect. Assumptions include: 1) random effects have a mean of 0 and a finite variance 2) random errors ε_{it} are

normally distributed with AR (1) autocorrelation within each facility 3) facilities are independent of each other and 4) the effects of all predictors are additive.

The second model that measured the effect of HIV patients initiated on ART on PHC indicators is as follows:

$$Y_{it} = \beta_0 * time_t + \beta_2 * integration_t + \beta_3 * postslope_t + \beta_4 * ART\ new\ initiations_t + Facility + Month_{ij} + \varepsilon_{it}.$$

The third model that measured for the effect of ART patients remaining in care on PHC indicators is as follows:

$$Y_{it} = \beta_0 * time_t + \beta_2 * integration_t + \beta_3 * postslope_t + \beta_4 * ART\ patients\ remaining\ in\ care_t + Facility + Month_{ij} + \varepsilon_{it}.$$

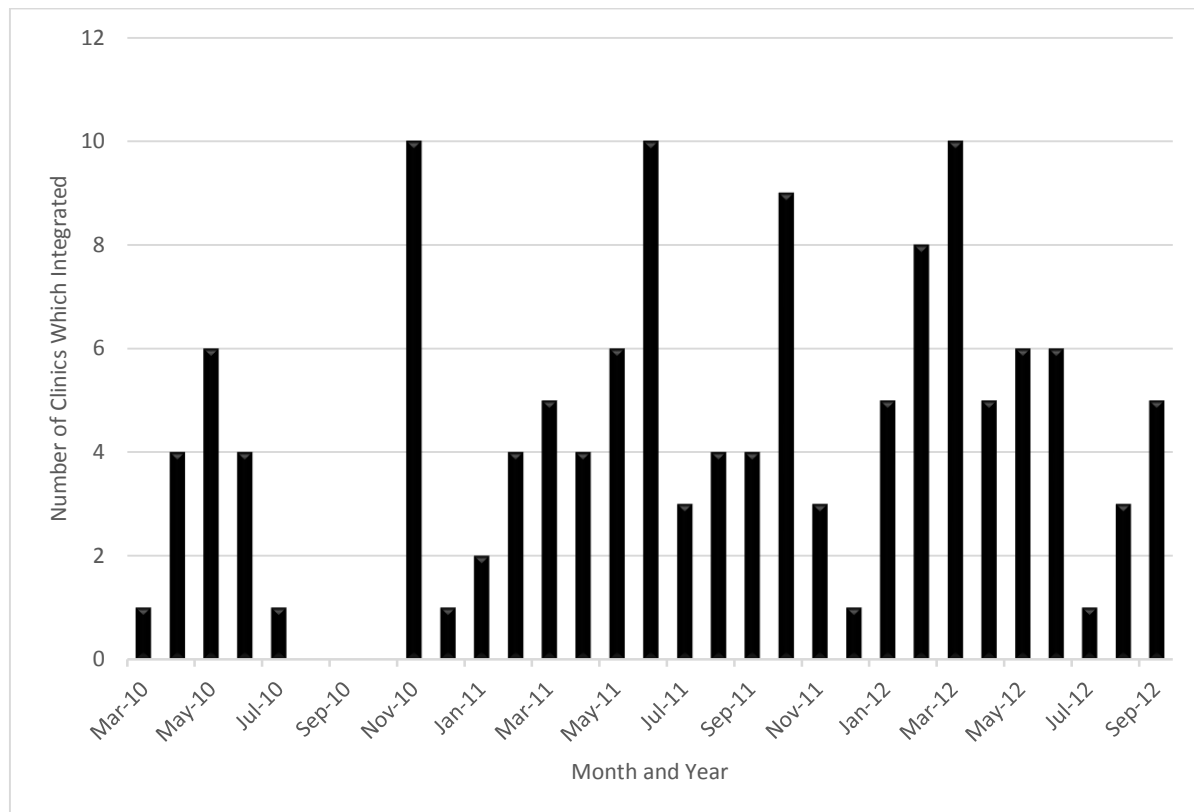
Due to the high multicollinearity of HIV predictors with other covariates in the models (e.g. integration and time), the magnitude and direction of the influence of these betas must be interpreted with caution. Therefore, results are reported only if there were significant influences on the PHC indicator when HIV service indicators were added in the models. However, coefficients should nevertheless be interpreted with caution.

5.3 Results

5.3.1 Clinic characteristics

Of the 131 clinics that met the inclusion criteria, integration (i.e. the month the clinic provided comprehensive HIV care) occurred between: March and December 2010 for 21% (n=27), January and December 2011 for 42% (n=55), and January and September 2012 for 37% (n=49). As seen in Figure 6, ten clinics per month was the highest number of clinics that had integrated within any month period, and this occurred in November 2010, January 2011 and January 2012. The 131 clinics included in the study represent a total catchment population of 54% of the province at 1.5 million people (2013).

Figure 6. Number of clinics that integrated per month across the study period (n=131)



5.3.2 Overview of indicators

As seen in Table 16, for the 131 clinics, in the first month (April 2009), 123 patients (119 adults and 4 children under 15 years old) were in HIV care (i.e. on ART). By the last month of the study (March 2013), a total of 57,958 patients (54,070 adults and 3,888 children) were in HIV care. During Year 1 of the study (April 2009 to March 2010), 1,045 patients (977 adults, 68 children) were initiated on ART. By Year 4 (April 2012 to March 2013), there were 21,870 patients initiated on ART (20,870 adults and 1,122 children). The situation that the number of patients remaining in care was higher than the number of patients initiated on treatment was presumably because patients initiated on ART in the previously vertical model were down-referred to these PHC clinics after integration when ART became available.

Table 16. Total HIV patients in care and initiated on ART at primary health care clinics (n=131)

Remaining in HIV Care (RIC) at the end of the month over study period					
	<i>Y0</i>	<i>Y1</i>	<i>Y2</i>	<i>Y3</i>	<i>Y4</i>
	Apr-09	Apr-10	Apr-11	Apr-12	Mar-13
Child RIC	4	228	997	2,684	3,888
Adult RIC	119	3,119	12,115	37,127	54,070
Total RIC	123	3,347	13,112	39,811	57,958
<i>% increase per year</i>		2721.1%	391.8%	303.6%	145.6%
Initiations on ART per year over study period					
		<i>Y1</i>	<i>Y2</i>	<i>Y3</i>	<i>Y4</i>
Child		68	277	663	1,122
Adult		977	4,661	16,080	20,748
Total		1,045	4,938	16,743	21,870
<i>% increase per year</i>			472.5%	339.1%	130.6%

The total number of patients over course of the study period are described below and descriptive statistics for PHC indicator can be found in Appendix B.3. On average, 91.5% (sd=53.3) of children were fully immunised at 1 year old. The mean percentage of new smear-positive tuberculosis clients missing a sputum sample at 2 months was 0.09% (sd=0.31). On average, neonatal HIV testing rates were 119% (sd=113). This number is likely above 100% since the denominator (i.e. ANC clients having tested positive 6 months prior in the primary care clinic) was a proxy for HIV-positive ANC clients at the clinic-level, and does not include those with a known HIV status or already on ART. The estimated catchment population of patients over 30 years old was 2,379, 016 from all 131 clinics, indicating that this number may be inflated when compared to the provincial population of 2.8 million. Across all clinics, on average, 83% (sd=18%) of total active HCW posts were filled. Professional nurses on average saw 40.53 (sd=18.12) patients per workday. Mean utilisation rate for PHC was 5.20 (sd=0.64) visits per person in the catchment population per year and 3.89 (sd=1.43) visits for those under 5 years old.

Bivariate analysis is presented for 12 month average differences after integration compared to before integration in Table 17. They are reported for clinics using only complete

data for 12 months pre and post-integration, as well as all available data, and are reported to two decimal places and whole numbers per 100,000, where numbers are appropriate. Further bivariate analysis results can be found in Appendix B.4. Increases were identified for early ANC coverage (2.76, $p < 0.01$), neonatal HIV testing (0.22, $p > 0.01$) and clinic visits per person per year (0.17, $p < 0.01$).

Table 17 .T-test results for mean difference between 12 month average pre and post-integration (complete data and all available data over study period)

PHC INDICATOR	12 months avg. (complete)			12 months avg. (all available)			Units
	diff.	p-value	df	diff.	p-value	df	
Antenatal Care (ANC)							
ANC 1st visit before 20 weeks rate	2.76	<0.01	99	2.96	<0.01	107	ANC clients seen before 20 weeks per total ANC clients per month
ANC client HIV 1st test rate	-4.35	0.38	5	0.03	0.99	87	ANC clients HIV tested (first time) in current pregnancy per ANC clients eligible
Sexual and Reproductive Health							
Couple year protection rate*	0.27	0.70	96	0.59	0.37	107	Women protected against pregnancy per catchment population
Child Health							
Immunisation coverage 1 year*	4.08	0.13	98	3.43	0.18	108	Children under 1 year old fully immunised per population under 1 y.o.
Immunised fully under 1 year – new per PHC headcount under 5	127	0.32	98	148	0.24	108	Children under 1 year old fully immunised per clinic visits under 5 y.o.
Infectious Disease							
New Sm+ TB clients missing 2 month sputum result	-0.04	0.09	24	-0.03	0.17	102	New smear + TB patients missing a sputum result per ew smear + TB patients per month
Baby PCR (6 week) done per ANC client 6 months prior	0.16	0.08	23	0.22	<0.01	106	Infants tested for HIV per HIV positive ANC client seen in the 6 months previous
Non-communicable disease (per 100 000)							
Diabetes Mellitus new per population*	44	0.09	32	-25	0.28	93	New Diabetes cases on treatment per population over 30 y.o.
Diabetes Mellitus new per PHC headcount	5	0.22	22	-2	0.58	93	New Diabetes cases on treatment per clinic visits over 5 y.o.
Hypertension new per population*	-27	0.67	102	-4	0.95	108	New Hypertension cases on treatment per population over 30 y.o.
Hypertension new per PHC headcount	-24	0.06	87	-16	0.18	108	New Hypertension cases on treatment per clinic visits over 5 y.o.
Workload and productivity							
Profession Nurse Clinical Work Load	-1.34	0.23	91	-0.76	0.45	108	Patients seen by a professional nurse per clinic w ork day
Human Resources per PHC Headcount (per 100 000)	9.32	0.48	77	4.54	0.67	108	Human Resources (health care w orkers) per PHC headcount
PHC Utilisation rate*	0.17	<0.01	102	0.17	<0.01	108	Visits per year per catchment population
PHC Utilisation rate- under 5 years*	0.12	0.19	93	0.08	0.33	108	Visits under 5 y.o. per year per catchment population under 5 y.o.

* indicates indicator is annulised (denominator is the same across all months in the year),df=degrees of freedom, **bolded values indicate significance at p<0.05**, PHC is Primary Health Care, PCR is polymerase chain reaction test, Sm+ TB refers to Smear positive tuberculosis, y.o. is years old

5.3.3 Summary of PHC indicator results

The following figures on ITS results represent ± 30 months from integration. Figures representing ITS analysis and models at ± 18 months, and ITS and LME tables of results can be found in Appendix B. Indicator names are in italics. In order to provide an overview of the directionality of the trends, the following summary in Table 18 is based on changes from pre to post-integration for the ITS and LME. HIV-related indicators are listed as to whether or not they have a significant ($p < 0.003$) influence on the PHC outcome, and not necessarily with respect to directionality or magnitude of effect.

In summary, we identified statistically significant decreases in both population and clinic level childhood immunisation coverage after integration when compared to before integration. These decreases however, were not related to the number of HIV patients at the clinics. Although no changes in the trends post-integration compared to pre-integration were detected in new hypertensive patients on treatment, both the population level and clinic level indicators were influenced by the number of new patients on ART in the PHC clinics per month. Lastly, there were also significant decreases in the post-integration contexts for numbers of clinic visits per patients per year, both for all age groups and for those under five years old. Both these indicators were influenced by the number of patient on ART at the clinics and the number of clinic visits per patient per year for all age groups was also influenced by the number of new ART patients per month.

Table 18. Summary of results post-integration compared to pre-integration

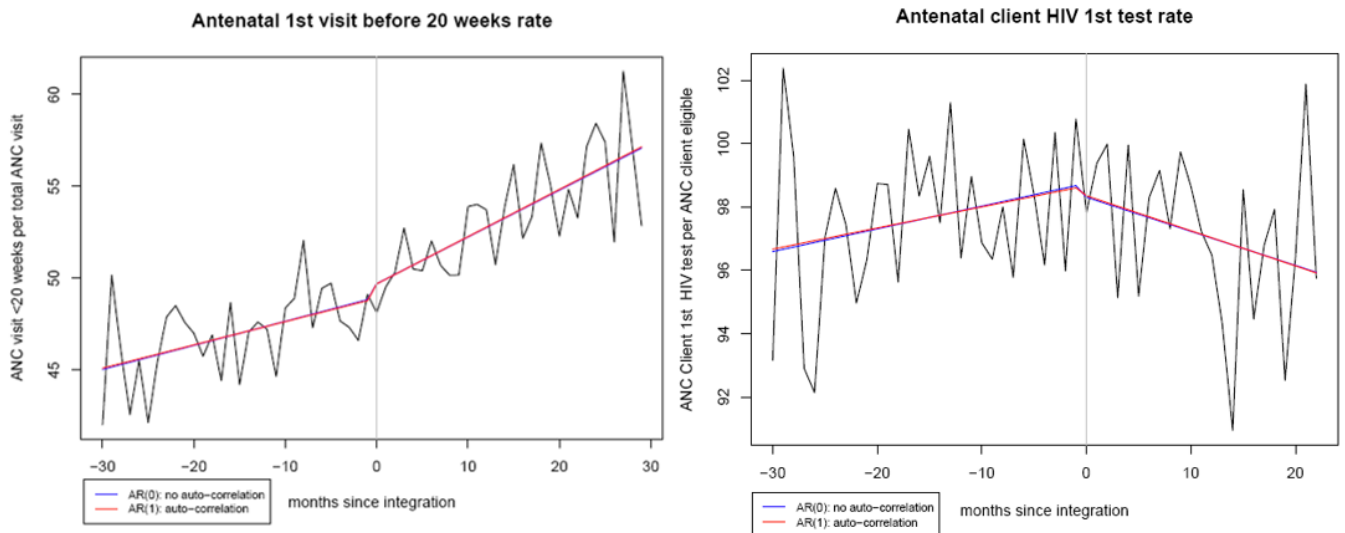
Primary Health Care Indicator	Interrupted Time Series (change in trend post-integration compared with pre-integration)		Linear Mixed Effect Models		
	± 18 months	± 30 months	No HIV indicators	ART new	ART total
Antenatal Care (ANC) and Sexual/Reproductive Health					
Early ANC coverage	none	none	none	no	no
ANC 1st HIV test coverage	none	none	none	N/A	N/A
Contraception coverage	none	none	none	no	no
Child Health					
Population level immunisation coverage	- 0.98 (p <0.001)	-1.3 (p <0.001)	-0.94 (p <0.001)	no	no
Clinic level immunisation coverage (per 100,000)	none	-33 (p <0.001)	none	no	no
Infectious Disease					
Percent of tuberculosis sputum not tested	none	none	none	no	no
Neonatal HIV testing	none	none	none	no	no
Non-communicable disease (per 100, 000 people)					
Population level new diabetics on treatment	none	none	none	N/A	N/A
Clinic level new diabetics on treatment	none	none	none	N/A	N/A
Population level new hypertensive on treatment	none	none	none	6 (p =0.001)	no
Clinic level new hypertensive on treatment	none	none	none	1 (p =0.002)	no
Workload and Productivity					
Patients seen by a nurse per day	none	none	none	no	no
Staff to patient ratio	none	none	none	no	-0.14 (p<0.001)
Clinic visits per person each year	-0.02 (p <0.001)	none	-0.01 (p <0.001)	0.003 (p<0.001)	0.0003 (p <0.001)
Under 5 years old clinic visits per year	-0.05 (p <0.001)	-0.02 (p <0.001)	-0.02 (p <0.001)	no	0.001 (p <0.001)
Note: As indicated in boldface , increases and decreases are reported for values significant at p<0.003, due to multicollinearity in the models, magnitude and direction of association with HIV indicators must be interpreted with caution. For units on indicators see previous table.					

5.3.4 Antenatal care and sexual/ reproductive health

As seen in Figure 7, we found no differences in early ANC coverage (*i.e. ANC visits before 20 weeks per total ANC visits*) post-integration compared to pre-integration (*i.e. post slope*). The ITS analysis (± 18 months and ± 30 months) showed a trend towards increasing ANC visit coverage at baseline. The LME models also demonstrated an increase of 0.20% ($p < 0.001$) of ANC visits before 20 weeks, independent of integration shown by the “time” coefficient in Appendix B.10. No influence was noted from the addition of HIV predictors in the models.

As indicated in Figure 7, for ANC 1st HIV test coverage (*i.e. ANC clients' HIV 1st test per ANC clients*), we did not detect any change from ITS analysis in the post-integration trend despite the notation of an increasing trend at baseline. LME showed no change in trend post-integration, however an increase in the trend, independent of integration, was observed at 0.18% of ANC clients 1st HIV tested ($p < 0.001$). We did not have sufficient data to examine the influence of HIV indicators on the model.

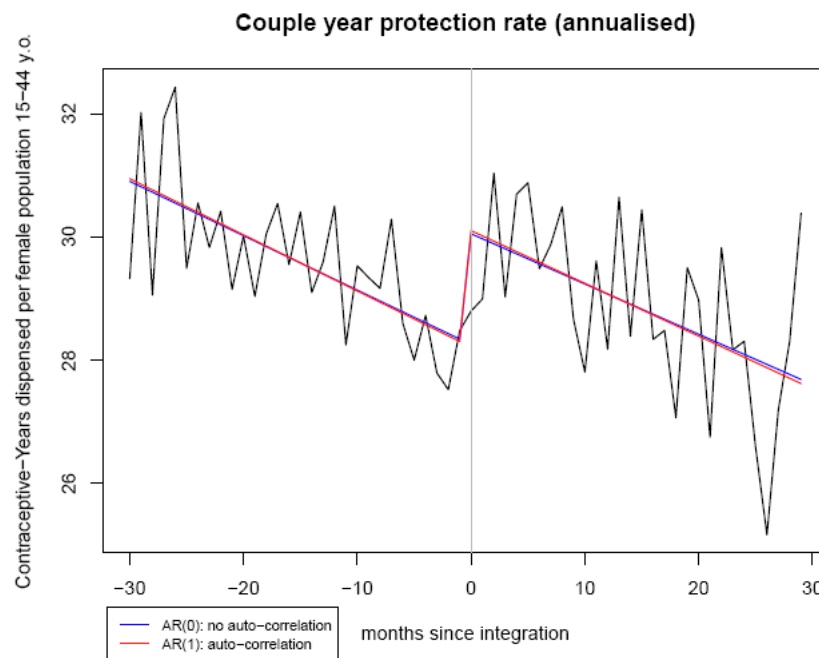
Figure 7. Interrupted time series trends ± 30 months pre and post-integration (antenatal care)



Note: Integration is represented by the grey vertical line at month 0. The black line shows the trend in the original data (after outliers have been removed) averaged per month across clinics, while the red line shows the fitted trend in the absence of AR(1). The blue curve represents the fitted trend adjusted for AR(1).

I found no difference in contraception coverage (i.e. *couple year protection rate*) post versus pre-integration in either the ITS and LME analyses. The trend of the ITS analysis can be seen in Figure 8. However, changes in the trends existed independent of integration (i.e. had the trend continued and integration not taken place). A decrease, independent of integration, of 0.14% (SE=0.03, $p < 0.001$) of contraceptive years dispensed per females in the population was seen when examining data at ± 18 months, and a decrease of 0.09% (SE=0.02, $P > 0.001$) was seen at ± 30 months in the ITS analysis. At the specific month and year that integration took place, ITS analysis showed an increase of 2.06% (SE=0.44, $p < 0.001$) of contraceptive years dispensed per females in the population at ± 18 months and 1.88% (SE=0.48, $p < 0.001$) at ± 30 months. No influence was detected from either of the HIV indicators.

Figure 8. Interrupted time series trend ± 30 months pre and post-integration (sexual and reproductive health)



Note: Integration is represented by the grey vertical line at month 0. The black line shows the trend in the original data (after outliers have been removed) averaged per month across clinics, while the red line shows the fitted trend in the absence of AR(1). The blue curve represents the fitted trend adjusted for AR(1).

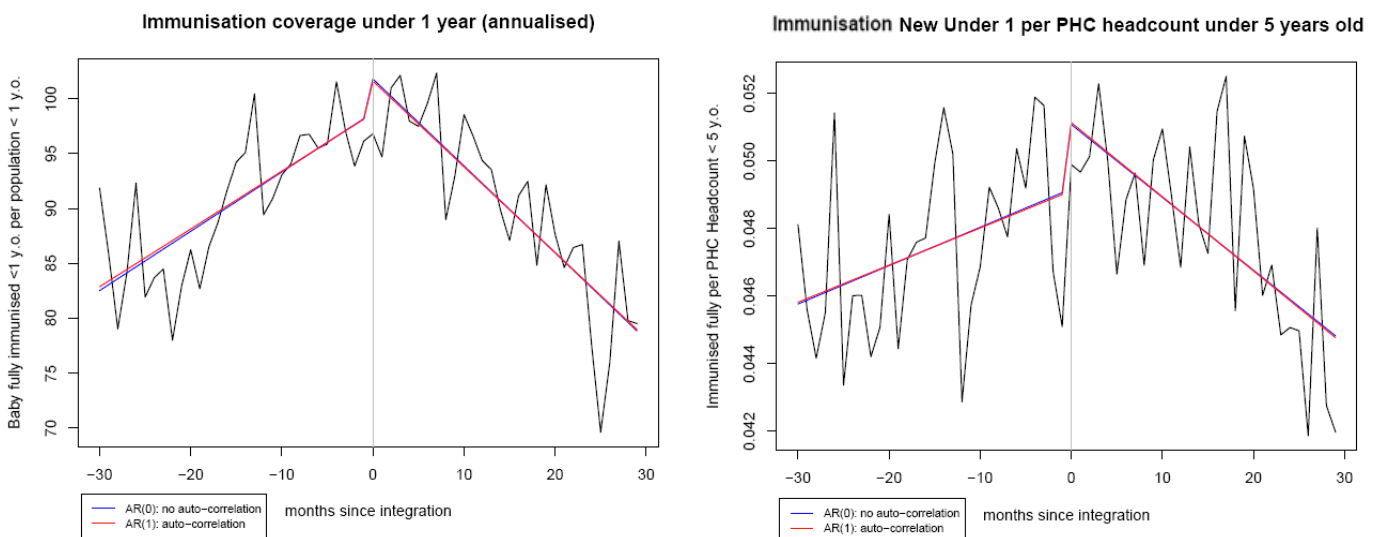
5.3.5 Child health

Population level immunisation coverage (i.e. *Immunisation coverage under 1 year old*), as seen in Figure 9, increased independent of integration (i.e. had integration not happened and the pre-integration trend continued) in the ITS analysis at ± 18 months by 0.53% (SE=0.11, $p < 0.001$) of children fully immunised under 1 year old per population. However, at ± 18 months post-integration, a decrease of 0.98% (SE=0.25, $p < 0.001$) of children immunised fully under 1 year old compared to pre-integration was seen. This trend was also noted at ± 30 months post-integration with a decrease of 1.31% (SE=0.16, $p < 0.001$) of children fully immunised under 1 year old per population. The LME analysis showed similar trends. In the LME, an increasing trend for immunisation coverage of 0.69% ($p < 0.001$) of children fully immunised under 1 year old had

integration not occurred was found, and a decrease of 0.94% ($p < 0.001$) of children fully immunised under 1 year old was found post-integration compared to pre-integration.

The post-integration decreases were similar for the clinic level immunisation coverage indicator (i.e. *immunised fully new under 1 year old per PHC headcount under 5 years old*) for ± 30 months post-integration. There was a post-integration decrease of 33 infants per 100,000 patients ($SE=8$, $p < 0.001$) of children immunised fully (new) under 1 year, as seen in Figure 9. This decrease was not seen in the LME analysis. Neither indicators were influenced by the addition of HIV predictors into the models.

Figure 9. Interrupted time series trend ± 30 months pre and post-integration (child health)



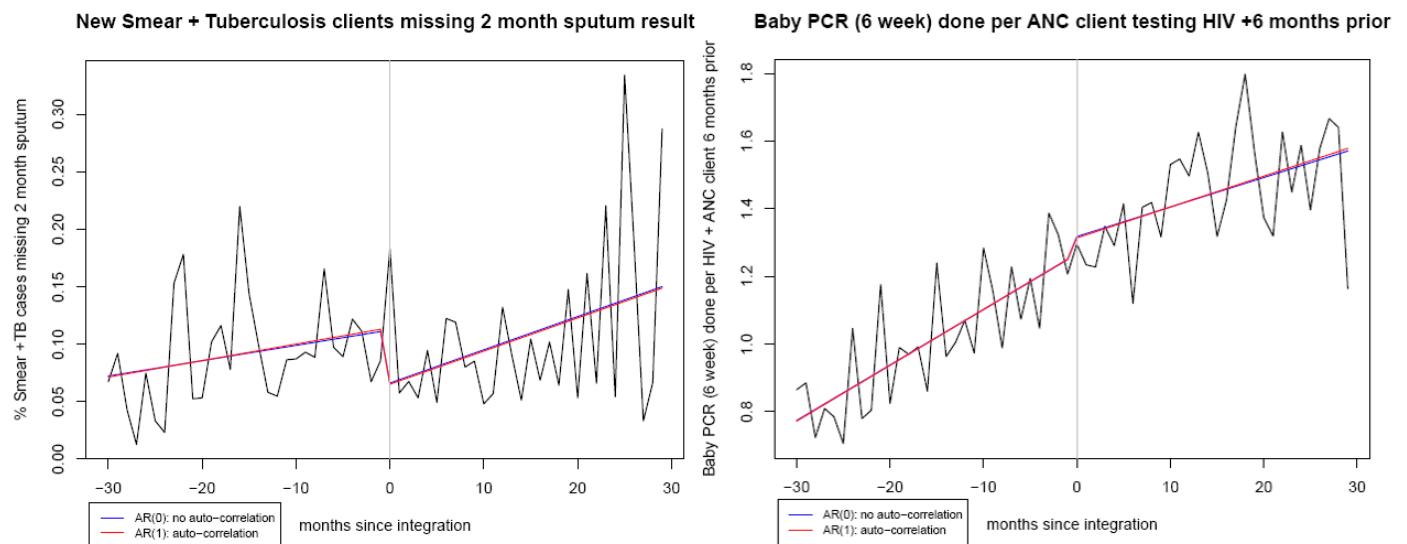
Note: Integration is represented by the grey vertical line at month 0. The black line shows the trend in the original data (after outliers have been removed) averaged per month across clinics, while the red line shows the fitted trend in the absence of $AR(1)$. The blue curve represents the fitted trend adjusted for $AR(1)$.

In order to further understand the decrease in immunisation coverage, we disaggregated the data to the clinic level and found 11 to 13 clinics accounted for the overall decrease. In these clinics, characteristics varied greatly with respect to size, location and dates of integration.

5.3.6 Infectious disease

I found no differences in the percent of tuberculosis sputum not tested (i.e. *tuberculosis patient missing sputum results*) in the analysis according to pre and post-integration trends, and neither HIV service indicators were associated with this indicator. Figure 10 below shows the trend from the ITS analysis at ± 30 months. For neonatal HIV testing (i.e. *HIV tests taken on 6 week old babies born to HIV-positive mothers*), no change post-integration was detected in either ITS or LME analysis. Results from the ITS analysis can be seen in Figure 10. However, both analyses showed increases in trends, independent of integration (i.e. had integration not occurred). The ITS analysis showed increases. At ± 18 months, an increase of 1,769 babies were tested per 100,000 HIV-positive mothers (SE 394, $p < 0.002$), and at ± 30 months, an increase of 1,651 babies tested per 100,000 HIV-positive mothers (SE=247E-03, $p < 0.001$) was detected. LME analysis also identified an increase, independent of integration, of 1,626 ($p < 0.001$) babies PCR tested at 6 months per 100, 000 HIV-positive mothers. Neither HIV predictors influenced this outcome.

Figure 10. Interrupted time series trend ± 30 months pre and post-integration (infectious disease)

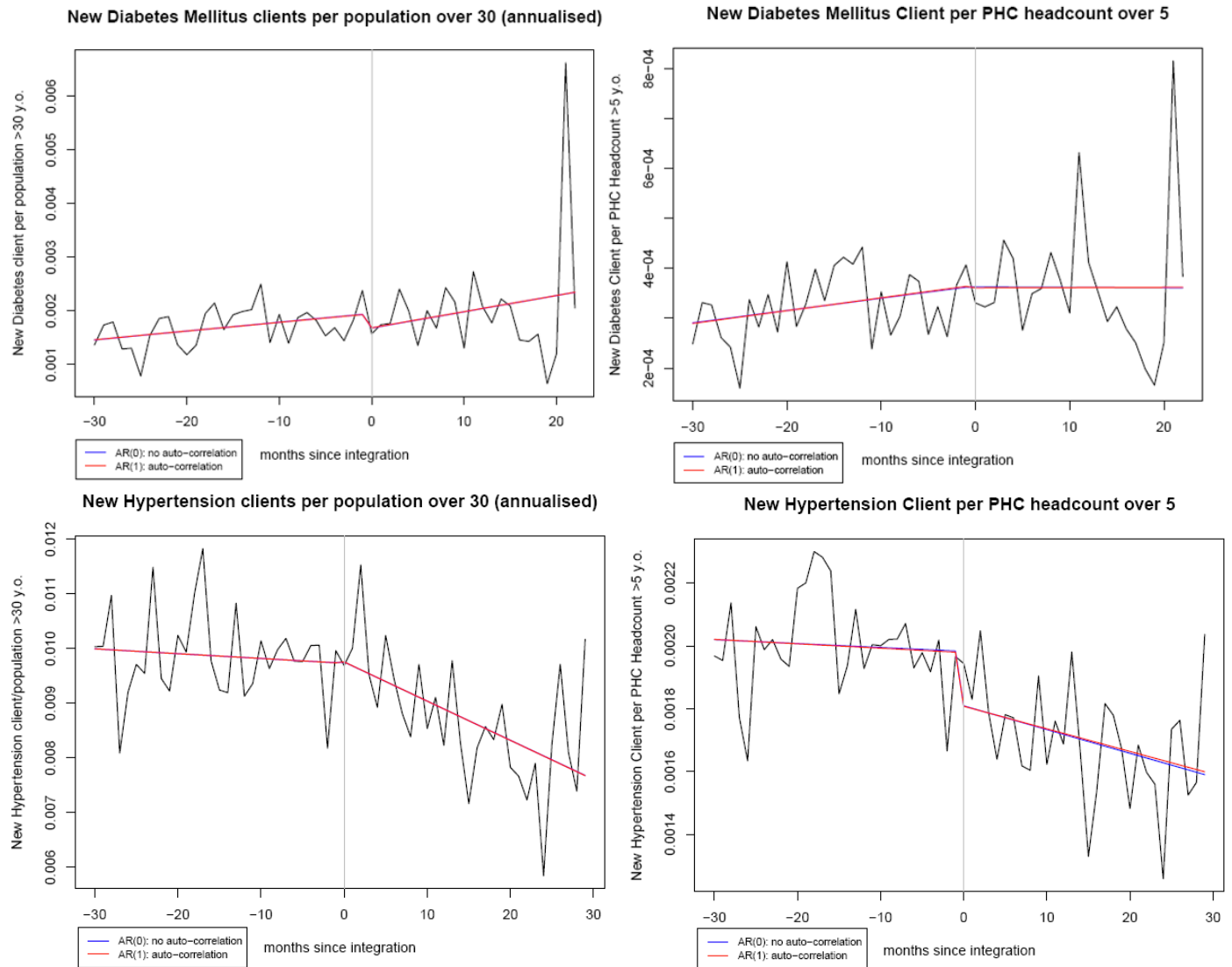


Note: Integration is represented by the grey vertical line at month 0. The black line shows the trend in the original data (after outliers had been removed) averaged per month across clinics, while the red line shows the fitted trend in the absence of AR(1). The blue curve represents the fitted trend adjusted for AR(1).

5.3.7 Non-communicable disease

Concerning diabetes and hypertension indicators, we did not identify any changes pre versus post-integration, as is indicated in Figure 11. Data to assess the influence of HIV service indicators on diabetes indicators was insufficient. As seen in Table 19, an influence from new initiations on ART was identified for both population level new hypertensive patients on treatment (i.e. *new hypertension clients per population over 30 years old*) ($\beta = 6$ per 100,000, $p < 0.001$) and clinic level new hypertensive patients on treatment (i.e. *new hypertension patients per PHC over 5 years old*) ($\beta = 1$ per 100,000, $p > 0.002$).

Figure 11. Interrupted time series trend ± 30 months pre and post-integration (non-communicable disease)



Note: Integration is represented by the grey vertical line at month 0. The black line shows the trend in the original data (after outliers have been removed) averaged per month across clinics, while the red line shows the fitted trend in the absence of AR(1). The blue curve represents the fitted trend adjusted for AR(1).

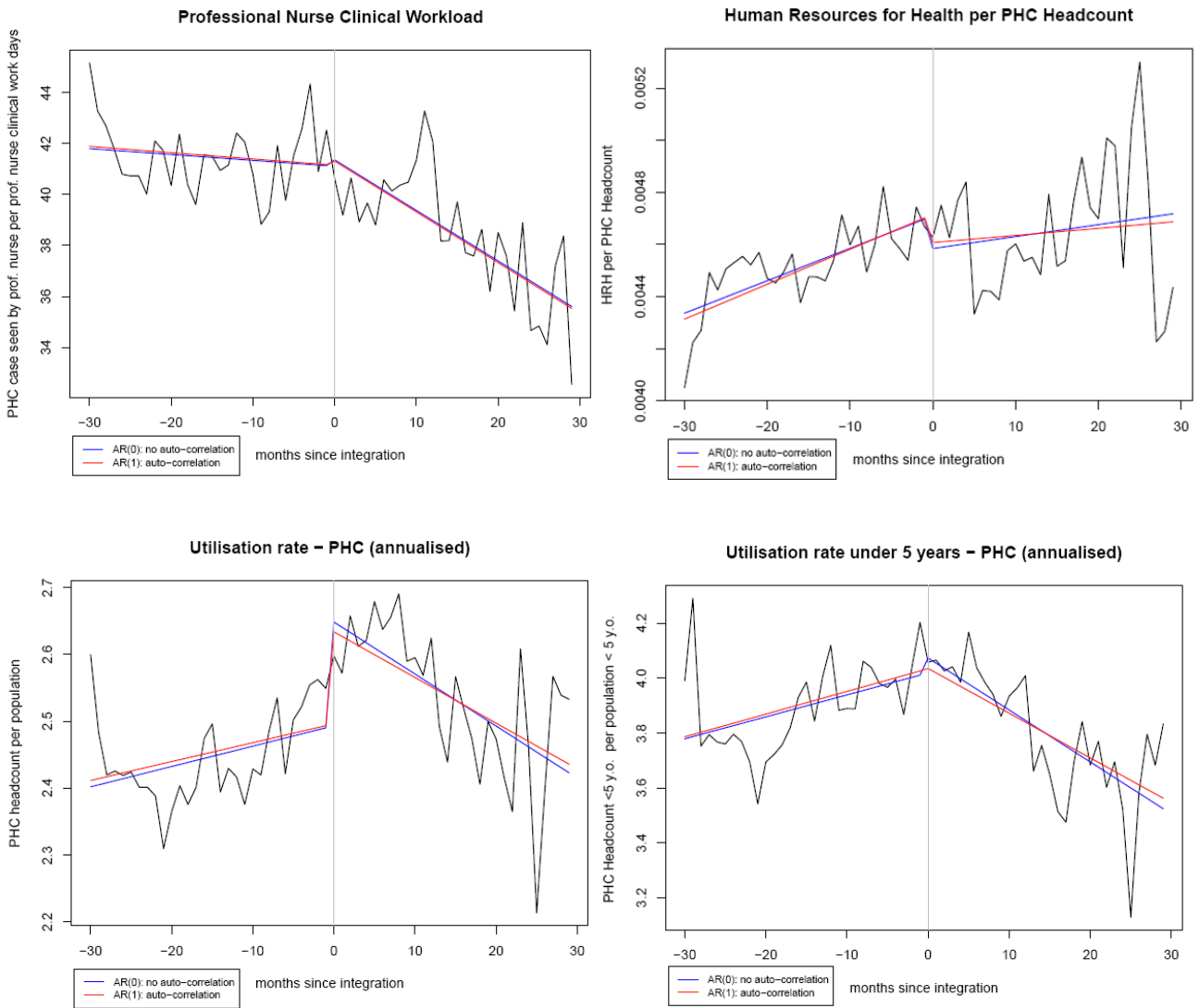
5.3.8 Workload and productivity

With respect to the patients seen by a nurse per day (i.e. *professional nurse clinical workload*) we found no differences in pre versus post-integration trends, as is indicated in Figure 12. Neither of the HIV-related indicators were associated with this outcome. Concerning staff to patient ratio (i.e. *human resources for health per persons attending the PHC clinic per month*), the LME analysis showed an increase had integration not occurred of 2 health care workers per 100,000 patients ($p<0.001$) per month. This indicator was influenced by the total of ART patients remaining in care ($\beta = -0.137$, $p<0.001$).

With respect to clinic visits per person each year (i.e. *PHC utilisation rate*), post-integration ITS analysis at ± 18 months showed a decrease of 0.02% ($SE=0$, $p<0.001$) of clinic visits per population. As shown in Figure 12, this trend was not seen post-integration in the ITS analysis at ± 30 months. The LME analysis revealed an increasing trend at baseline of 2.61% ($p>0.001$) of visits per population, an increasing trend had integration not occurred of 0.01% ($p<0.001$) of visits and an increase at integration of 0.08% ($p>0.003$) of visits. However, LME analysis showed a post-integration decrease of 0.01% ($p>0.001$) of visits when compared to pre-integration. This indicator was seen to be associated with new initiations on ART ($\beta=0.003$, $p<0.001$) and total ART patients in care ($\beta=0$, $p<0.001$).

As seen in Figure 12, the under 5 year old clinic visits per year (i.e. *PHC utilisation rate for children under 5 years old*) showed a post-integration decrease of 0.05% ($SE=0.01$, $p>0.001$) of children in the ± 18 months model, and a decrease of 0.02% ($SE=0.01$, $p>0.001$) of children in the ± 30 months model. This decrease was also seen post-integration in the LME analysis at 0.02% ($p>0.001$) of children. The LME analysis identified an increasing trend of 0.02% ($p<0.001$) of children independent of integration. This indicator was influenced by the total ART patients in care ($\beta=0.001$, $p>0.001$), as can be seen in Table 19.

Figure 12. Interrupted time series trend ± 30 months pre and post-integration (workload and productivity)



Note: Integration is represented by the grey vertical line at month 0. The black line shows the trend in the original data (after outliers have been removed) averaged per month across clinics, while the red line shows the fitted trend in the absence of AR(1). The blue curve represents the fitted trend adjusted for AR(1).

Table 19. Association of HIV indicators on primary care indicators in linear mixed effect models

	<i>New Initiations on ART</i>		<i>Total ART patients in Care</i>		<i>Units</i>
<i>Primary Health Care Indicator</i>	β coeff.	p-value	β coeff.	p-value	
Antenatal Care					
Early ANC coverage	0.05	0.15	0.01	0.006	ANC clients seen before 20 weeks per total ANC clients per month
ANC 1st HIV test coverage		ANC clients HIV tested (first time) in current pregnancy per ANC clients eligible
Sexual and Reproductive Health					
Contraception coverage	0.02	0.19	0.00	0.42	Women protected against pregnancy per catchment population
Child Health					
Population level immunisation coverage	0.06	0.37	0.01	0.14	Children under 1 year old fully immunised per population under 1 y.o.
Clinic level Immunisation coverage	-2	0.53	0	0.26	Children under 1 year old fully immunised per clinic visits under 5 y.o.
Infectious Disease (per 100,000)					
Percent of tuberculosis sputum not tested	-4	0.93	-3	0.28	New smear + TB patients missing a sputum result per ew smear + TB patients per month
Neonatal HIV testing	278	0.10	0	0.03	Infants tested for HIV per HIV positive ANC client seen in the 6 months previous
Non-communicable disease (per 100,000)					
Population level new diabetics on treatment		New Diabetes cases on treatment per population over 30 y.o.
Clinic level new diabetics on treatment		New Diabetes cases on treatment per clinic visits over 5 y.o.
Population level new hypertensive on treatment	6	<0.001	0	0.09	New Hypertension cases on treatment per population over 30 y.o.
Clinic level new hypertensive on treatment	1	0.002	0	0.14	New Hypertension cases on treatment per clinic visits over 5 y.o.
Workload and productivity					
Patients seen by a nurse per day	0.01	0.52	0.00	0.10	Patients seen by a professional nurse per clinic work day
Staff to patient ratio	-0.526	0.02	-0.137	<0.001	Human Resources (health care workers) per PHC headcount
Clinic visits per person each year	0.003	0.001	0.000	<0.001	Visits per year per catchment population
Under 5 years old clinic visits per year	0.005	0.007	0.001	<0.001	Visits under 5 y.o. per year per catchment population under 5 y.o.

Note: Bolded values indicate $p < 0.003$, All results are adjusted for 1st level auto-correlation, y.o. is year old

5.4 Discussion

Our study provides evidence that primary health care service delivery remained mostly unchanged despite a rapid and massive scale-up of treatment and care for HIV patients in an integrated PHC model in Free State South Africa. As evidenced by the dramatic increase of patients who were both initiated on ART and in HIV care at PHC clinics during our study period, the integration of HIV care into PHC has been an effective strategy for improving access to HIV care, especially ART. However, the decrease in immunisation coverage warrants further attention. Additionally, we observed changes in workload and productivity but it was unclear whether these changes were positive or negative with respect to the function of PHC service delivery.

The decrease in immunisation coverage that occurred after integration despite an increasing trend prior to integration is of great concern. Our disaggregated data shows that a small number of clinics contributed to this change, and this may be indicative of clinic-level variations that contributed to our findings. Others have discussed the possibility of HIV care “crowding out” immunisations or other PHC programs in settings with human resource constraints (20). However, other studies report favourable outcomes related to immunisation when ART provision has been expanded (38,39,88,95). Nevertheless, of the studies reporting favourable outcomes, some were conducted in only urban settings with heavy donor involvement (95), and one incorporated only 6 months of longitudinal data (88) in the absence of ART provision in all clinics. Possible reasons for the decrease in immunisation coverage could be related to the increasing numbers of HIV-positive mothers on ART at the clinics post-integration, which has thus resulted in more HIV-exposed babies. Given the shortage of HCWs at PHC clinics, more time is required in child health consultations to monitor the health of both the mother and the child, as well as to conduct routine vaccinations. As such, this situation may result in a reduction in the focus on immunisations. As discussed by Geelhoed et al (177), inadequate staffing levels may play a larger role with respect to maternal and child health outcomes than the organisation of services in integrated contexts. Furthermore, as discussed in Chapter 2, some health care workers have raised the possibility that HIV-positive mothers may

be less inclined to have their children immunised due to the fear of finding out the HIV status of their babies, thus leading to reduced attendance and/or increased immunisation drop-outs. The decrease in immunisations was not significantly related to the number of patients on ART at the clinics. Further research - specifically wide-scale, longitudinal studies where all elements of HIV care are available at the PHC clinics under investigation - is therefore needed to learn more about this outcome. Additionally, process and impact indicators related to child health should be collected in order to identify where a compromise may be occurring in integrated settings in the provision of child health services.

The rate of patient visits per year (i.e. *PHC utilisation rate*) was also found to have decreased in our study. The relationship between workload, productivity and integration is complex. Despite the increase in support staff that accompanied integration (i.e. data entry staff and pharmacy assistants), the staff-to-patient ratio did not change post-integration. This suggests that increased patient numbers may have offset the ratio, or as discussed in the literature (42,160), that an extreme shortage of staff existed prior to integration and that the relative change would not be detected. Additionally, the number of staff assigned to the clinic may not accurately depict available staff as it is common practice to move staff among PHC clinics within a district. Additionally, an increase in the number of support staff may not significantly change the workload on nurses, especially in cases with extreme shortages. Moreover, the number of patients seen by a nurse per day did not change, despite the increased complexity per visit. We expected a decrease post-integration as a result of nurses attending to the multiple needs of patients each visit resulting in less patients being seen. Furthermore, we believe the decrease in clinic visits per person each year to be beneficial to PHC care provision. The integrated nature of service provision should inherently result in less clinic visits. Additionally, many clinics (especially in one district) began providing 3 month supplies of ART, which resulted in decreased visits per month for HIV patients. Expanded ART access would theoretically also result in dramatic improvements in health outcomes for HIV positive patients, and could thus lead to decreased workloads related to opportunistic infections and minor ailments. Additionally, as the implementation of the policy to integrate expands and more clinics

begin to offer HIV care, patients may be down-referred to a nearer clinic, and thus resulting in a decline in workload for larger health centres. Further research is needed to understand the complex relationship between integration, workload and staffing levels.

The strengths of this study are twofold: the analysis of longitudinal population-level data over a four year span and the development of indicators of clinic function. To our knowledge, it is the first study utilising population-level data examined over a long duration, especially in a context where investment from international donors was largely absent. Although the generalisability of the study may be limited, the implementation of integration in this context occurred as part of a national implementation and therefore the lessons learned could be useful for other settings. Additionally, we have proposed indicators of primary health care using routinely collected administrative data that capture many aspects of PHC service delivery. Most of the indicators identified through our interviews were indicative of clinic function as a process indicator rather than impact or disease outcome. The improved standardisation of administrative data could allow for comparability across settings to assist in formulating a larger picture of the impact of integration on PHC. Additionally, these indicators could allow implementers to identify challenges in clinic function as implementation progresses.

There are also several limitations to this study, particularly around the accuracy of data and the availability of indicators. As has been discussed previously (178), many shortcomings exist in the data collection system in South Africa. In the attempt to ensure that the most robust indicators were collected, those where a programme manager was also monitoring the data were collected to facilitate verification and explanation regarding changes during the study period. In cases where the denominator may have been inaccurate and influenced the effect of the indicator (e.g. NCDs, ANC), attempts were made to capture both population-based and clinic-based denominators, and denominators were purposefully chosen to err on the side of being conservative. However, some denominators were not available in the administrative data, so proxy denominators, whose accuracy was dependent on assumptions, were used and may not have been able to detect a change.' Additionally, due to changes in the administrative dataset during our study period, the indicators for diabetes care were the only indicators available.

However, they may not be indicative of the workload related to diabetes care since the majority of diabetes patients are initiated on treatment outside of PHC clinics and therefore we expect an underestimation for this indicator. Analytically, ITS examines the averages across clinics per month and may not be reflective of individual clinic differences. LME was employed as a sensitivity analysis but is limited in its modelling due to the assumption that all trends are the same across clinics, which we believed to be a non-defendable assumption. Another limitation is that, as discussed by Atun et al. (33), the integration of an intervention in a health system is not a binary function but comprises a complicated process that occurs over time. By defining integration as having occurred in a specific month, we were unable to account for changes leading up to integration or directly after integration in order to understand how these influenced the trend. Presumably, in the first few months after integration, patient numbers would increase slowly until a peak, at which time clinic function may begin to deteriorate (or strengthen) and would impact PHC. However, as mentioned in the analysis section, we did conduct a sensitivity analysis broadening the definition of integration to a five month window (i.e. two month' lead and lag time). The analysis of the results (found in Appendix B.8 and B.9) showed similar trends when integration was quantified as a single month and year. Also, as with other large datasets, the relevance of the statistical significance versus the clinical significance must be acknowledged. we have not addressed this explicitly, but by correcting for the potential of increased type II errors from multiple comparisons using the Bonferroni correction, we have reported results at a significance level of $p < 0.003$, therefore only reporting results that were highly different post-integration. Additionally, due to the high number of zeros for the tuberculosis indicator, the assumptions of normality were violated in the models. Lastly, as with any observational study, the changes observed may be due to unmeasured confounding effects. However the analysis allowed us to control for potential confounders such as seasonal trends and autocorrelation, and to identify the secular trends that could be influencing results.

In conclusion, integration of HIV care into primary health care is a viable and necessary strategy in high-HIV prevalence settings through which to expand access to ART and to begin to reach universal coverage. With a large increase in patient numbers and despite weaknesses in the health system, it is inspiring that the provision of PHC services was largely unaffected, with the

important exception of a slight decrease in immunisation coverage. More work is needed to understand the possible causes of decreased immunisation coverage and whether this is occurring in other settings. We hope to provide evidence to assist researchers and programme implementers in gaining a better understanding regarding the aspects of PHC that have been potentially weakened, as well as other information regarding additional aspects of the overall health system. However, further research is needed to understand how best to integrate in order to ensure that high quality, patient-centred primary health care is strengthened, and that health system resources are maximised.

Chapter 6: The effect of integration of HIV care on primary health care service provision - perspectives from health care workers and key informants

Background: The integration of HIV care into primary health care (PHC) clinics is a strategy through which to expand access to antiretroviral treatment while maximising available health system resources. However, little is known about how integration impacts primary health care (PHC) service delivery, especially in resource-constrained settings. Health care workers (HCWs) and key informants provide unique perspectives regarding health system-related benefits and challenges to PHC service provision in high HIV-burdened settings, such as South Africa.

Methods: Focus group discussions (FGDs) with HCWs were conducted in four PHC clinics in 2012 in which integration had occurred. FGDs were held again in these same four PHCs in 2013, and FGDs were also conducted in 2013 in four additional clinics for a total of eight clinics. Key informant interviews (KIIs) were also conducted with a variety of health system officials including managers within the health system, non-governmental organisations, academics and policy makers. A total of 114 HCWs (2012: n=38, 2013: n=76) participated in 14 focus groups in the eight clinics, of which four clinics were surveyed both years. Forty-nine key informant interviews were also conducted (2012: n=24, 2013: n=25). Results were thematically coded using ATLAS TI and analysed utilising a health systems framework

Results: Participants identified many positive themes related to improved efficiencies in the provision of comprehensive care including increased coordination between screening, testing and treating patients who had HIV and other conditions, and an improvement in the general health of the population. However, they also reported negative effects of integration including reduced quality of care and patient education for chronic disease patients, increased patient wait times, concerns with patients defaulting, and disparities between HIV and non-HIV focused service provision.

Conclusions: The integration of HIV care into PHC clinics has the potential to maximise efficiencies in resource-constrained settings and thus allow for greater coordination between HIV

and non-HIV service delivery. However, health system constraints such as lack of human resources can negate the benefits and potentially compromise overall PHC service delivery.

6.1 Background

In 2013, 35 million people were living with Human Immunodeficiency Virus (HIV) worldwide, with 2.1 million new infections having been reported in the same year (1). Identifying the best and most efficient way to expand access to life-saving antiretroviral therapy (ART) has been one of the greatest global challenges. One widely-promoted strategy has been to integrate or decentralise HIV care to the primary health care (PHC) level (48,64,96,135,136). Although ambiguities exist with respect to the operationalisation of integration (33), evidence indicates many positive effects of integrating HIV in PHC on health systems, especially as they relate to increased efficiencies between HIV and overall PHC service provision. Increased access to ART has resulted in improved survival and greater engagement in care (74,96,135). Furthermore, increased non-HIV service utilisation (88), improved clinic infrastructure and sharing of resources (83,84,88), and strengthened referral systems and laboratory capacity (83) have been observed since integration. Conversely, others have raised concerns about increased wait times for patients (84), reductions in quality of care due to increased workloads (138), less focus on other PHC conditions (179) and reduced access to specialists (36), especially in contexts with high workloads and human resource shortages (67,83).

The integration of HIV care into PHC has been shown to result in improved tuberculosis case findings, improved reproductive health coverage, expanded antenatal care, increased utilisation of PHC services and increased levels of immunisation (38,83,88,95,174). However, many of these findings do not take into account the perspectives of HCWs and managers within a health system. With the recognition that HIV can be managed through PHC based health systems, it has been noted that HIV care shares more in common with chronic disease models, and HIV care can be leveraged to address imminent non-communicable disease epidemics while ensuring quality PHC (27,83,96). Given health system constraints, the ways that the integration of HIV care into PHC clinics affects PHC service delivery is poorly understood (64,91,92),

especially from the perspectives of frontline HCWs, who have been greatly impacted by increased workloads, as well as a variety of other stakeholders in the health systems.

Setting

South Africa has the largest number of people living with HIV in the world - an estimated 6.4 million people (116). At the same time, it also has the largest public-sector ART programme (139). The national prevalence of HIV is estimated at 18.8% (15-49 years old) of the population (2012)(101) and in 2012, HIV/AIDS accounted for 32% of deaths (107) in the country. The public health system in South Africa is affected by a lack of HCWs (both in terms of skill mix and distribution), inadequate referral systems, insufficient monitoring and evaluation and interruptions in drug supply (30,42,116,140). Highly prevalent diseases such as HIV, tuberculosis, and non-communicable diseases place unprecedented strains on the public-sector health system, which in turn necessitates complex health system responses to these “colliding epidemics” (99). The ART treatment programme in South Africa was initiated as a vertical system in 2004 where patients had to access testing, treatment and care at separate sites (141). However, beginning in 2010, in an effort to improve access to comprehensive care, HIV care was integrated into all PHC clinics and PHC nurses were trained in Nurse Initiated Management of ART (NIMART). The majority of the responsibility for addressing the complex disease burden in South Africa lies on the PHC system, and as such, it is critical to ensure that high quality care is accessible to all South Africans in the context of PHC clinics. The aim of this study is to understand the ways that the integration of HIV care into PHC clinics impacts the provision and delivery of overall PHC service delivery. We chose to examine this question within the context of the province-wide rollout of NIMART in the Free State province of South Africa.

This study took place in Free State province, South Africa, which has a population of 2.8 million comprising of 5.2% of the total South African population(97). In 2012 there were 91 public-sector professional nurses per 100, 000 people in the population(107), the lowest in the country. The Free State province is largely rural with 2 former homelands from the previous

apartheid government(126). The estimated HIV prevalence among 15-49 year olds was 20.4% (2012)(101). HIV prevalence among antenatal clients is the 3rd highest in the country at 32% compared to the national average of 29.5 % (2012)(101).

6.2 Methods

I designed a qualitative study using focus group discussions (FGDs) with health care workers (HCWs) in PHC clinics and in-depth key informant interviews (KII) with multiple health system actors to gather broad perspectives on the effects of integration of HIV care in Free State South Africa. Clinic selection for FGDs began by the identification of clinics that had at least one professional nurse as indicated in the District Health Information System (DHIS) in June 2011 (n=219). Exclusion criteria encompassed clinics that were: 1) “priority sites” identified by key informants as clinics that had been designated as ART clinics under the previous vertical programme and had thus received extra resources to provide HIV care (i.e. additional staff or financial resources) (n=39); 2) not yet integrated (i.e. not able to initiate patients on ART at the clinic) by the time of FGD (n=62) and 3) atypical (e.g. catered to specific populations) (n=3). A total of 115 clinics met the inclusion criteria and were stratified into districts, catchment population and geography. Catchment population was classified as: small- less than 25, 000 (n=38), medium- 25, 000 to 50, 000 (n=46) and large-over 50, 000 people (n=31). Of the 115 clinics, geographic characteristics consisted of urban (n=39), rural (n=57) or former homeland (n=19) and the year integration began (2010: n=33, 2011: n=66, 2012: n=16). Through purposive sampling, four clinics were selected (3.5% of clinics meeting the inclusion criteria) representing diversity of the strata. The four clinics represented four of the five districts, two were large, urban clinics, one was a large clinic in a former homeland and one was a small, rural clinic. Two of the clinics began integration in November 2010, one in May 2011 and one in February 2012.

The study was designed to sample participants until saturation of themes was reached, which we estimated would be met by recruiting 80% of staff at the four clinics (n=41). Because Year 1 FGDs did not reach saturation, we selected an additional five clinics for Year 2.

Exclusion criteria for Year 2 clinics encompassed clinics that had not integrated at least six months prior to FGDs (n=35) and clinics that had participated the year previous (n=4). Of the 28 clinics that met the inclusion criteria, all had integrated between March and June 2012. Upon further stratification on size (small: n=7, medium: n=17, large: n=4), and geography of catchment population (rural: n=10, urban: n=4, former homeland: n=14), five clinics (3.6% of the 138) were purposively selected based on key informant input to represent diversity in the strata to further elucidate the research objectives. Of the five clinics, two were medium sized, urban clinics, two were small, rural clinics and one was a small clinic in the former homeland.

Prior to inviting clinics to participate permission and inputs as to whether selected clinics could accommodate a research team were obtained from district and local area managers. All staff were invited to participate by the PI. Clinic staff were introduced to the study in-person by the PI and the Provincial NIMART mentoring and support specialist. During clinic recruitment, the study aims and the voluntary nature of participation were discussed with all staff. One week later, clinic managers were contacted to obtain the staff's decision regarding participation. In the case that staff wished to participate but could not due to scheduling, separate interviews were conducted. Clinic managers were interviewed individually.

The following questions were asked in order to understand the impact of integration (both positive and negative) on PHC service delivery and clinic function from the perspectives of HCWs in FGDs:

- 1) With respect to clinic function, do you think offering HIV care (including initiations) in this clinic has impacted any other programmes?
- 2) Is the clinic functioning better now that many services are offered here?
- 3) Have there been any impacts on primary health care programmes?

Key Informants (KIs) were purposively selected to capture diverse perspectives from key players across the health system from multiple viewpoints/levels including: 1) Clinic 2) District and Local Area 3) Provincial 4) employees of non-governmental organisation (NGO) and 5)

Expert/Academic and Policy Maker. Snowball sampling technique was used to identify KIs until saturation was reached. Interview questions related to the impact of integration on PHC service delivery were:

- 1) *For clinic managers*: “Are there any impacts [from integration] on other (PHC) programmes?”
- 2) *For other key informants*: “What do you think the impacts (both positive and negative) are on primary health care service provision?”

For both FGDs and KIIs probes included asking about the impacts of specific areas of PHC as defined by the government PHC package (125). The consent process included written, informed consent and permission to audio record. Topic guides and narratives can be found in Appendix A. These were developed from themes emerging from the literature. Although participants came from a variety of language groups the interviews were conducted in English as this is the predominant language of communication in health facilities. Analysis was grounded in a critical realism approach (142) and interpretive description (143) methodologies guided the analysis. First, themes emerging from the data were inductively and deductively coded based on the guides in ATLAS TI ® (version 7.5.2, Thousand Oaks, CA: SAGE Publication). A second researcher checked codes for congruency and committee members were consulted on discrepancies. Second, codes were applied to a health systems framework (133). Codes that did not fall into an element of the framework were considered new and emerging. Committee members were consulted on their relevance to the research question and adaptations of the framework to incorporate these themes.

6.3 Results

6.3.1 Participants

As seen in Table 20, a total of 114 HCWs (2012: n=38, 2013: n=76) participated in 14 focus groups in eight clinics. In 2012, all four selected clinics participated. However, in 2013, only four of the five selected clinics participated, with one clinic unable to participate on the

scheduled day of the FGD due to an audit. Due to travel logistics, the visit could not be rescheduled. Of the participants, 47 (41%) were professional nurses, 17 (15%) were other categories of nurses (e.g. enrolled nurses or assistant nurses), 6 (5.3%) were pharmacy assistants, one (1%) was a nutritionist, 13 (11%) were data entry staffs, 12 (11%) were security guards, general assistants or cleaners, and 18 (16%) were outreach workers (i.e. volunteer lay counsellors, home-based carers, DOTS supporters for tuberculosis, or community health workers). One-third (n=38) of the total participants partook in 2012, and two-thirds (n=76) in 2013. Seven interviews were conducted with participants who could not attend the FGD in 2012 (3 volunteer lay counsellors, 3 pharmacy assistants and 1 data entry staff), while 2 interviews were conducted in 2013 (2 volunteer lay counsellors). FGDs lasted approximately 1 hour, and interviews approximately 30 minutes.

Table 20. Characteristics of clinics and participants in 14 focus groups from 2012 and 2013 (n=114)

Focus Group	Clinic	Size	Urban, Rural, Former Homeland	Year	Integ. Mo/Yr	Months Since Integration	Total	Prof. Nurse	Nurse (Other)	Pharm. Assistant	Nutrition-ist	Data Capturer, Clerk	Security, General Assistant, Cleaner	Outreach*	
1	A	Large	Urban	2012	May-11	11	4	4	0	0	0	0	0	0	
2	A	Large	Urban	2012	May-11	11	12	4	3	0	0	1	2	2	
3	A	Large	Urban	2013	May-11	22	12	4	1	1	0	0	2	4	
4	A	Large	Urban	2013	May-11	22	7	2	2	1	0	1	0	1	
5	B	Small	Rural	2012	Nov-10	18	7	4	0	1	0	0	0	2	
6	B	Small	Rural	2013	Nov-10	28	8	4	2	0	0	1	1	0	
7	C	Large	Urban	2012	Feb-12	3	3	2	0	0	0	1	0	0	
8	C	Large	Urban	2013	Feb-12	13	6	2	0	1	1	1	0	1	
9	D	Large	F.H.	2012	Nov-10	18	12	6	1	0	0	2	3	0	
10	D	Large	F.H.	2013	Nov-10	28	10	3	1	0	0	2	2	2	
11	E	Small	Rural	2013	Apr-10	35	4	1	1	1	0	0	0	1	
12	F	Small	F.H.	2013	Jun-12	9	12	2	3	0	0	2	1	4	
13	G	Med	Urban	2013	Nov-10	28	10	5	1	1	0	2	0	1	
14	H	Med	Urban	2013	Feb-12	13	7	4	2	0	0	0	1	0	
Median(IQR)						18 (15)	TOT. 114	47	17	6	1	13	12	18	
								%	41.2%	14.9%	5.3%	0.9%	11.4%	10.5%	15.8%

*Note: Outreach workers include: Volunteer Lay Counsellor, Home Based Carer, DOTS supporter, community health worker. IQR is interquartile range, F.H.is Former Homeland

Over both years, a total of 49 key informant interviews were conducted (2012: n=24, 2013: n=25 with 33 unique individuals as seen in Table 21. A total of 19 individuals were interviewed in both years of the study. Joint interviews (i.e. 2 people in 1 interview) were conducted twice in both years upon request of the key informants. Participants included: academics, employees of non-governmental organisation (NGO), and policy makers (n=5), provincial programme managers (n=9) and assistant managers (n=4) from FSDOH, provincial mentors (n=2), a district manager (n=1), local area representatives (n=4), and clinic managers (n=8) from eight PHC clinics across the province.

Table 21. Description of key informants (2012 and 2013)

Position	Scope	Year	
Academic/NGO	Health System-National	2012	2013
Academic	Health Systems-Provincial	2012	-
Academic	Tuberculosis-Provincial	2012	2013
National Minister of Health	Health System-National	-	2013
Provincial Manager-NGO	NGO	2012	2013
Provincial Manager-DOH	Child Health	2012	2013
Provincial Manager-DOH	Chronic Disease	2012**	2013
Provincial Manager-DOH	HIV	2012	2013
Provincial Manager-DOH	HIV Data	2012	-
Provincial Manager-DOH	Human Resources	-	2013
Provincial Manager-DOH	Information System	2012	-
Provincial Manager-DOH	Reproductive Health	2012	2013
Provincial Manager-DOH	Sexual Health	2012	2013
Provincial Manager-DOH	Tuberculosis	2012	2013
Provincial Assistant Manager-DOH	Child Health	2012**	2013**
Provincial Assistant Manager-DOH	Chronic Disease	2012**	-
Provincial Assistant Manager-DOH	HIV	2012	2013
Provincial Assistant Manager-DOH	PMTCT	2012	2013
Provincial Mentoring-DOH	Nurse Clinical Mentor	2012	2013
Provincial Mentoring-DOH	NIMART Mentoring and support	2012	2013
District-Manager	PHC	2012	2013
Roving Data Manager	Local Area	2012	-
Local Area Manager	Local Area	-	2013**
Local Area Manager	Local Area-PHC	2012	-
Clinic Supervisor	Local Area	-	2013**
Clinic Manager-Clinic A	Clinic	2012	2013
Clinic Manager-Clinic B	Clinic	2012	2013
Clinic Manager-Clinic C	Clinic	2012	2013
Clinic Manager-Clinic D	Clinic	2012	2013
Clinic Manager-Clinic E	Clinic	-	2013
Clinic Manager-Clinic F	Clinic	-	2013
Clinic Manager-Clinic G	Clinic	-	2013
Clinic Manager-Clinic H	Clinic	-	2013

Note: DOH is Department of Health, PMTCT is Prevention of Mother to Child Transmission of HIV, PHC is Primary Health Care, NIMART is Nurse Initiated Management of Antiretroviral Therapy, NGO is Non-governmental Organisation

***Indicates Joint interview where 2 key informants were interviewed together*

6.3.2 Impact of integration on PHC services in the clinics

As described in Table 22, many positive and negative themes emerged from participants in the FGDs and KIIs in response to questions regarding the impact of the integration of HIV care on PHC services in the clinics as a whole. Overall, participants felt that primary care service delivery had improved as a result of using resources more efficiently. Additionally, many perceived a renewal of the importance of primary health care in the clinics. With the expanded coverage of ART at the PHC clinics, many participants felt that the overall health of the population had improved as a result of HIV patients initiating treatment earlier. They further suggested that this resulted in a reduction in the numbers of patients coming to the clinics for acute illnesses related to advanced HIV infection. Many participants felt community outreach, including HIV counselling and testing campaigns, had not only increased the number of patients identified as HIV-positive, but had also improved accessibility to screening for hypertension, diabetes and tuberculosis. However many also commented on some negative impacts of integration. Participants perceived a reduction in quality of care for chronic disease patients, increased wait times and concerns regarding the number of patients defaulting treatment.

Antenatal Care

Participants identified several positive effects of the integration of HIV care on antenatal care services at the clinic-level. The major effect identified was that the integration of HIV care had led to improved prevention of mother-to-child transmission of HIV (PMTCT) by increasing the levels of HIV testing and treatment for pregnant women. They also noted that women were testing for HIV earlier in their pregnancies, and that this resulted in a reduction of maternal deaths due to expanded ART coverage. This is well illustrated by the following quote from a key informant in 2013:

“One of the big problems with the old ARV [antiretrovirals] clinic system was that the pregnant women would get their antenatal care at their local clinic and have to go the ARV site for ARVs and a lot of them wouldn't go, it was just too many visits. It was difficult to get pregnant [women] on ARVs because of that very issue of having to access the antenatal care in one place, one clinic and then ARVs in another clinic and a lot of them didn't get onto it.”

However, participants also identified at least one negative residual impact even after integration had occurred. Despite the integration of HIV services improving accessibility to HIV care for ANC patients, HIV-related stigma played a role in women defaulting ANC care. Some participants felt there had been an increase in women defaulting antenatal care when they were diagnosed as HIV-positive because they were unwilling to disclose their status to their child's fathers or their families. This is illustrated in the following quote from a HCW in a large clinic in a former homeland in 2013:

“There are others that will test HIV positive but would not like to take ARVs [antiretrovirals], she will just disappear. They come with an address and cell number - everything is wrong, you won't find her. Some did not inform their partners.”

Sexual and reproductive health

Many participants felt that sexual and reproductive health services had been strengthened by the integration of HIV care, as most patients accessing HIV care could also benefit from sexual and reproductive health care, and access to both services had been improved as a result of integration. Participants felt that integration had led to an increased uptake of family planning and contraception, and that this had led to a decrease in unwanted pregnancies. Several participants reported improved access to family planning counselling where HIV patients were able see one clinician during one visit. Many HCWs perceived the benefits, in the context of post-integration, of the awareness of patients' HIV status. They spoke of the ways this facilitated the provision of appropriate family planning and HIV prevention services. Participants felt that integration had also resulted in an increased uptake of pap smears, as seen in the following quote from a HCW in a medium sized, urban clinic in 2013:

“We are doing more pap smears because all the HIV positive patients are being sent for pap smear every year then it's improving because more patients are being referred for a pap smear.”

However, several participants did note some negative impacts regarding the integration of HIV care on the uptake of contraceptive services. Participants mentioned two reasons for decreased uptake of contraceptive services. The first was that some patients defaulted as they did not like being offered an HIV test when coming for contraception. The second was that patients defaulted their contraceptive visit dates as a result of increased wait times at the clinic that many described as a result of increased workloads following integration. The following is a quote from a local area manager in 2013:

“With family planning you'll get complaints. You'll have to wait three hours before getting an injection and those are the things that will tell us that there is something wrong there.”

Child health

Three main positive themes that participants attributed to integration emerged within the context of child health: improved coordination and continuity of care between mother and child services, fewer minor ailments in children, and improved health information. The first encompassed improved coordination and continuity of care for maternal and child health services, with positive effects for both mothers and babies. For example, in the previous vertical system, participants suggested that HIV-positive mothers often prioritised the one day a month they could take from work to travel to a separate clinic to obtain ART. Therefore, many felt that mothers were less likely to be able to take another day off to visit the PHC clinics and have their children immunised, resulting in a decrease in immunisation coverage for children of HIV-positive mothers. With integration, participants suggested that mothers were able to obtain HIV treatment and child health care, often from one visit to one clinic, and that this situation had led to improved immunisation coverage. Some clinic managers mentioned that through increased coordination of scheduling, both mother and child could now access services concurrently.

Additionally, many participants spoke of immunisation as a point of entry into HIV care, as seen through this quote from an assistant manager in 2013:

“We pick up the HIV-positive babies and you see where the integration comes in - because the baby comes for immunisations, the baby is tested for HIV if the mother is HIV-positive and if that baby is positive, that baby is able to be initiated on treatment from the immunisation clinic, so that's the positive side of it.”

With respect to continuity of care, many participants suggested that integration has closed a critical gap between HIV-positive mothers delivering in hospital maternity wards and then not receiving HIV care thereafter. When mothers attend PHC clinics for child health, HCWs said that they are then able to follow-up with both the mothers and babies. Secondly, many participants felt that children are generally healthier and that, as a result of the expansion of ART, fewer of them are presenting with minor ailments. Thirdly, KIs spoke about the capacity for providing improved health information about breastfeeding practices to HIV-positive women within the context of integration.

However, participants also identified some negative impacts regarding the integration of HIV care on child health services. These fell broadly into three themes: reduced numbers of child health visits for HIV-exposed babies, reductions in the quality of child health care for non-HIV exposed babies, and increased time for child health visits. Some participants spoke of a decline in attendance for child health visits for HIV-exposed children that were the result of the mother's fear of the baby testing HIV-positive. Many participants felt that, because of an overemphasis on HIV, babies who had not been exposed to HIV were not receiving the same quality of care as their exposed counterparts. This is illustrated by the following quote from a manager in 2013:

“Because [non-HIV exposed babies] just come in for immunisation but the HIV-exposed [babies] are getting investigated, looking at this - we don't screen you for TB because you are healthy but you are coughing now for the third time this month and no one investigates because they are focusing more on HIV.”

Many participants also spoke about the increased time needed to conduct child health consultations when HCWs concurrently attend to the needs of HIV positive mothers and children

who have been HIV-exposed. Several suggested that this leads to reductions in the number of patients who can be seen, and to the quality of care that can be provided. Lastly, participants also commented on continuing problems with coordination between immunisation and PMTCT programmes. Many participants felt that when HIV-exposed babies come for either their 6 week or 18 month visits, the immunisation or the HIV test they should be receiving is omitted.

Tuberculosis (TB) care

Participants from both FGDs and KIIs felt that overall, tuberculosis (TB) care had been strengthened as a result of the integration of HIV care into PHC. This was perceived as having occurred through an increased coordination of HIV-TB activities such as HIV testing of patients with TB, and TB testing for patients with HIV, as well as the provision of isoniazid preventive therapy to decrease the incidence of TB in HIV patients. With the high HIV-TB co-infection rates in South Africa, many participants reported the benefits of having two entry points into TB care from screening both the PHC patients and the HIV patients, as illustrated by the following quote from a HCW in a medium sized, urban clinic in 2013:

“If you are having HIV and you've got TB regardless of the CD4 count you have to take the ARVs, so it's helping. You see now if the patient comes for TB we know we have to test for HIV and we do not miss the HIV positive patients who are having TB even the same with the HIV positive patients, we test you for TB. Now it's much easier for the patients to take TB treatment as well as ARV treatment.”

As illustrated in the following 2013 quote from a provincial manager, another positive impact regarding TB care that was identified from a provincial management perspective was increased funding, particularly with respect to TB diagnostics:

“Now because of the ARVs there was an injection of money given to provinces also used in the management of TB/HIV. We can have more of the gene expert (diagnostic testing) than we should have had in any case in the first place if we were only utilising the TB funds. So diagnosis of TB becomes easier and within a shorter period.”

Participants also identified several problems regarding the integration of HIV and TB care. Firstly, many participants felt that despite the increased coordination of HIV-TB activities,

further HIV-TB coordination was needed to achieve full integration, especially with respect to TB screening. Secondly, many participants noted that HIV maintained a position of greater focus within TB wherein those who were co-infected were receiving care with higher levels of priority when compared with those who were only TB infected. Thirdly, some participants felt that the administrative responsibilities from coordinated HIV-TB activities resulted in a reduction in quality of care for TB patients and reduced data management, especially with respect to receiving timely TB-related laboratory test results and the appropriate follow-up thereafter. This is illustrated in the following quote from a provincial manager in 2013:

“This month, [it was] reported there that in one [primary health care] facility there was a stack of about 90 sputum reports that was not filed, that was not recorded, was not followed-up. It’s because of the increased workload because now they are working TB/HIV.”

Chronic non-communicable disease (NCD) care

Many participants felt that the integration of HIV care into PHC services had an overall negative impact on services for NCD care and management. Despite an increased uptake of screening for hypertension and diabetes in HIV patients, many participants suggested that the quality of care for hypertension and diabetes patients had deteriorated. Most participants felt that the increased workload from integration had negatively impacted the time that HCWs could spend on providing comprehensive care and health education for patients with chronic diseases such as hypertension and diabetes. HCWs felt that they no longer had time to conduct patient education, check for complications (e.g. examining the feet of diabetics), and ensure compliance and adherence to NCD medications, as seen in the following 2013 quote from a clinic manager:

“We’ll just take the blood pressure quickly. You just write to go to the dispensary because the load is such a lot. So some of the things it happens that they are left out - telling them in the process look well after your feet but you don’t physically check and say ‘let me see your feet, let me do.’ Everything is done hastily.”

One participant reported increased defaulters amongst those with HIV, diabetes or hypertension due to discordant ART blister packages and the supply of chronic disease medication as illustrated in the following quote from a nurse in a small, rural clinic in 2013:

“The chronic[disease patient] tablets are 28 days and the ARVs are 30 days and now the patients don't come on [the] 28th day for his high blood and then he must come on 30 days for his ARVs or they come in on the 28 days and there is always 2 days left. So they are building up [medication] then they start defaulting because they always have a lot of extras, that's really frustrating.”

Many participants spoke of increased wait times and overcrowding for other PHC patients, and especially for those with chronic conditions. They suggested that this was the result of increased volumes of HIV patients on HCW workloads. Additionally, some participants reported that after integration they sometimes noted higher levels of disorder in the queues. They suggested that since many of the ART patients are young and feel healthy, the older chronic disease care patients sometimes complained about unruly queues. Many spoke about the overemphasis on HIV (both reporting and the government's prioritisation of it) and the lack of focus on chronic disease conditions. Thus, they noted the creation of a disparity between HIV and general chronic disease conditions. This idea is referred to in the following quote from a nurse in a small, rural clinic in 2013:

“Yes we must give statistics for [ART] weekly about our stock clearance but they don't give for high blood, so what's the difference if a patient is without his high blood treatment he will get the stroke or more complications now. It feels like they are focusing a lot more on [ART] and HIV and less on the other things. Actually everything is the same - disease is disease. We must treat everything the same. If you do drug readiness for [ART] you can do a drug readiness for a new hypertension or new diabetic.”

Table 22. Themes from key informant interviews and focus group discussions on the impact of integration on primary health care

	Positive	Negative
<i>Antenatal Care</i>	<ul style="list-style-type: none"> • Earlier and increased HIV testing and treatment in pregnant women • Reduced maternal deaths • Improved PMTCT 	<ul style="list-style-type: none"> • High defaulters once HIV test is positive • Difficult to trace lost to follow up
<i>Sexual and Reproductive Health</i>	<ul style="list-style-type: none"> • Increased uptake of PAP smears • High access to condoms • High uptake of contraception generally and for HIV patients • Reduction in unwanted pregnancies • Improved family planning counselling for HIV patients 	<ul style="list-style-type: none"> • High defaulters due to HIV discussion during contraception visits • High wait time for contraceptive visits • Increased focus on HIV and insufficient focus on prevention aspects of family planning
<i>Child Health</i>	<ul style="list-style-type: none"> • Low numbers of defaulters and easier tracing • Fewer babies with minor ailments • Improved logistical accessibility of care for mothers and children • Using immunisation as a point of entry to HIV care • More comprehensive service provision 	<ul style="list-style-type: none"> • High number of defaulters for immunisation due to fear of babies testing positive for HIV • Non-HIV exposed babies are receiving reduced quality of care • Lack of coordination between immunisation and HIV care
<i>Infectious Disease (Tuberculosis)</i>	<ul style="list-style-type: none"> • Increased and earlier TB case detection • Improved coordination of HIV-TB activities (e.g. testing, IPT, funding) • Improved prophylaxis for HIV patients • Less patient deaths 	<ul style="list-style-type: none"> • Lab results often delayed or unfiled due to system overload from increased number of HIV patients • Need for further HIV-TB coordination • Smear conversion difficult to identify
<i>Non-communicable Disease</i>	<ul style="list-style-type: none"> • Increased access to ART • HIV patients screened for chronic disease and vice versa 	<ul style="list-style-type: none"> • Reduced quality of care for hypertension and diabetes due to increased workload • Reduced adherence to medication • Chronic disease patients neglected due to clinic being full • Increased wait times • Reduced health education • Disparity between ART and HIV-attention and funding • Increase defaulters
Abbreviations: TB=Tuberculosis, ART=Antiretroviral treatment, PMTCT=Prevention of Mother To Child Transmission of HIV, IPT= isoniazid preventive therapy		

6.4 Discussion

Using data collected from 114 health care workers and 49 key informants over a critical period after integration in the Free State province of South Africa, we identified many benefits of integrated HIV care on PHC provision. Firstly, the improved efficiency of PHC service provision was one widely perceived benefit. Secondly, improvements in the general health of the population from less HIV-related health conditions provided an emerging theme across many areas of PHC. However, the major challenges noted were a reduction of the quality of care and increase in patients defaulting routine visits for problems other than HIV, due to the increased workload from patients accessing HIV care. Participants also noted remaining gaps in care due to the fear of HIV testing for themselves or their children.

With its improved efficiency, integration is generally believed to have resulted in the improved coordination of multiple disease programmes. For example, our participants suggested that the screenings for HIV, TB, and NCDs had improved. Improved timeliness of HIV testing and treatment for ANC patients was also found, and an increased uptake in contraception, especially for HIV positive patients, that has been noted elsewhere (180). Integration appears to maximise resources wherein the integration of HIV care functions as a point of entry for non-HIV services and vice versa. Consistent with other findings (93,108), TB care was perceived as having been strengthened although, as discussed by others (105,108,117), improvements are still needed to reach fully integrated care for HIV-TB. Our findings supported the idea that the provision of comprehensive services for naturally overlapping populations (e.g. maternal and child health, sexual reproductive health, and HIV) maximises efficiencies (35,179). This was well illustrated by reported improvements in women's health-related services (i.e. increased pap smears and the coverage of mother and child services).

With expanded ART coverage, our findings suggest an improvement in the general health of the population, and this was perceived to have resulted in a decreased need for acute HIV-related care at the PHC level. Health status impacts such as reductions in unwanted pregnancies and fewer maternal deaths demonstrate the benefits of ART provision, and also demonstrate

improvements for populations of reproductive age. Improved survival and earlier access to ART has been noted in other studies (74,108), although how this impacts broader PHC has not been discussed. Our findings suggest that many positive benefits have resulted from the integration of HIV care with respect to the improvement of the health of the general population. This could lead to an overall reduction in the demand on health system resources.

However, several negative impacts of the integration of HIV care into PHC were identified by participants, especially during FGDs with clinic staff. Participants identified increased complexity with respect to the content of consultations, increased workload leading to increased waiting times, and poorer quality of care for chronic disease patients. The findings of reduced quality of care were concerning, especially as related to patient education, checking for complications and ensuring adherence for NCD care. This was considered to be predominantly the result of increased HIV-related workloads and the resultant lack of time to promote health education and provide comprehensive care. As discussed by Samb et al. (179), health systems must be able to respond to the chronic disease needs of a population at the PHC level.

Additionally, while continuity of care seems to have increased for HIV-positive mothers who can be treated at child health visits in the PHC setting, participants also reported concerns regarding the rates of defaulting for ANC clients, sexual and reproductive health users, and HIV-exposed children. It is critical to understand how the integration of HIV care influences retention of HIV and non-HIV patients at the PHC-level. Concerning equity, disparities appear to exist between HIV and other PHC service provision and uptake. Our findings suggest that the focus on HIV at PHC clinics has resulted in an increase in the quality of care and prioritisation of those who are HIV-positive, exposed or HIV/TB co-infected when compared to their HIV-negative counterparts. Further research is needed to better understand the equitability of service provision and where disparities still exist in order to ensure the overall equitability of health service provision.

The strength of this study is that it is one of the few studies that addresses an identified need to explore the question of the impact of integration on PHC from a broader health system perspective (179). We not only captured the perspectives of frontline HCWs who are delivering

integrated care at PHC settings, but also managers and various actors from across the health system over a two year period. Additionally, it is one of the few studies to focus on PHC service delivery as well as the ways that the clinics have functioned both before and after integration.

Limitations include the small number of clinics through which the perspectives of HCWs were captured, although saturation was reached. The focus group discussions with clinic staff were only conducted at 8 clinics, and these may not represent the experience of staff at other clinics. However, the clinics were diverse and were purposively selected to try and represent a variety of locations, clinic sizes and experiences of integration. Also the findings from clinic staff in these clinics were complemented by interviewing a wide range of local district provincial and national key informants in order to try and capture a more general experience of the impacts of integration into PHC services in the Free State province, and in South Africa as a whole. These findings must be corroborated by quantitative evidence in order to identify the magnitude of changes described in the study.

In conclusion, our participants identified many benefits of integration on PHC service delivery. Many of the negative consequences of integration that were identified through this study were a result of inadequate staffing levels. Therefore, recommendations include increasing support for HCWs in order to help alleviate the burden from increased workloads and identifying ideal staff to patient ratios to provide high quality health care to the population. Additionally, taking practical steps such as ensuring the concordance of medication supplies between those used for HIV and non-HIV patients, may assist in furthering the integration of HIV care into PHC settings and fostering patient-centred PHC. Given the increasing numbers of patients who will need lifelong HIV care within PHC settings, as well as those who will need care for NCDs, adequate staffing levels are important to not undermine the achievements made thus far by integrated HIV care.

Chapter 7: Conclusion

There is an urgent need to evaluate the health system impacts of the integration or decentralisation of HIV care into primary health care (PHC) clinics in high HIV burdened countries, especially those with under-resourced health systems (48,64,96,135,136). Responding to the call for improved evidence on the impact of integrating HIV care into PHC (64,68,70,181), this research addresses a major gap in evidence on the effects of integration on patients, health care workers and service delivery within a health system. This study is particularly timely in that it provides evidence, from a province-wide perspective during a critical time in the implementation of this policy.

7.1 Main findings and recommendations

7.1.1 Patients

The **first objective** of the study was to understand the effects of integration on patients attending PHC clinics both before and after integration, as well at two time periods after integration took place. We hypothesised that although integrating HIV care at PHC clinics would result in advantages for patients, quality of care in the post-integration context would be reduced from Year 1 to Year 2 as a result of the increased HIV-related workloads at PHC clinics. Evidence pertaining to this objective, obtained from our qualitative findings, as presented in **Chapter 2**, revealed that advantages of integration existed for patients, families and communities. However, our findings point to the potential for compromises as well. Quantitative findings, presented in **Chapter 3**, from two cross-sectional waves of patient surveys conducted at four clinics and administered ten months apart following the time that HIV care was integrated into PHC services, showed no difference in quality of care or satisfaction with staff between years. Therefore we reject the hypothesis articulated. Nonetheless, our findings suggest from both these sources that although there were many advantages for patients who attended PHC clinics, some aspects of care indeed seemed to have been compromised. Therefore, the results of the impact on patients are mixed.

The broader benefits to patients included the provision of comprehensive care at one single clinic, with the potential of being seen by one provider for all of one's health needs. We also found a high level of accessibility to ART and HIV care. Participants believed that this had led to improvements in the overall health of the population. This, in turn, was reported by participants to have resulted in a reduced need for health system resources. Our qualitative findings support current evidence that patients are presenting with less advanced HIV illness and related complications (57) and that they are experiencing improved survival rates (74) from expanded ART coverage in integrated contexts. However, we also identified remaining gaps in the achievement of universal access to ART for those living in areas where PHC clinics are difficult to access (i.e. farms), and for men. Although men reported no significant changes in perception of quality of care or satisfaction with staff in the patient surveys, our qualitative findings suggest that unique care models may be needed to improve access for men (108). Current evidence suggests that fewer men are on ART, men are sicker when they begin treatment, are less likely to be retained in care, and that they have an increased risk of death on ART (153,154).

Additionally, our qualitative findings suggest that the integration of HIV care was associated with better continuity and engagement in care across the HIV care spectrum. This could be attributed to improved geographic and logistic accessibility to HIV care, improved ability for HCWs to provide health information and monitor patients, and improved family and community level psycho-social support. Participants did however express some concerns regarding retention and engagement in HIV care within the PHC setting. This has been discussed in the literature concerning integrated models where HIV patient numbers are increasing rapidly (37) and the evidence on retention and patient engagement is mixed (76,77,79,182). With studies demonstrating only 60% of patients engaged in care after 2 years of HIV treatment initiation (46) in SSA, long-term studies are needed to identify health system related factors that may influence patient engagement. One long-term study from an urban clinic in South Africa showed retention rates as low as 38% seven years after HIV treatment initiation (183). Although integrated HIV care in PHC levels has been associated with lower defaulter rates compared to other models (62,77,79), concerns were noted from participants in our study that some patients were defaulting

ART as a result of the rapidly increasing workloads at clinics due to the numbers of patients accessing HIV care.

Our findings also suggest that, as demonstrated through the findings of the patient surveys between the two years, a high quality of care was successfully maintained during the integration of HIV care. In fact, tuberculosis (TB) attendees reported a higher quality of care and satisfaction with staff than did any other group of patients. This is most likely due to the high HIV-TB co-infection rates in South Africa, as well as the overlap in the health care needs of those who have these two diseases (94,102,105). However, as will be further discussed below, both our qualitative and quantitative findings suggest that those attending PHC clinics for child health and chronic non-communicable disease care experienced a reduced quality of care. Increased wait times in the integrated context were also identified by our study participants, and this is consistent with other findings (184).

Lastly, our qualitative findings suggest the development of a wider level of family and community transformation as a result of the provision of ART nearer to patients' homes and because of the expansion of access to treatment. Participants identified high HIV status disclosure, improved HIV awareness and support through community activities, and decreases in HIV-related stigma as a result of integration. However, as discussed by others (82,84), breaches in patient confidentiality in waiting rooms due to HIV specific folders, queues and consulting rooms may increase stigma in integrated contexts, and these issues need to be addressed further.

Further research on continuity of care and patient engagement in integrated contexts is needed in order to better understand the determinants of disengagement in care, especially those related to health systems in high-HIV burdened areas. Further research is also needed on how best to expand ART and to identify models that promote the highest levels of equity for reaching all populations in need of treatment and care, while at the same time protecting patient confidentiality. Additionally, the relationship between HIV-related stigma and integration needs to be better understood.

7.1.2 Health care workers

The **second objective** of our study was to understand the effects of integration on HCWs at PHC clinics through a comparison of their situations both before and after integration. We hypothesised that health care workers would hold diverse views regarding integration when they compared pre and post-integration situations. The evidence from our qualitative findings, as presented in **Chapter 4** revealed that many benefits existed for HCWs from integration although challenges were also identified. Quantitative workload and productivity indicators in the administrative data discussed in **Chapter 5**, indicated changes after integration compared to pre-integration which may have a multitude of determinants and consequences on HCWs. Therefore, from these findings we accept our hypothesis that HCWs held diverse views.

Benefits, including improved job satisfaction from the provision of ART, the addition of support staff, as well as improved teamwork and organisational culture that were identified in this study are comparable to the benefits that have been described by others (67,90). Additionally, the NIMART training and the resultant improvements in skills and knowledge were identified as major benefits that have resulted from integration. HCWs commented that the training improved their confidence, morale and skills, with the majority of HCWs describing integration as an overall positive experience. Support from mentorship was also identified as a positive aspect of integration.

However, staff shortages and lack of resources to provide comprehensive care and support were prevailing negative themes in our study, as has also been described elsewhere (87,90). Additional support staff were appointed to PHC clinics at the time of integration, and staff-to-patient ratios from the analysis of administrative data remained unchanged across the study period, suggesting that actual patient caseload did not change after the integration of HIV care. However, HCWs reported increased consultation times due to the increased complexity of patient care per visit, and increased administrative responsibilities related to vertical reporting structures, suggesting that actual workloads did increase significantly and that current staffing levels are not sufficient.

Our study is one of the first to provide evidence from the perspectives of diverse cadres of staff at PHC clinics. This is especially important given how critical the strategy of task shifting or sharing to lower cadres of HCWs is to providing integrated care. Also, this study is one of the few studies to examine the impact of integration during the implementation phase of this policy. Further research is needed on how the increased complexity per patient in integrated PHC models influences HCW productivity, workload, burnout and the ability to provide comprehensive care. Additionally, the study calls attention to the need to redefine optimal staff-to-patient ratios to ensure high-quality PHC. Lastly, the study highlights the need to streamline and integrate data capturing tools to support integrated care and to better understand where lower level community-based HCWs could supplement care.

7.1.3 Primary health care

The **third objective** of the study was to assess the impact of integration on PHC service delivery by comparing indicators before and after integration. We hypothesised that the integration of HIV care into PHC would result in the deterioration of PHC service provision at PHC clinics when pre versus post-integration scenarios were compared. Evidence described in **Chapter 5** from the trend analysis of administrative data in 131 clinics across four years revealed that PHC service provision was largely not compromised, with the exception of child health services, where the observed change was not related to the number of HIV patients. Qualitative findings in **Chapter 6** resulting from HCWs and key informants suggested many benefits related to improved efficiencies but also noted aspects where PHC services could be compromised. Thus, our findings largely militate to reject the hypothesis in favour of the alternative that PHC service provision was not compromised during the integration of HIV care into PHC clinics.

Overall, PHC service provision was not compromised despite an impressive increase of almost 58,000 HIV patients having accessed ART in the 131 public-sector primary health care clinics studied across our four-year study period. Some aspects of care, such as the provision of tuberculosis care, and antenatal and reproductive health, were thought to have been strengthened.

However, there is evidence that some services, including child health (specifically immunisation coverage) and care for chronic non-communicable diseases, may have been compromised.

Our findings support the existing evidence from the integration of HIV and tuberculosis care in primary health care levels, that suggests that benefits exist for improved case detection, coordination of HIV and TB programmes, and engagement in care (94,105). This was also demonstrated by a lack of changes in the indicator for missing sputum results at 2 months, revealing a high level of monitoring of tuberculosis care in integrated settings. The findings also support the high quality of care and satisfaction with staff reported by tuberculosis attendees. From qualitative findings, participants reported improved coordination of TB care as a result of integration, although the need for further HIV-TB coordination at PHC levels was identified.

Additionally, although our trend analysis did not show improvements in reproductive and antenatal indicators, qualitative findings suggest improved coordination of HIV care with antenatal and reproductive health programmes. Furthermore, our qualitative findings indicate that prevention of mother-to-child transmission of HIV improved after integration, with an increased likelihood of keeping HIV positive mothers engaged in care after delivery.

However, there was a decline in immunisation coverage, both as a proportion of patients attending PHC clinics, as well as at a population level that was not found to be related to the number of HIV patients at PHC clinics. A lower quality of care was also reported in patient surveys for child health attendees between the two years. This decrease may be attributable to the increased workload in child health visits for HIV-exposed babies, as described by HCWs. Also, many HCWs suggested that mothers of HIV-exposed infants may not want to immunise their babies due to the fear that the baby might test positive for HIV. This decrease in immunisation coverage found in our study is not consistent with findings of improvements in immunisation in integrated PHC models found in other studies (83,88,95). However, it is consistent with a finding that HIV-related aid has displaced immunisation provision in contexts where human resource shortages exist (20), as well as evidence that immunisation drop-out rates are increasing in South Africa (97). These findings warrant immediate action and further research.

Furthermore, although no changes were noted in the chronic non-communicable disease indicators in our trend analysis, our qualitative findings suggest that patient care for chronic disease patients was compromised after integration due to increased workloads from the number of HIV patients attending PHC clinics. Although improved HIV testing for chronic disease care patients was noted, as well as improved care for those co-infected with HIV and either diabetes or hypertension, overall, participants felt that chronic disease care had been compromised. Participants noted reduced time to spend on patient education and care; they also mentioned an increased prioritisation of HIV care compared to other conditions. Some participants suggested that the higher numbers of HIV patients could result in increased wait times and increased defaulters for chronic disease patients. This may be the reason for the reduction in quality of care seen in our patient survey results for those who had been visiting the clinic for more than 10 years, as these respondents were most likely to have been chronic disease patients. This finding is especially important given the upcoming chronic disease epidemics that are predicted in South Africa, and that will place an unprecedented strain on health systems to care for those with both infectious and non-communicable diseases (185).

Our study is the only study to examine the impact of integrated PHC utilising a large, population-level data set across four years pre and post-integration. Further research is needed to understand how the provision of specific components of HIV care with primary health care interact within the health system, especially as integration influences immunisation coverage and chronic non-communicable disease care. Overall, despite a large increase of HIV patients at the PHC facilities, primary health care was not found to be greatly compromised and therefore is a promising strategy to expand access to ART in resource-limited, high HIV prevalence settings.

7.2 Strengths and limitations

7.2.1 Strengths

The major strengths of this research are threefold: the data collected from our study represent a “real world” implementation, the utilisation of a mixed methods approach with both cross-sectional and longitudinal study designs and the examination of the questions within the context of a health system framework. Therefore, this research is comprehensive in its nature.

This data represents a “real world” setting where the implementation of a policy to integrate was done within the constraints of a health system in a high HIV-burdened, middle-income country in the absence of specialised support and additional finances. Free State province and South Africa on the whole, has had very little support from external funders. Hence, this study provides evidence from a nationally funded expansion of ART in a high-HIV burdened context. Furthermore, South Africa has one of the world’s largest disease burdens from HIV globally and although some results may not be generalisable to other contexts, it provides important evidence that could benefit other high-burdened, middle-income contexts.

Additionally, we utilised a variety of methods and study designs to answer the research questions. By utilising a mixed method approach, we were able to not only quantify the effects of integration on each of these components of a health system, but also to gain insights from a variety of perspectives within a health system. This provides us with a rich dataset that allows us to understand the potential health system-related determinants of our findings. The data from the qualitative findings not only captures diverse perspectives across a health system, but it also engages multiple cadres of staff at PHC clinics. Furthermore, by capturing qualitative data in two waves of ten months apart, we were able to identify themes that were sustained as the implementation of ART progressed, and it also allowed for periods of reflection where the staff could elaborate on changes since the last set of interviews. Furthermore, the longitudinal data captured in Chapter 5 represents a large, population-level data set over four critical years and offers us increased confidence in our research findings. The data collected represents an attempt to capture a population-level perspective across a province both before and after integration, as well as while integration was implemented. This speaks to a critical research gap that is timely to address, as many countries are moving towards integrated service delivery within the PHC platform with a weak evidence base through which to understand the effects on the broader health system

I utilised a health systems approach that allows us to better understand the broader-level determinants and outcomes of integration within multiple levels of a health system. By examining the overall impact of integration on three essential components of a health system -

patients, health care workers, and primary health care service provision, this study acknowledges that health systems are complex adaptive system where interventions do not occur in isolation of health system and patient level factors. It also provides a point of comparison for other researchers and implementers examining these questions.

7.2.2 Limitations

This study should provide evidence for other settings with a generalised HIV epidemic that are considering integrating HIV care into PHC clinics. However, limitations do exist. One of these include concerns regarding the generalisability of this study to other contexts. South Africa is in a unique situation compared to other SSA countries due its status as a middle-income country with a large HIV-burden. Other countries in SSA with similar high HIV burdens may not have the same human and financial resources to implement integrated HIV care using the same model as South Africa. Another limitation to this study, is the use of routine, administrative data and concerns about the accuracy and the availability of indicators. As has been discussed in detail in Chapter 5, the use of administrative data has its limitations with respect to accuracy (178). Although we attempted to capture the most robust indicators during the indicator selection process, we found some indicators not to be ideal, and proxy denominators were used. As such, the accuracy of these proxy denominators was dependent on assumptions. Additionally, changes in data availability occurred over our study period, which resulted in some of the indicators not encompassing the entire 4 year period. As well, analytically, ITS examines the averages across clinics per month, and may not be reflective of individual clinic differences. LME was employed as a sensitivity analysis but is limited in its modelling due to the assumption that all trends are the same across clinics, which we do not believe to be a defensible assumption. Another limitation is that, as discussed by Atun et al. (33), the integration of an intervention into a health system is not a binary function but is a complicated process that takes place over time. By defining integration as having occurred in a specific month, we were not able to account for changes leading up to integration, or directly after integration, in order to understand how these influenced the trend. Presumably, in the first few months after integration, patient numbers would increase slowly until they reached a peak, after which we believed that clinic function would either begin to deteriorate (or strengthen) and would have an impact on PHC. Because we

were unable to capture how integration was implemented in each clinic, we are unable to report on the relationship between changes in organisation of service delivery on patients, health care workers or PHC care. As well, as with any observational study, the changes observed may have been the result of unmeasured confounding effects. Furthermore, although we did capture open-ended questions in our patient survey, the patient voice was not as in-depth as that other participants in our study for several reasons. Discussions with key informants informed the decision to not conduct FGDs with patients. In a setting where HIV patients were recently incorporated into PHC clinics, asking patients to disclose their HIV statuses in order to create separate focus groups could be potentially stigmatizing. Alternatively, conducting FGDs with patients whose HIV statuses were unknown could potentially lead to patients with HIV feeling discriminated against if non-HIV patients discussed their presence at PHC clinics negatively. Ideally, individual patient interviews would have been conducted but this was not possible due to limited resources. . Lastly, although we acknowledge that costing related to integration is an important component of health system evaluation, since the policy to integrate HIV care into PHC in South Africa was not supported with additional financial resources aimed at the process of integration or any substantial increases in staffing levels, this was not evaluated in our study.

7.3 Application of the research findings and future directions

The application of these research findings can be considered in the following ways: First, the study provides evidence supporting the integration of HIV care into PHC that offers other settings a methodology for analysing impacts, as well as a point of comparison as they move forward towards integrated PHC. Second, we have identified areas within a health system that may be potentially strengthened or compromised as integration progresses, and for which further research and policies could be developed to mitigate these potential negative consequences. This can lay the basis for more sophisticated analyses as well as integrative evaluations, including economic evaluations, if funding and financing options were to be explicitly considered. Third, we have provided evidence that with the wide-scale implementation of a primary health care approach to the expansion of ART, primary health care and the health system were not severely weakened. This can inform further comparative analysis of the options concerning vertical, horizontal and diagonal approaches to health service delivery. As countries move forward with

the expansion of ART, many health system-related challenges remain. These include the need to further expand ART while retaining those who are already in care, attending to chronic disease care requirements, and strengthening health systems, especially with respect to human resources.

This study has demonstrated that a massive scale-up of ART in PHC clinics in the Free State province did not greatly compromise the ability to provide PHC. That said, more studies are needed to investigate whether these findings are similar in other contexts. By the end of 2013, an estimated 2.5 million South Africans were accessing ART. Of these, 90% were accessing it through public-sector primary health care clinics (117). In light of the 2013 WHO recommendations for ART initiation, once implemented in South Africa, an additional 1.6 to 2 million people in addition to those who are currently in the ART programme would also be eligible for treatment (56). This translates to a health system that would need to provide lifelong, chronic HIV care for 5-6 million individuals (117) while maintaining high quality primary health care. While alternative models of HIV care such as adherence support groups for the delivery of ART to stable patients (186) and movements towards self-managed care (187) are being explored, the expansion of ART will necessitate health system innovations guided by strong operational evidence regarding the efficacy of alternative models. Such models should incorporate some of the benefits we have discussed of engaging families and communities towards HIV care once services are located nearer to patients' homes. Additionally, these models should aim to mitigate some of the negative effects of integration we have identified in our study such as decreased immunisation coverage, increased workloads, high wait times, and reduced quality of care for chronic disease care patients. Furthermore, the need to address human resource shortages and identify realistic staff to patient ratios and workloads in integrated contexts cannot be overemphasised. Further research is needed to identify strategies to maximise these benefits and to understand the challenges while further expanding ART.

Concurrently, HIV as a chronic disease will bring with it the unique challenges of HIV and aging yet to be seen. As discussed by Deeks et al. (70), with increases of HIV survivors, toxicities and complications related to life-long ART may result in multiple co-morbidities with increasing risks of cancers, diabetes, hypertension, cardiovascular and neurological diseases.

Additionally, the chronic disease care needs of populations are predicted to increase in many LMICs (124,185,188), raising concern as to whether PHC-based health systems are equipped to address the needs of these populations (189). With many chronic disease care programmes in LMICs currently being highly fragmented, vertical in nature (179) and dependent on aspects of care provided at hospitals (189,190), integration of all aspects of healthcare into PHC levels must be prioritised and researched. The rapid expansion of ART has provided the first global chronic disease model wherein tools, protocols and alternative strategies for delivering health care have adapted to local contexts and resources, and these lessons must be leveraged for NCDs (68,191,192). According to our findings, standardised protocols such as the PALSA plus training, the supportive role of nurse mentorship in the implementation of integration, and drug readiness training for patients should be expanded to all diseases and patients in PHC clinics and used to expand programmes for the integrated management of childhood and adult illnesses (IMCAI) (25,26). Communities and patients should be engaged and consulted with regard to what strategies would best meet individual and community needs. Integrated service-delivery models should go beyond the binary integration of two or even three disease-specific programmes and integrate all programmes into one service delivery package, as has been done in this context. However, that said, this cannot be done without robust evidence and adequate health system resources, especially human resources.

More evidence is needed regarding how to build and sustain patient-centred health systems in resource-limited contexts that promote equity and high-quality care while at the same time caring for its HCWs. Despite the successful integration of HIV care into primary health care utilising alternative staffing models, there exists a shortage in the health workforce. Currently, there is a shortage of 7.2 million HCWs worldwide, with this number predicted to increase to 12.9 million by 2035 (193). While countries move towards the strengthened development of HCWs, the role of lower cadres of HCWs in integrated contexts needs to be further understood. As evidenced in our study, although additional staff were provided with integration, their numbers were inadequate to offset increases in workloads. There is a need to identify where new cadres of HCWs, such as further specialised data support staff, could be used effectively to reduce the workload in integrated contexts. Additionally, high quality routine data collection is

an important part of monitoring the health of a health system, albeit not the main function of the health system, and needs to be streamlined to accommodate integrated service-delivery platforms and staff shortages. Best practices on how to balance the need for quality data within the context of limited human resources need to be identified. Also, as discussed by Stender et al., “successes should be measured by not only individual disease morbidity and mortality, but also by improvements in the health of societies.” We would like to further this recommendation by calling for metrics on the health of communities since community support has been shown to be a large advantage for decentralised models of care such as integration. This call echoes other comparable demands that have been discussed by others (194).

In conclusion, the integration of HIV care into PHC settings has allowed for tremendous increases in patients accessing ART without major compromises to PHC service delivery or the health system at large. We emphasise the urgent call for further evidence examining the wider health system implications of integration in order to ensure that patient-centred health systems can meet the needs of people within their communities regardless of the disease that ails them. However, this cannot be achieved in the absence of adequate staffing levels and resources and we caution that gains made from integration could be undermined if the health workforce is not supported.

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Appendices

Appendix A: Survey instruments and tools

A1: Focus group discussion guide

Introduction: Thank you for participating in our focus group. A focus group is a way through which we can explore ideas and experiences around integration of ART (antiretroviral treatment) at the primary care clinics. We would like to know what your experiences are of work before and after the integration of ART care. We would like to ask you all, out of respect for confidentiality, to refrain from disclosing the contents of the discussion outside of the focus group. All responses will be kept confidential and no specific response will be attributed to you. We are looking for collective themes that emerge. Your participation is completely voluntary and if you wish to no longer participate at any time during the focus group please interrupt me and let me know. You do not have to provide a reason and there will be no penalties for not participating. I would like to record our conversation and then transcribe it so that I have an accurate record of what our conversation contained. If at any stage you would like me to stop the recorder please just ask and I will do that. Do we have your permission? Great, let's start.

1. This clinic has been offering ARTs since (DATE)-this is what we are considering integration. How many of you were working here before that time? If you did not work in the clinic prior to that date, please respond about your experience since you started working at this clinic. If you have worked here when the clinic did not provide ART, please consider how the functioning of the clinic has changed when answering the questions.
2. **Patients and Caregivers-** When thinking of before and after offering ART we are interested in what effect integration has had on patients and caregivers? What are some of the good comments you may have heard from patients or caregivers? What have been some of the problems?
3. **Health workers-**Next we are going to discuss the impacts offering ART has had on staff. What are some of the benefits of offering ART at the primary care level? How has it been challenging? How has it impacted your administrative responsibilities you do?
4. **Clinic function-**With respect to clinic function, do you think offering ART in this clinic has impacted any other programs? Is the clinic functioning better now that many services are offered here? Have there been any negative impacts on primary health care programmes?
5. **Other-**Do you have any other feedback or comments that you think would be valuable for the objectives of the study (Restate objectives: The purpose of this study is to understand the impact of integration of HIV-related services ART on your work.)

Probes related to HCW-(if time remains and any of the following have not been discussed probing will be used to illicit responses on the positive and negative aspects on the following):

Workload, Working Conditions, Morale/Job satisfaction, Stigma, Attrition/Staff Turnover/Absenteeism, Data Collection

Probes related to patients: HIV patients, non-HIV patients, stigma, (and for Year 2 only): family and communities.

Conclusion: I would like to thank you all for your participation in this focus group. The information you provided will be very helpful for our research question. If you have any questions please feel free to contact me at (INSERT CONTACT). I would like to return in one year to see how your work has changed and look forward to seeing you all again then.

A2: Patient and caregiver survey

PATIENT INFORMATION

Gender: Male Female Other	Age (patient):	Months patient visiting this clinic:
Interviewee: Patient or Caregiver		Frequency: daily, weekly, monthly, twice a month, every 3 months, every 6 months, yearly, every 18 months, seldom
Primary purpose of the clinic visit today:		
prenatal care (1)	reproductive health (2)	multiple conditions (3)
Geriatric (4)	child health (5)	Nutrition (6)
ART (7)	laboratory services only (8)	medication pick up only(9)
TB (10)	Other (o) (specify):	
chronic conditions (11)		

QUALITY OF CARE

This section deals with all services you receive at the clinic.

Please rate the services you receive at the clinic in terms of the following:

Category	Not applicable	Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied	Do not know
1 Medical care provided	-1	1	2	3	4	5	0
2 Complaint procedure	-1	1	2	3	4	5	0
3 Cleanliness of clinic	-1	1	2	3	4	5	0
4 Privacy during examinations	-1	1	2	3	4	5	0
5 Confidentiality of your medical record	-1	1	2	3	4	5	0
6 Respect shown by nurses	-1	1	2	3	4	5	0
7 Respect shown by doctor(s)	-1	1	2	3	4	5	0
8 Health information	-1	1	2	3	4	5	0
9 Information about medication provided by nurse(s)	-1	1	2	3	4	5	0
10 Information about medication provided by doctor(s)	-1	1	2	3	4	5	0
11 Opportunity to ask questions	-1	1	2	3	4	5	0
12 Language used during consultations	-1	1	2	3	4	5	0
13 Hours that clinic is open	-1	1	2	3	4	5	0
14 Waiting time before consultations	-1	1	2	3	4	5	0

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SATISFACTION WITH STAFF

Please rate the services you receive from the following staff at the clinic:

Category	Not applicable	Very good	Good	Neither good nor bad	Poor	Very poor	Do not know
1 Nurse	-1	1	2	3	4	5	0
2 Doctor	-1	1	2	3	4	5	0
3 Lay counsellor	-1	1	2	3	4	5	0
4 Pharmacist	-1	1	2	3	4	5	0
5 Nutritionist/dietician	-1	1	2	3	4	5	0
6 Social worker/psychologist	-1	1	2	3	4	5	0
7 Clerk	-1	1	2	3	4	5	0
8 Attendant staff (e.g. cleaner, porter)	-1	1	2	3	4	5	0

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3. DO YOU HAVE ANY COMPLAINTS ABOUT THE SERVICE YOU RECEIVE AT THE CLINIC?

No	0
Yes	1

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Please explain.

4. **HAVE YOU NOTICED ANY IMPROVEMENTS IN THE SERVICES SINCE (DATE OF INTEGRATION)**

5. **DO YOU HAVE ANY COMPLIMENTS YOU WOULD LIKE TO SHARE ABOUT THE STAFF OR CARE YOU RECEIVE HERE?**

A3: Patient and caregiver survey administration guide

In addition to reading the participant information to the patients, the following script will be read to supplement the patient and caregiver survey.

1. Is this the clinic where you access your health care, regularly? Have you taken this survey last year?

- If yes, person interviewed is considered the patient. All the questions will be answered on the experience of the person you are interviewing. The questions should be framed as “How long have you been visiting this clinic?”
- If no, **are you here today to accompany someone, or to access services?**
 - If they are accompanying a patient, they are considered a caregiver. “We will be asking you questions based on your thoughts of the care the patient is receiving.” All the questions will be answered based on the patient’s perspective and should be framed as so. For example, “What is the primary purpose of the patient’s visit today? How long has the patient been visiting this clinic?”
 - If they are here to access services and this is their first time to this clinic, they are not eligible to participate in the survey since they are not regularly seeking service at this clinic. “Thank you for your interest in participating. We are interesting in people who

have been coming here regularly to access services so we can know how the services have changed. These are all the questions we have for you today. Thank you!”

- At this point, the research assistant will check patient or caregiver on the survey for interviewee.

2. Is the patient male, female or other? The assistant will mark male, female or other while interviewing the patient and will ask the question if interviewing the caregiver.

3. How old are you (is the patient)?

4. How many months have you (or the patient) been visiting this clinic for your services? Guide the respondent to guess or estimate if they do not know.

5. How often do you (or the patient) come to the clinic?

6. What is the primary purpose of your (the patient's) visit today?

1. I'm going to name a series of services offered at the clinic. I would like you to rate how satisfied you (you think the patient is) are with the services. Your choices are:

-Not applicable: this means I have not accessed this service at this clinic

-Very satisfied: this means I have no suggestions for improvement and it was great

-Satisfied: Overall I was happy with it but it could have been better

-Neither satisfied nor dissatisfied: I don't have an opinion in it was good or bad

-Dissatisfied: there could be some improvements but it is not the worst

-Very dissatisfied: there needs to be many improvements

-Do not know: I can't answer the question because I do not know

2. Next, I would like you to rate the services you (the patient) has received from the following staff at this clinic: Your choices are:

-Not applicable: this means I have not had an interaction with this type of staff member

- Good: this means the interaction I had with the staff was great

-Neither good nor bad: I don't have an opinion in it was good or bad

-Poor: there could be some improvements but it is not the worst

-Very poor: there needs to be many improvements

-Do not know: I can't answer the question because I do not know

3. Do you have any complaints about the services you (or the patient) receive at the clinic?

- If yes, ask interviewee to explain
- If no, move to the next question

4. Have you noticed any improvements in the services since (Date of Integration)?

- If yes, ask interviewee to explain
- If no, ask if they have noticed any changes, either positive or negative

5. Do you have any compliments you would like to share about the staff or care you (or the patient) receive(s) here?

Thank you so much for your time. It is much appreciated and the information you have provided will help us with our study. Do you have any questions? If you have any questions in the future feel free to call me at the number provided on this sheet. (Interviewer will refer to the consent form or patient information sheet).

A4: Key informant interview guide

Introduction:

As part of my research for fulfilment of the requirements for a PhD at the School of Population and Public Health I am conducting a study to understand how the public primary health care clinic function is impacted by the integration of HIV-related care in high HIV-prevalence, low-resource settings. The aims of this interview are as follows: to understand

- how integration has impacted patient/caregiver perception of quality of care
- health workers' experiences
- indicators of primary health care as collected by the government information system. A special emphasis is being placed on pre-integration versus post-integration outcomes
- identify successes and challenges of implementation as it relates to aforementioned populations
- strategies to mitigate negative impacts of integration

The results will be used to as part of fulfilment for the requirements for a PhD dissertation research and will be synthesised with the study data and disseminated via conference presentations and journal articles.

You have been identified as a key informant. We estimate our survey will take 30 minutes to complete. Participation in this interview is completely voluntary and you can stop participating at any time with no ramifications. Would you like to volunteer to participate in this survey?

- If no, thank you for your time. Do you know anyone who you would consider an expert in this topic who may be interested in participating? May we contact them? May we use your name as a reference to this expert?
- If yes, we would like to include your name, title and affiliations as a key informant. No specific answer will be attributed to you. Do we have your permission to include this information or would you prefer to remain anonymous.
- If No, Thank you. Your comments will remain anonymous.
- If Yes, Thank you. Could you please confirm the spelling of your name, your title and affiliation?

Do we have your permission to record and transcribe this conversation.

- If yes, thank you.
- If no, do we have your permission to take notes?

5 Main Questions:

1. In your opinion how would you define the term “integration” with respect to offering HIV-related care and services at the public-sector primary health care level?
2. What do you think the impacts (both positive and negative) are on the following:
 - Patients and caregivers (both with HIV/AIDS and without)
 - Human resources for health (please specify which cadre you are referring to)
 - Aspects of primary health care service provision
 - Indicators of primary health care as collected by government
3. Of the negative consequences you have mentioned, could you suggest potential strategies to mitigate the impact?
4. Which indicators of primary health care service delivery would be robust indicators to study for assessing the impact of ART into PHC Clinics?
5. Could you please summarize your geographic area of expertise and discuss your experience with this topic?

Do we have your permission to contact you again for follow-up questions or new developments of integration take place?

We would like to thank you for your time and sharing your experience with us. Would you like to recommend any other colleagues or experts in the field who would be knowledgeable on this topic? May we use your name as a reference to this expert?

A5: Key informant interview guide-data related

1. Of this list of indicators below, please tell us which you think are most robust? (i.e. least likely to give biased results) as an indicator of clinic functioning with respect to primary health care?
2. Have any of the indicators listed below changed during the study time frame (March 2009 till today) with respect to definition, numerators, denominators, etc.?
3. What do you think with respect to completeness (i.e. missing data values) of the data for the indicators listed below?
4. Do you recommend them for capturing how a clinic is functioning? If not, could you list any alternative indicators to collect?
5. Can you think of any factors that may influence the indicators that are not related to integration?
6. Do you have any other comments on choosing indicators for the purpose of this study?

A6: Key informant interview guide-clinic managers

1. How has integrating ART at the primary care level changed your job with respect to: Job duties, Responsibilities, Work
2. Has there been an increased or decreased amount of patients attending the clinic? If so, describe how the patient population has changed.
3. What are the positive benefits on staff of integration?
4. Have there been any negative effects on staff?
5. Do you think ART integration has been positive for patients?
6. Are there any impacts on other programmes?
7. What do you believe are the biggest challenges of implementing the policy to integrate?
8. What have been the biggest successes in the implementation of policy?
9. What do you think other provinces/settings could learn from your experience?
10. How has the number of staff in your clinic changed? Could you please provide the number of staff per job function this year so we can compare it with next year?

Appendix B: Primary health care indicators-supplemental methodology and results

B.1: Overview of primary health care indicators

<i>PHC</i>	<i>Indicator</i>	<i>Numerator</i>	<i>Denominator</i>	<i>Source and time</i>
Antenatal Care (ANC)	ANC visit before 20 week rate	Antenatal 1st visits before 20 weeks	Antenatal 1st visits before 20 weeks + 20 weeks or later	DHIS, Apr 09-13
	ANC Client 1 st test HIV rate	Antenatal clients HIV tested for the first time during current pregnancy	Antenatal clients eligible for HIV 1st test (includes all new ANC clients-excludes patients with already known HIV status and those on ART)	DHIS, April 09-Feb 12
SRH	Couple year Protection Rate	Contraceptive years dispensed (including sterilisations)	Female target population 15-44 years (annualised)-females used as a proxy for couples	DHIS, April 09-13
Child Health	Immunisation Coverage Under 1 year old (IMCI)	Number of children who completed full course of immunisation	Catchment population (annualised) of children who should be immunised	DHIS, April 09-13
	Immunisation-new per PHC headcount under 5	Number of children who have completed his/her primary course of immunisation before the age of one.	Primary Health Care Clinic headcount under 5 years old	DHIS, April 09-13
NCDs	Diabetes new per population over 30 years old	Diabetes mellitus case put on treatment - new	mid-year population estimate over 30 years old	DHIS, April 09-Feb12
	Diabetes new per PHC headcount over 5	Diabetes mellitus case put on treatment - new	PHC headcount over 5 years old	DHIS, April 09-Feb12
	Hypertensive new per population over 30 years old	Hypertension case put on treatment - new	Mid-year population estimate of those 30 years and older	DHIS, April 09-13
	Hypertensive new per PHC headcount over 5	Hypertension case put on treatment - new	PHC headcount over 5 years old	DHIS, April 09-13
Infectious Disease	Tuberculosis Missing Sputum Conversion Rate	2 months sputum results which are missing for a given month	Number of new smear positive pulmonary tuberculosis cases 2 months prior	ETR.net, April 09-March 2013
	Baby PCR (6 week) testing rate	# of Baby PCR done at 6 week in the clinic	# of mothers testing positive for HIV in the clinic 6 months prior	DHIS, April 09-13

	Indicator	Numerator	Denominator	Source and time
Workload, productivity	PHC Headcount Utilisation Rate(PHC Workload) over 5 years old and Under 5	PHC total headcount	Total catchment population (annualised)	DHIS, April 09-13
	PHC Headcount Utilisation Rate under 5 years old	PHC headcount under 5 years	Total catchment population under 5 years old (annualised)	DHIS, April 09-13
	Professional Nurse Clinic Workload	PHC cases seen by Professional nurse	Professional Nurse clinical work days- The number of actual work days by Professional Nurses, irrespective of rank, used to perform clinical services in the facility during the reporting period (usually month). One actual work day is normally equivalent to an 8-hour shift (40 hours).	DHIS, April 09-13
	Human Resources for Health (HCWs) per PHC headcount	Active filled posts assigned to the clinic	PHC headcount	Department of Treasury/DHIS, April 09-13
HIV indicators	Total ART patients Remaining in Care (HIV)	# of patients on ART minus (LTFU + Deaths)-cumulative per month	--	TIER.net/DHIS, April 09-13
	New patients initiated on ART (HIV)	New initiations on ART per month	--	TIER.net/DHIS, April 09-13
Full course of primary course immunisation includes: BCG, OPV 1, DTP-Hib 1 / Pentaxim 1, OPV 2 & 3 + DTP-Hib 2 & 3 / Pentaxim 2 & 3, HepB 1, 2 & 3, and 1st measles dose before 1 year.; DHIS is Department of Health Information System, TIER.net is the integrated 3 Tier HIV database, ART is antiretroviral therapy, PHC is primary health care, HCWs is health care workers. NOTE: PHC Headcount is defined as all individual patients attending the facility during the month for Primary Health Care. Each patient is counted once for each day they appear at the facility, SRH is Sexual and Reproductive Health				

B.2: Data dictionary of primary health care indicators- descriptions, sources, and data cleaning

A. Antenatal Care (ANC)

Two indicators were analysed for antenatal care (ANC): 1) Antenatal visits before 20 week rate defined as “women who have a booking visit (first visit) before they are 20 weeks (about half way) into their pregnancy as a proportion of all antenatal 1st visits” and 2) ANC client HIV 1st test rate defined as “ANC clients HIV tested for the first time during current pregnancy as the proportion of ANC clients eligible for first HIV tests”. Clients eligible for an HIV test on those who have unknown HIV statuses. These indicators are measuring whether there is change in early access to ANC care and to understand the impact of integration on 1st HIV test rates for ANC patients. The second indicator was measured until February 2012 and therefore contributes a smaller amount of data across the study period.

1) Antenatal Visit before 20 weeks rate

Name of Indicator in Source Data: Antenatal Visits before 20 weeks rate	
Definition: Women who have a booking visit (first visit) before they are 20 weeks (about half way) into their pregnancy as a proportion of all antenatal 1st visits	
Type of Indicator and Source: Indicator from District Health Information System (DHIS), collected and calculated in DHIS (derived)	
Numerator and Denominator (if derived):	Numerator: Antenatal 1st visits before 20 weeks
	Denominator: Antenatal 1st visits before 20 weeks + 20 weeks or later
Notes on changes in definition over study period: none, FSDOH has been encouraging “early bookers” through education campaigns	
Expected changes: none	

2) Antenatal Client 1st HIV test rate

Name of Indicator in Source Data: Antenatal client HIV 1st test rate	
Definition: Antenatal clients HIV tested for the first time during current pregnancy as the proportion of antenatal clients eligible for first HIV tests	
Type of Indicator and Source: Indicator from District Health Information System (DHIS), collected and calculated in DHIS (derived)	
Numerator and Denominator (if derived):	Numerator: Antenatal client HIV 1st test
	Denominator: Antenatal clients eligible for HIV 1st test CALCULATED(includes all new ANC clients-excludes patients with already known HIV status and those on ART)
Notes on changes in definition over study period: only available until Feb 2012, after this date the denominator is no longer collected	
Expected changes: increase in ANC clients testing for HIV as ART is available at the clinics	

B. Sexual and reproductive health

One indicator was analysed for sexual and reproductive health: couple year protection rate (CYPR) is an annualised indicator defined as “the rate at which couples (specifically women) are protected against pregnancy using modern contraceptive methods including sterilisations”. This indicator is measuring reproductive health service delivery at the population level where women serve as a proxy for couples protected.

1. Couple Year Protection Rate (annualised)

Name of Indicator in Source Data: Couple year Protection Rate	
Definition: The rate at which couples (specifically women) are protected against pregnancy using modern contraceptive methods INCLUDING sterilisations	
Type of Indicator and Source: Derived in DHIS	
Numerator and Denominator (if derived):	Numerator: Contraceptive years equivalent
	Denominator: Target population 15-44 years (couples using females as proxy)
Notes on changes in definition over study period: none noted; December and January the indicator will be less due to reduced PHC headcounts due to the holiday season.	
Expected Changes: Increase as increasing discussion on sexual and reproductive health with clients will result in more uptake of contraception. Also, with the addition of ART patients to the clinic, reproductive health can now be discussed and therefore will increase among ART patients	

C. Child Health

Two indicators were analysed for child health: 1) immunisation coverage under 1 year (annualised) defined as the proportion of all children in the target area under one year who completed their primary course of immunisation and 2) immunised fully under 1 year per PHC headcount under 5 years old defined as children fully immunised (new) under 1 year old per PHC headcount under 5 years old. A primary course includes Bacille de Calmette et Guérin (BCG), Oral Polio Vaccine (OPV 1,2 & 3), Diphtheria, Tetanus, Pertussis, and Hemophilus influenza type B vaccine (DTP-Hib 1,2 & 3), Hepatitis B (1,2 & 3), and 1st measles. In 2009, the immunisation schedule was updated (hence the “new” in the second indicator) to include Pneumococcal Conjugate (Prevenar®), Rotavirus (Rotarix®) and the Pentavalent (Pentaxim®) vaccines. These indicators are measuring impact on immunisation coverage as the population and clinic headcount changes. The following schedule includes the primary course of immunisation prior to 1 year old:

At birth: OPV (0), BCG

6 weeks: OPV (1), DTaP-IPV/ Hib (1), Hep B (1), RV (1), PCV (1)

10 weeks: DTaP-IPV/ Hib (2), Hep B (2)

14 weeks: DTaP-IPV/ Hib (3), Hep B (3), RV (2), PCV (2)

9 months: Measles (1), PCV (3)

1) Immunisation coverage under 1 year (annualised)

Name of Indicator in Source Data: Immunisation coverage under 1 year (annualised)	
Definition: The proportion of all children in the target area under one year who complete their primary course of immunisation. A Primary Course includes BCG, OPV 1,2 & 3, DTP-Hib 1,2 & 3, HepB 1,2 & 3, and 1st measles (usually at 9 months).	
Type of Indicator and Source: Derived in DHIS	
Numerator and Denominator (if derived):	Numerator: Children fully immunised under 1 year
	Denominator: Target population under 1 year-per facility
Notes on changes in definition over study period: none. There is a seasonal trend associated with this indicator where every Feb-May there is an expected increase in immunisation due to a yearly immunisation campaign. Additionally December and January the indicator will be less due to reduced PHC headcounts due to the holiday season. Census estimates for denominator change annually.	
Expected Changes: as integration progresses the immunisation rates will also increase due to caregivers of children attending the PHC clinics. For example, if a woman had HIV and previously had to take a day each month to obtain ART at specialty clinics, she is now able to obtain ART attend to other health matters (e.g. vaccination for children) at the same visit.	

2) Immunised fully under 1 year old per PHC headcount over 5 years old -new

Name of Indicator in Source Data: Calculated from 2 elements	
Definition: The proportion of all children in the target area under one year who complete their primary course of immunisation. A Primary Course includes BCG, OPV 1,2 & 3, DTP-Hib 1,2 & 3, HepB 1,2 & 3, and 1st measles (usually at 9 months) per PHC clinic headcount under 5 years old	
Type of Indicator and Source: Calculated based on DHIS data	
Numerator and Denominator (if derived):	Numerator: Children fully immunised under 1 year-new
	Denominator: PHC headcount under 5 years old
Notes on changes in definition over study period: none. There is a seasonal trend associated with this indicator where every Feb-May there is an expected increase in immunisation due to a yearly immunisation campaign. Additionally December and January the indicator will be less due to reduced PHC headcounts due to the holiday season.	
Expected Changes: We hypothesise that as integration progresses the immunisation rates will also increase due to caregivers of children who previously had to take a day each month to obtain ART at specialty clinics now are able to obtain ART attend to other health matters (e.g. vaccination for children) at the same visit. Using PHC under 5 may lead to an underestimation of the effect but this was the only age group available for children.	

D. Infectious Disease

Two indicators were analysed for infectious disease encompassing tuberculosis (TB) and prevention of mother to child transmission of HIV (PMTCT): 1) new smear positive pulmonary tuberculosis patients missing a 2 month sputum result per client (abbreviated as missing sputum) and 2) Polymerase chain reaction test (PCR) for HIV done at 6 weeks old per ANC client testing positive for HIV 6 months previously (abbreviated as Baby PCR). This denominator does not include women who were tested for HIV elsewhere or previously, already knew their HIV status or were already on ART. Missing sputum is measuring the integration related impact on tuberculosis care, specifically the health system capacity to monitor treatment effectiveness. Two months after a new smear positive pulmonary tuberculosis patient begins treatment a sputum sample must be taken, analysed and recorded for conversion to test the effectiveness of the chemotherapy. At 70 days if no result is entered it is considered missing. This was identified in KIIS as a critical process indicator for tuberculosis care. Baby PCR is measuring the impact of workload on a critical aspect of PMTCT. This was identified as a critical indicators by KIs because successfully obtaining a sample requires multiple integrated care components and coordination; namely identification of HIV-exposed infant at a child health visit, collection of the sample and recording the results, any of which could be compromised if clinic function was deteriorating.

1) New Smear Positive tuberculosis clients missing 2 month sputum result

Name of Indicator in Source Data: ETR.net provides 2 raw elements	
Definition: percentage of missing two month sputum samples missing from new smear positive pulmonary tuberculosis cases	
Type of Indicator and Source: Derived from ETR net	
Numerator and Denominator (if derived):	Numerator: Number of 2 month sputum samples which are missing 60 days after a new smear positive TB case begins treatment for a given month
	Denominator: Number new smear positive cases 2 months prior for a given month
Notes on changes in definition over study period: none. GeneXpert diagnostic testing (i.e. a test for drug sensitivity of the mycobacterium) was implemented during the study period. Health care workers were instructed to still collect sputum samples but the implementation could potentially influence this indicator. The patient is registered for the month when they start treatment and are then in the cohort for a given month. They will show up as missing if there is no sputum collected for 70 days after treatment initiation. To correspond with other data, we backdated the denominator 2 months (60 days) after (e.g. if you are interested in seeing how a given clinic is functioning on March 2009 check missing sputums for Jan 2009). This does not include retreated patients (i.e. those who have relapsed) since their sputums are to be collected 90 days after which accounts for 22-24% of total TB patients. 2009- New Smear + Total: 9481, Retreated: 2283 (24%) 2010 -New Smear + Total: 9375, Retreated: 2103 (22.4%)	

2011- New Smear + Total: 9375, Retreated: 2103 (22.4%)
Expected Changes: Increased missing sputum as workload increases from increasing numbers of HIV patients at the clinics.

2) Baby PCR (6 week) per ANC patients 6 months prior

Name of Indicator in Source Data: Calculated from 2 elements	
Definition: PCRs done on 6 week old babies born to HIV-positive women as a proportion of ANC clients whose 1 st HIV test was positive 6 months prior	
Type of Indicator and Source: 2 elements combined -Raw from DHIS	
Numerator and Denominator (if derived):	Numerator: number of Baby PCR done on 6 week old infants in the clinic per month
	Denominator: number of ANC clients testing positive on their first HIV test in the clinic 6 months prior
Notes on changes in definition over study period: Numerator is called Baby PCR around 6 weeks for 2009-10. From 2011-13 it's called Infant 1st PCR test around 6 weeks. Denominator was extracted and back dated 6 months.	
Expected Changes: We hypothesise that the Baby PCR rate will increase due to PCR tests being encouraged to be coupled with IMCI. However, this is an indicator of clinic function and could be reduced as integration progresses due to clinic work overloading and extracting a blood sample from a 6 week old is a time consuming task. As integration progresses there should not be an increase in the denominator (ANC 1 st HIV test positive due to increase number of women). These patients should have been coming to the PHC clinic whether or not the clinics were offering ART. A bias may be present due to a few factors: 1) It is assumed women attending ANC clinic for the first time are coming 6 weeks prior as per key informant interviews. 2) The denominator could be artificially low due the fact that it will not include women already on ART or women who already know their HIV-positive status. This could make the rate artificially high. However, this under calculation is constant across the study period 3) This assumes the woman would come to her PHC clinic in order to get a pregnancy test and or antenatal care and at that time an HIV test would be offered	

E. Non-communicable disease

Four indicators were analysed for non-communicable diseases (NCDs): 1) new diabetes mellitus clients per population over 30 years old (annualised) 2) new diabetes mellitus clients per PHC headcount over 5 years old 3) new hypertension client per population over 30 years old and 4) new hypertension clients per PHC headcount over 5 years old. These indicators are measuring the impact of integration on programmes for NCDs as the population changes as well as the clinic headcount changes. Key informants indicated multiple screening and monitoring components must be in met in order to identify and place a patient on treatment. Diabetes indicators were measured until February 2012 and therefore contribute a smaller amount of data across the study period.

1) New Diabetes mellitus patients put on treatment per population over 30 years old

Name of Indicator in Source Data: Calculated from 2 elements	
Definition: proportion of Diabetes mellitus (DM) cases put on treatment (new) as a proportion of mid-year annual population estimates of those over 30 years old (annualised)	
Type of Indicator and Source: Raw from DHIS	
Numerator and Denominator (if derived):	Numerator: Diabetes mellitus case put on treatment – new
	Denominator: mid-year population estimate over 30 years old
<p>Notes on changes in definition over study period:</p> <p>Diabetes patients put on treatment new is the most consistent over the study period. However, data is only available until Feb 2012 and then the numerator was phased out.</p> <p>Diabetes Data: Explored the following raw elements: 1. DM cases on register, 2. DM visit, 3. High Risk DM cases new; Explored the following indicators: A. DM High risk incidence rate, B. # DM visits per DM client rate, C. DM detection rate. Detailed definition is as follows:</p> <ol style="list-style-type: none">1. Numerator is number of new diabetes mellitus cases put on treatment defined as A client diagnosed with diabetes mellitus (in this facility or any other facility like a hospital) for the first time and put on treatment2. Denominator is number of males and females in the population over age 30-mid-year estimate	
<p>Expected Changes: Hypothesis is that it will decrease as integration progresses since chronic disease care is being neglected with an increased focus on HIV treatment. Key informants have reported that the majority of patients begin diabetes treatment in a hospital or while a physician is visiting a PHC clinic. There may be an underreporting of this indicator at the PHC clinics.</p>	

2) New Diabetes mellitus patients put on treatment per PHC headcount over 5 years old

Name of Indicator in Source Data: Calculated from 2 elements	
Definition: proportion of Diabetes mellitus (DM) cases put on treatment (new) as a proportion of PHC headcount over 5	
Type of Indicator and Source: Raw elements from DHIS	
Numerator and Denominator (if derived):	Numerator: Diabetes mellitus case put on treatment – new
	Denominator: PHC headcount over 5 years old
<p>Notes on changes in definition over study period: see above for explored indicators and changes. Numerator data were only available until Feb 2012.</p> <ol style="list-style-type: none">1. Numerator is number of new diabetes mellitus cases put on treatment defined as A	

<p>client diagnosed with diabetes mellitus (in this facility or any other facility like a hospital) for the first time and put on treatment</p> <p>2. Denominator is all individual patients five years (60 months) and older attending the facility during the reporting period (usually month) for Primary Health Care. Each patient is counted once for each day they appear at the facility, regardless of the number of services</p>
<p>Expected Changes: Hypothesis is that it will decrease as integration progresses since chronic disease care is being neglected with an increased focus on HIV treatment. Key informants have reported that the majority of patients begin diabetes treatment in a hospital or while a physician is visiting a PHC clinic. There may be an underreporting of this indicator at the PHC clinics.</p>

3) New hypertensive patients put on treatment per population over 30 years old

Name of Indicator in Source Data: Calculated from two elements	
Definition: new hypertension cases put on treatment as a proportion of mid-year population estimates of the catchment population 30 years and older	
Type of Indicator and Source: Derived indicators from 2 data elements. Raw from DHIS	
Numerator and Denominator (if derived):	Numerator: Hypertension case put on treatment - new
	Denominator: Mid-year population estimate of those 30 years and older per facility
<p>Hypertension (HTN) case put on treatment new (numerator) is defined as: A client diagnosed with hypertension (in this facility or any other facility like a hospital) and put on treatment for the first time. Originally wanted to capture workload from HTN clients so the ideal indicator would be a numerator with HTN follow-up. However, the follow-up indicator was dropped later in the study. Notes on changes in definition over study period: Indicator changed during study period. We examined the following indicators as potential indicators:</p> <ol style="list-style-type: none"> 1. HTN visits per HTN client rate-available from 2011 onwards=HTN on register 2. HTN clients on register=total number of clients diagnosed with HTN, put on treatment and receive treatment on a regular basis 3. HTN F/U visit=any follow up visit related to the treatment and management of HTN 4. HTN visit=any visit related to the regular treatment of HTN including 1st and follow-up 5. HTN case put on treatment-new <p>2011 Onwards the indicators above were replaced with the following:</p> <ol style="list-style-type: none"> 1. HTN High Risk new=(HTN high risk incidence rate) which is high risk HTN new/catchment population 40 years or older 2. HTN client on treatment new=a client diagnosed with HTN and put on treatment the first time <p>Therefore, the numerator we used was “hypertension case put on treatment-new” for 2009-10 and hypertension client on treatment-new” for 2011-13 upon confirmation with key informants that this should measure the same dimension of new HTN cases on treatment...</p>	

Expected Changes: Hypothesis is that it will decrease as integration progresses since chronic care is being neglected and a greater emphasis on HIV treatment at PHC clinics
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4) New hypertensive patients put on treatment per PHC headcount over 5 years old

Name of Indicator in Source Data: Calculated from two elements	
Definition: new hypertension cases put on treatment as a proportion of PHC headcount over 5 years old	
Type of Indicator and Source: Derived indicators from 2 data elements. Raw from DHIS	
Numerator and Denominator (if derived):	Numerator: Hypertension case put on treatment - new
	Denominator: PHC headcount 5 years and older
Hypertension (HTN) case put on treatment new (numerator) cleaning and information on indicator selection is above. Denominator is: All individual patients five years (60 months) and older attending the facility during the reporting period (usually month) for Primary Health Care. Each patient is counted once for each day they appear at the facility, regardless of the number of services	
Expected Changes: this indicator will decrease as integration progresses since chronic care is being neglected and a greater emphasis on HIV treatment at PHC clinics. However, using PHC over 5 years old may dilute the effect if increases in younger patients come.	

F. Workload and Productivity

Four indicators were analysed to understand workload and productivity: 1) professional nurse clinical workload (PNCWL) defined as “the average number of patients seen per professional nurse per professional nurse clinical work day” (annualised). 2) human resources for health (HRH) per PHC headcount defined as all filled posts for any human resource for health (e.g. nurse, cleaner, pharmacy assistant, clerk etc.) per PHC headcount 3) utilisation rate for PHC (annualised) is defined as the “rate at which PHC services are utilised by the total catchment population”, represented as the average number of visits per person, per year in the catchment population. The denominator is a Census-derived population estimate 4) utilisation rate under 5 years old (annualised) defined as “the rate at which PHC services are utilised by children under 5 years in the catchment population”, represented as the average number of PHC visits per child under 5 per year in the target population. The denominator is usually Census-derived population”. The first is measuring the workload specific to professional nurses. The second is measuring the staff assigned to a clinic (as identified through posts active and filled according to the National Treasury) as a proportion of the workload measured by the PHC headcount. The third is measuring total PHC workload and service utilisation as the population changes while the fourth is measuring this for populations under 5 years old.

1) Professional nurse clinical workload (PNCWL)

Name of Indicator in Source Data: Professional nurse clinical workload
Definition: The average number of patients seen per Professional Nurse per Professional Nurse clinical work day
Type of Indicator and Source: Derived from DHIS

Numerator and Denominator (if derived):	Numerator: PHC cases seen by Professional nurse (A patient/client - child or adult- seen by a professional nurse for a Primary Health Care service)
	Denominator: Professional Nurse clinical work days defined as the number of actual work days by Professional Nurses, irrespective of rank, used to perform clinical services in the facility during the reporting period (usually month). One actual work day is normally equivalent to an 8-hour shift (40 hours).
Notes on changes in definition over study period: In some clinics, the definition of “case” may be collected differently. Some nurses may define each reason a patient visits as a “case” while others may count each person as a “case”. This could lead to artificial changes in the workload?	
Expected Changes: Assuming the way in which each clinic collects this data will not change with integration (i.e. they will continue to define this variable as they were previously) this variable will increase with the number of ART patients representing increased workload from increasing numbers of HIV patients.	

2) Human resources for health (HRH) per PHC headcount (staff to patient ratio)

Name of Indicator in Source Data: Calculated from two elements	
Definition: number of staff assigned to a clinic per PHC headcount each month	
Type of Indicator and Source: Calculated-number of staff is from the National Treasury and PHC headcount is from DHIS	
Numerator and Denominator (if derived):	Numerator: Active posts at the clinic which are currently filled per month
	Denominator: PHC headcount per month (all individual patients attending the facility during the reporting period (usually month) for Primary Health Care. Each patient is counted once for each day they appear at the facility, regardless of the number of services
Notes on changes in definition over study period: none. The data from the treasury were matched to clinic names in DHIS and TIER.net. Discrepancies were discussed with key informants to ensure accurate names across the three datasets. Data provided included health care worker posts which were: Active filled, Active vacant, Frozen, Total Posts, Total Posts Vacant. Upon discussion with Key Informants, active filled represented any staff assigned to the clinics.	
Expected Changes: the number of staff will increase with integration as data capturers and pharmacy assistants were provided. This may not accurately reflect all the staff at the clinics as it is common to share staff within the same district.	

3) Utilisation rate for PHC

Name of Indicator in DHIS: PHC Utilisation-total (annualised)	
Definition: PHC headcount as a proportion of estimated mid-year population of each clinic	
Type of Indicator and Source: Indicator collected from DHIS, numerator collected monthly and denominator annually	

Numerator and Denominator (if derived):	Numerator: PHC headcount total				
	Denominator: Population total (annualised)-mid-year population estimate per clinics				
Notes on changes in definition over study period: Each year the population changes. Below is an example of the provincial population across the study period:					
	2009	2010	2011	2012	2013
Total population	2,902,533	2,917,924	2,930,356	2,941,284	2,949,671
Expected Changes: This indicator will increase with integration due to increased numbers of HIV patients attending PHC clinics, thus increasing the headcount. The change will not be seen monthly since the denominator is annualised (i.e. only changing annually)					

4) Utilisation rate for PHC-under 5 years old

Name of Indicator in DHIS: PHC Utilisation-under 5 (annualised)					
Definition: PHC headcount under 5 as a proportion of estimated under 5 mid-year population of each clinic					
Type of Indicator and Source: Indicator collected from DHIS, numerator collected monthly and denominator annually					
Numerator and Denominator (if derived):	Numerator: PHC headcount under five defined as all individual patients not yet reached five years (60 months) of age attending the facility during the reporting period (usually month) for Primary Health Care.				
	Denominator: Population total under 5 years old (annualised)-midyear population estimate per clinics				
Notes on changes in definition over study period: Each year the population changes. Below is an example of the provincial population by gender across the study period:					
	2009	2010	2011	2012	2013
Female under 5 years	151,760	149,521	147,054	143,916	140,306
Male under 5 years	152,760	150,503	148,027	144,883	141,238
Total	304,520	300,024	295,081	288,799	281,544
Expected Changes: It will increase with integration since now HIV patients are coming in the headcount will be higher. The change will not be monthly since the denominator changes yearly. Decreasing trend in the denominator may not be reflective of the population changes.					

G. HIV data cleaning and collation

The TIER.net system was rolled out in phases. Facilities began entering data into the TIER system once a computer was furnished to them and a team of roving data entry staffs examined physical patient files to back capture and clean to data to ensure accuracy. By February 2013, more than 50% of facilities had finished this process with the remaining to finish by June 2013.

A final dataset was created with all select indicators of PHC as seen above. These indicators were collated with HIV remaining in care (RIC) and initiations. RIC and initiations were plotted monthly across the study period to understand variability in the data and compare availability of both TIER.net and DHIS data. A variable was created to identify which data source provided the most consecutive months of ART data and identified how many months of data were available from each source. Generally, clinics integrating before April 2012 had more complete data from TIER.net. Where TIER data were unavailable or where DHIS provided more consecutive months of data, DHIS was given preference. Data were then visually compared and confirmed based on aforementioned criteria. Clinic selection was then finalised.

The data were obtained from both systems. The DHIS data were aggregated in the source data to the clinic level. The TIER.net data were patient level data and with the help of a programmer was collated to monthly data using the following iterative logic: For each facility for each month, April 2009 to March 2013, all rows were iterated through to see if the row matched the current facility, and "Method Into ART" column was "New", and "ART Start Date" was contained within the current month, then this would be a new patient initiated on ART. If the patient age was 15 or greater on the date the treatment started, the adult value was incremented, and otherwise the child value was incremented. Next, if the row matched the facility and "Outcome Date" is omitted, or if the "Outcome Date" lands after the end of the current month, and either "Transferred / Moved In Date" is missing with "ART Start Date" during/before the current month or "Transferred / Moved In Date" is not missing with "Transferred / Moved In Date" during/before the current month, then this is a patient that is currently on treatment. If the patient age is 15 or older on the 1st day of the current month, then they are counted as an adult. Otherwise they are counted as a child.

Of the clinics that were missing data, 2 clinics had no data at all. Of the remaining 12 clinics that had partial data, all clinics had DHIS data but no TIER data. Therefore the data are thought to be missing due to administrative technicalities where the data was not provided. Clinics were identified by matching HIV data from TIER.net and DHIS for congruent clinic names. Data were visually examined and key informants were consulted to clarify disparities in clinic names.

Two HIV-related indicators analysed were: 1) total ART patients remaining in care, defined as the number of HIV patients currently on ART plus those newly initiated on ART at the PHC clinic, less those who are lost to follow-up (LTFU) or had died by the end of the month. This captures workload from total HIV patients at each clinic across the study period. 2) new patients initiated on ART, defined as treatment-naïve patients initiated on ART at the PHC clinics, which captures workload as new patients are placed on ART at the PHC clinics. According to key informant interviews, initiating patients on ART is a time-consuming process. The number of new patients to initiate could impact clinic function and other PHC service delivery.

H. Excluded indicators

- a. Asthma (Chronic Care) –visits and news, under the domain of chronic care. Data are very incomplete, possible change during study period
- b. Epilepsy-(Chronic Care)-looked at over 18 and under, new cases, data are incomplete
- c. Mental health visits for adults (Mental Health)-explored MH client new, MH follow-up, MH visit—all these are not available for 2011-12. For 2010 (38% missing), 2011/12 (2% missing), 2009 blank
- d. ANC Client Retest Rate at 32 weeks (ANC and PMTCT)-2011 this indicator is missing
- e. Measles 1st to 2nd dose dropout rate (Child Health)-available 2011-13 but not prior
- f. 18 month old HIV test for HIV exposed child (PMTCT)-data sparse across study period
- g. Pap smear tests performed at the clinic (Sexual/Reproductive Health)-this was uncommon and a campaign/ policy change began in 2011 which would make it difficult to isolate the effect of integration

B.3: Absolute numbers of specific indicators across the study period

Number	Component of Indicator
58,647	ANC patients- 1 st visit
52,776	ANC patients tested for HIV in ANC care for the first time
107,958	Fully immunised children under 1 year old
18,738	New cases of smear-positive pulmonary tuberculosis
1,552	New smear positive tuberculosis cases missing a sputum sample result at 60 days
27,030	Babies who were PCR-tested for HIV at 6 weeks old
3,522	New diabetes mellitus patients put on treatment
22,609	New hypertension patients put on treatment
51,378	Health care worker posts were filled

B.4: T-test results-6, 9, 12 month averages

PHC Indicator	6 months			9 months			12 months			18 months		
	diff.	p-value	df	diff.	p-value	df	diff.	p-value	df	diff.	p-value	df
Antenatal Care (ANC)												
ANC 1st visit before 20 weeks rate	2.21	0.38	125	1.68	0.55	116	7.07	<0.01	99	11.38	<0.01	50
ANC client HIV 1st test rate	0	1.00	53	0.72	0.90	31	-0.04	0.99	25	---		
Sexual and Reproductive Health												
Couple year protection rate*	0.74	0.51	127	-0.38	0.73	118	-2.38	0.05	101	1.58	0.54	48
Child Health												
Immunisation coverage 1 year*	3.81	0.46	128	-0.18	0.97	119	8.54	0.13	103	-7.46	0.33	52
Immunised fully <1 year per PHC headcount – new	-1.97E-03	0.51	128	5.01E-04	0.86	120	4.56E-03	0.09	102	-9.38E-03	0.02	51
Infectious Disease												
New Sm+ TB clients missing 2 month sputum result	3.65E-03	0.95	79	4.27E-03	0.91	76	7.08E-02	0.38	61	2.44E-02	0.52	32
Baby PCR (6 week) done per ANC client 6 months prior	-3.06E-02	0.83	95	0.04	0.84	89	0.41	0.02	80	0.66	0.02	35
Non-communicable disease												
Diabetes Mellitus new per population*	4.64E-04	0.45	63	1.06E-03	0.14	46	4.45E-04	0.53	30	---		
Diabetes Mellitus new per PHC headcount over 5 y.o.	-6.66E-06	0.96	61	1.26E-04	0.33	44	2.54E-05	0.87	28	---		
Hypertension new per population*	-3.17E-04	0.80	130	-1.51E-05	0.99	118	-1.52E-03	0.17	103	-3.12E-03	0.11	52
Hypertension new per PHC headcount over 5 y.o.	-1.50E-04	0.52	125	-1.76E-04	0.55	115	-4.00E-04	0.10	101	-8.54E-04	0.09	52
Workload and productivity												
Profession Nurse Clinical Work Load	0.80	0.65	130	1.13	0.57	118	0.38	0.85	100	1.95	0.33	51
Human Resources per PHC Headcount	-1.84E-04	0.17	118	2.82E-04	0.17	98	1.95E-04	0.42	79	1.15E-03	<0.01	40
PHC Utilisation rate*	0.21	<0.01	129	0.18	<0.01	119	0.26	<0.01	103	0.17	0.03	52
PHC Utilisation rate- under 5 years*	0.05	0.71	127	0.01	0.93	118	-0.01	0.95	100	0.23	0.35	52
* indicates indicator is annulised (denominator is the same across all months in the year),df=degrees of freedom, bolded values indicate significance at p<0.05 , PHC is Primary Health Care, PCR is polymerase chain reaction test, Sm+ TB refers to Smear positive tuberculosis												

B.5: Number of clinics contributing to the interrupted time series analysis

	Number of Clinics Contributing Data per time period				
	Months Pre-Integration		Integration	Months Post-Integration	
	-30 months	-18 months	0	+18 months	+30 months
Primary Health Care Indicator					
<i>Antenatal Care</i>					
Antenatal 1st visit before 20 weeks rate	55	111	126	67	15
Antenatal client HIV 1st test rate	37	82	82	13	0
<i>Sexual and Reproductive Health</i>					
Couple year protection rate (annualised)	61	116	129	62	13
<i>Child Health</i>					
Immunisation coverage 1 year (annulised)	63	115	131	68	15
Immunised fully under 1 year – new per PHC headcount under 5 years old	63	115	129	66	15
<i>Infectious Disease</i>					
New Smear + Tuberculosis clients missing 2 month sputum result	48	94	98	44	8
Baby PCR (6 week) done per ANC client 6 months prior	49	93	104	55	10
<i>Non-communicable disease</i>					
Diabetes Mellitus new per population (annualised)	63	116	93	14	0
Diabetes Mellitus new per PHC headcount over 5 y.o. (annualised)	63	114	93	13	0
Hypertension new per population (annualised)	63	116	130	68	15
Hypertension new per PHC headcount over 5 y.o. (annualised)	61	114	129	68	15
<i>Workload and productivity</i>					
Profession Nurse Clinical Work Load	63	114	130	68	15
Human Resources for Health per PHC Headcount	60	115	131	56	13
Utilisation rate PHC (annualised)	63	116	131	68	15
Utilisation rate under 5 years PHC (annualised)	59	116	129	68	15
<i>Mean</i>	<i>58</i>	<i>110</i>	<i>118</i>	<i>53</i>	<i>11</i>
<i>sd</i>	<i>7.69</i>	<i>10.80</i>	<i>17.90</i>	<i>21.73</i>	<i>6.03</i>

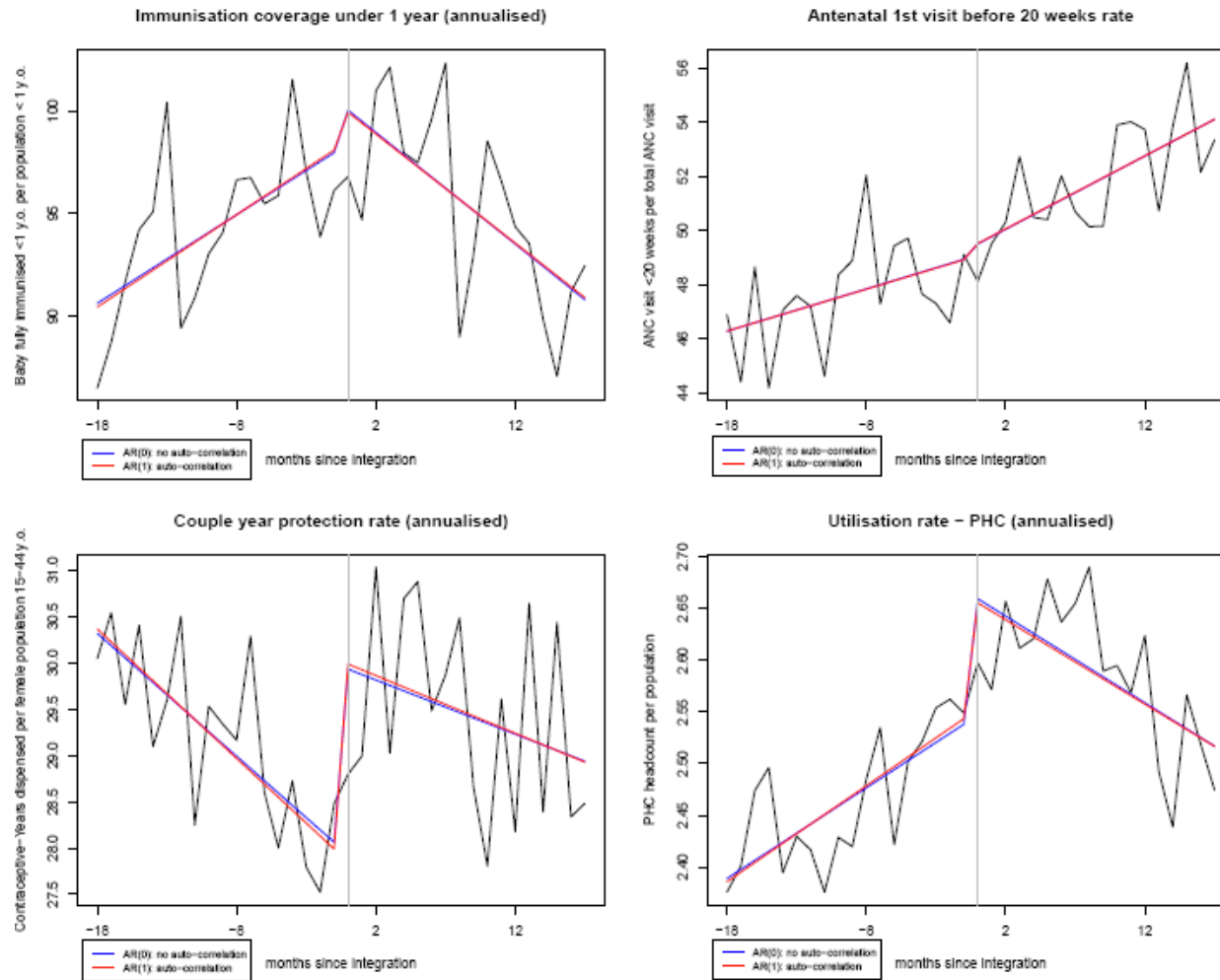
B.6: Interrupted time series results (± 18 and 30 months from integration)

PHC Indicator	<u>± 18 month</u>			<u>± 30 month</u>		
	β coeff.	SE	p-value	β coeff.	SE	p-value
Antenatal Care						
Antenatal 1st visit before 20 weeks rate ¹						
Intercept	49.08	0.77	<0.001	48.89	0.69	<0.001
time	0.15	0.07	0.037	0.13	0.04	0.004
integration	0.33	1.05	0.754	0.65	0.95	0.497
postslope	0.11	0.10	0.261	0.13	0.05	0.057
Antenatal client HIV 1st test rate ²						
Intercept	97.88	0.69	<0.001	98.67	0.81	<0.001
time	-0.03	0.06	0.641	0.07	0.05	0.153
integration	1.52	0.96	0.121	-0.14	1.23	0.911
postslope	-0.20	0.09	0.030	-0.18	0.08	0.036
Sexual and Reproductive Health						
Couple year protection rate (annualised) ³						
Intercept	27.85	0.31	<0.001	28.21	28.21	<0.001
time	-0.14	0.03	<0.001	-0.09	0.02	<0.001
integration	2.06	0.44	<0.001	1.88	0.48	<0.001
postslope	0.08	0.04	0.067	0.01	0.03	0.843
Child Health						
Immunisation coverage 1 year (annulised) ⁴						
Intercept	98.55	1.89	<0.001	98.66	2.04	<0.001
time	0.45	0.17	0.014	0.53	0.11	<0.001
integration	2.37	2.51	0.352	4.26	2.73	0.125
postslope	-0.98	0.25	<0.001	-1.31	0.16	<0.001
Immunised fully under 1 year – new per PHC headcount under 5 years old (per 100 000) ⁵						
Intercept	4,841	132	<0.001	4,912	95	<0.001
time	2	12	0.879	11	5	0.044
integration	129	173	0.459	235	130	0.076
postslope	-3	18	0.887	-33	8	<0.001
Infectious Disease (per 100,000)						
New Smear + Tuberculosis clients missing 2 month sputum result ⁶						
Intercept	8,841	1,870	<0.001	11,445	1,920	<0.001
time	-160	173	0.360	144	108	0.191
integration	402	2,547	0.876	-5,071	2,669	0.063
postslope	85	244	0.730	145	152	0.346
Baby PCR (6 week) done per ANC client 6 months prior ⁷						
Intercept	128,047	4,236	<0.001	126,741	4,369	<0.001
time	1,796	394	0.002	1,651	247	<0.001
integration	-3,957	5,858	0.504	5,384	6,075	0.379
postslope	23	550	0.967	-738	347	0.038

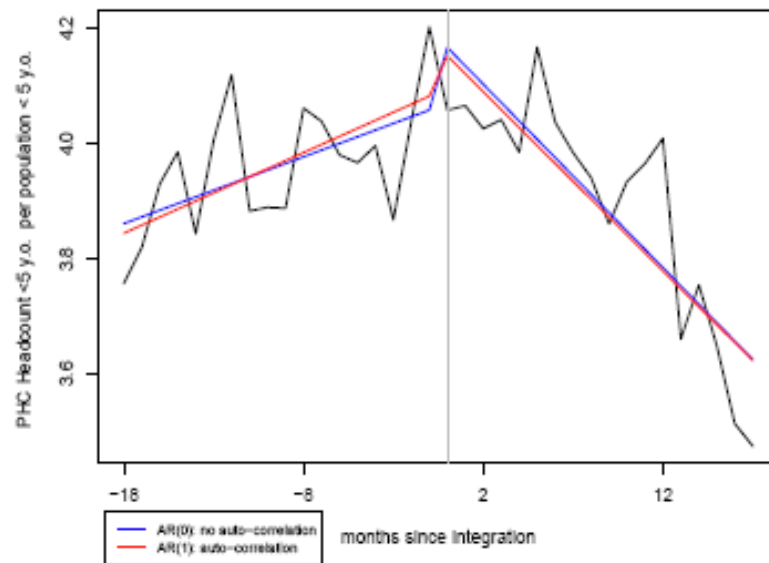
PHC Indicator	18 month Adjusted			30 month Adjusted		
	β coeff.	SE	p-value	β coeff.	SE	p-value
Non-communicable disease (per 100 000 people)						
Diabetes Mellitus new per population over 30 years old (annualised) ⁸						
Intercept	172	15	<0.001	195	27	<0.001
time	-1	1	0.337	2	2	0.294
integration	18	20	0.389	-28	41	0.499
postslope	1	2	0.495	1	3	0.614
Diabetes Mellitus new per PHC headcount over 5 years old (annualised) ⁹						
Intercept	32	4	<0.001	37	4	<0.001
time	0	0	0.468	0	0	0.296
integration	6	5	0.298	0	6	0.964
postslope	0	1	0.955	0	0	0.568
Hypertension new per popopulation over 30 years old (annualised) ¹⁰						
Intercept	933	32	<0.001	973	34	<0.001
time	-6	3	0.060	-1	2	0.645
integration	99	44	0.032	9	46	0.850
postslope	-7	4	0.084	-6	3	0.022
Hypertension new per PHC headcount over 5 years old (annualised) ¹¹						
Intercept	185	7	<0.001	198	7	<0.001
time	-2	1	0.009	0	0	0.731
integration	2	9	0.828	-17	10	0.099
postslope	0	1	0.777	-1	1	0.322
Workload and productivity						
Profession Nurse Clinical Work Load ¹²						
Intercept	42.15	0.91	<0.001	41.15	0.74	<0.001
time	0.10	0.08	0.261	-0.02	0.04	0.555
integration	-1.48	1.15	0.209	0.34	1.00	0.735
postslope	-0.18	0.12	0.161	-0.17	0.06	0.005
Human Resources for Health (Health Care Workers) per PHC Headcount(per 100 000) ¹³						
Intercept	470	7	<0.001	472	11	<0.001
time	1	1	0.053	1	1	0.028
integration	-8	9	0.385	-10	14	0.474
postslope	-1	1	0.110	-1	1	0.230
Utilisation rate PHC (annualised) ¹⁴						
Intercept	2.55	0.03	<0.001	2.50	0.04	<0.001
time	0.01	0.00	0.002	0.00	0.00	0.204
integration	0.12	0.04	0.004	0.15	0.05	0.006
postslope	-0.02	0.00	<0.001	-0.01	0.00	0.004
Utilisation rate under 5 years PHC (annualised) ¹⁵						
Intercept	4.10	0.06	<0.001	4.03	0.09	<0.001
time	0.01	0.01	0.021	0.01	0.00	0.088
integration	0.10	0.08	0.225	0.03	0.11	0.816
postslope	-0.05	0.01	<0.001	-0.02	0.01	<0.001

Note: Bolded values indicate p<0.003, All results are adjusted for 1st level auto-correlation, PHC is Primary

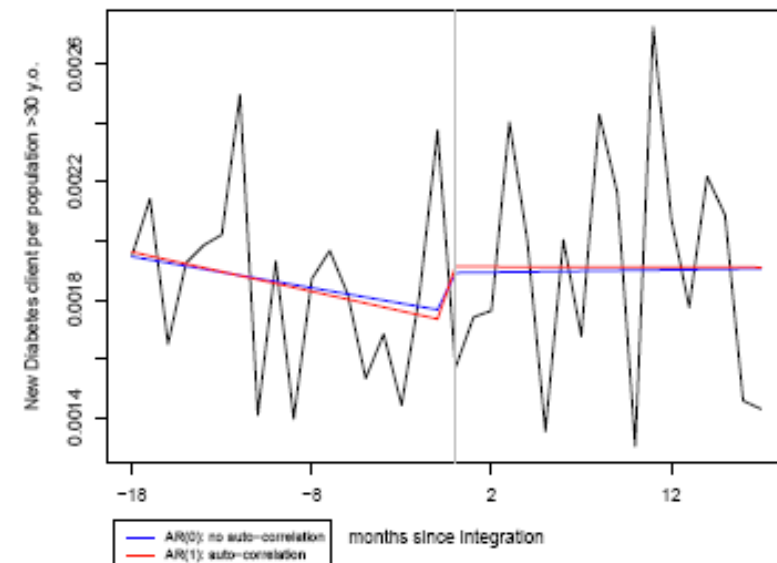
B.7: Interrupted time series graphs (± 18 months)



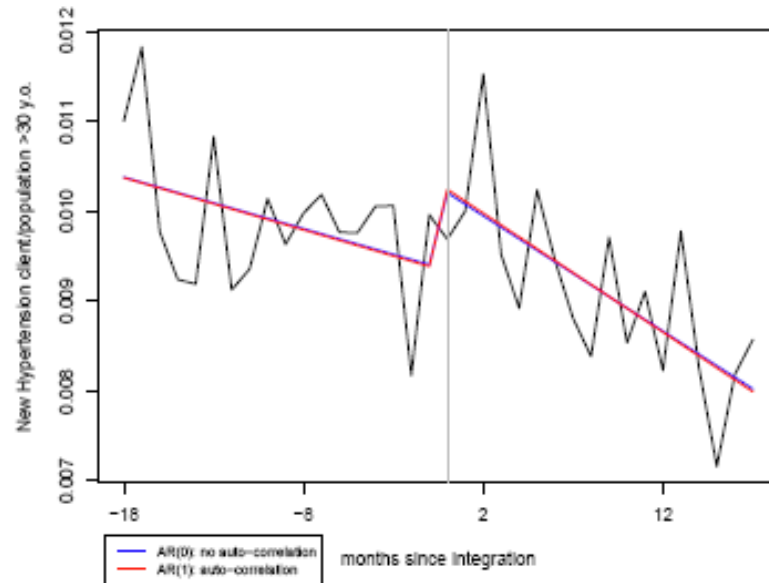
Utilisation rate under 5 years – PHC (annualised)



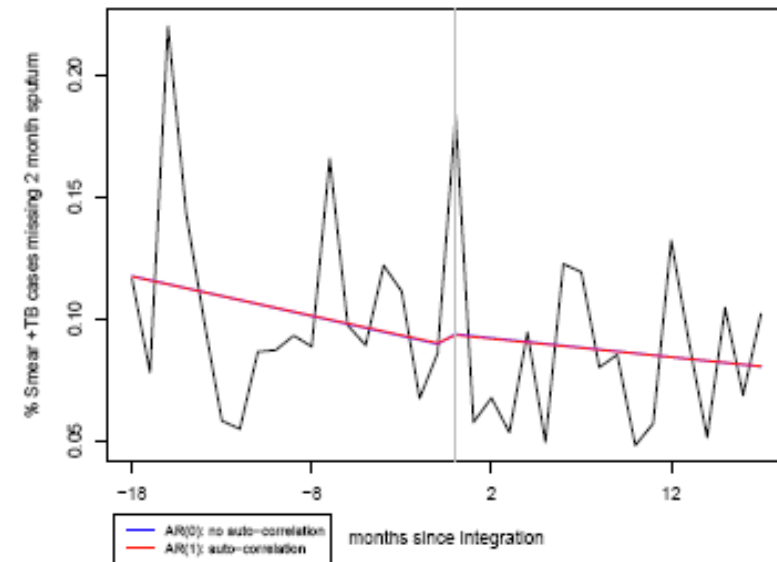
New Diabetes Mellitus clients per population over 30 (annualised)

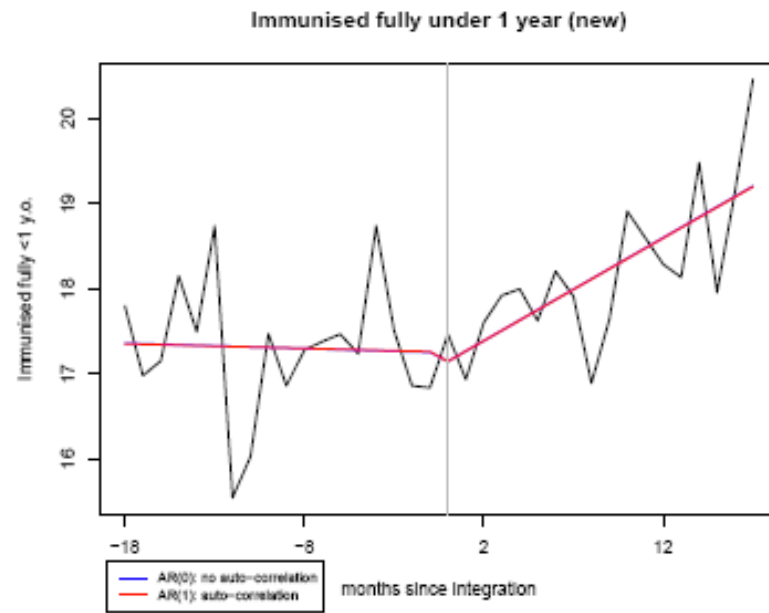
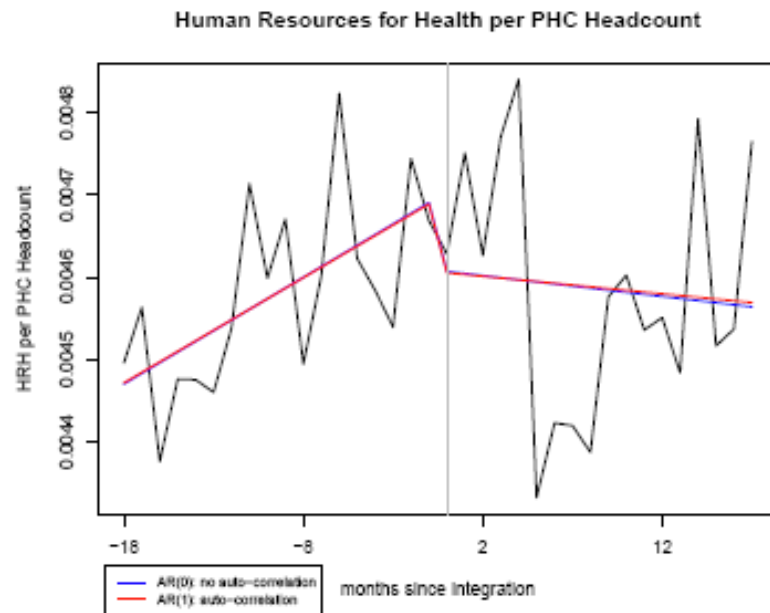
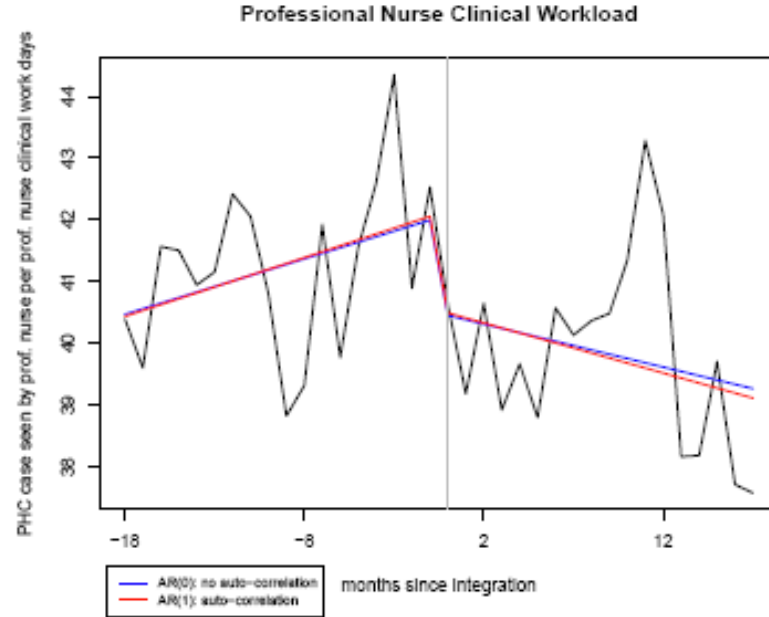
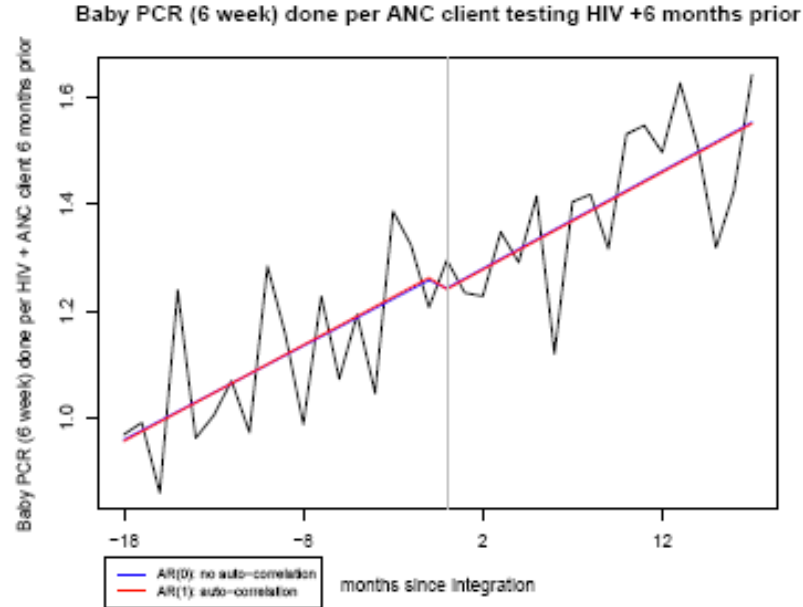


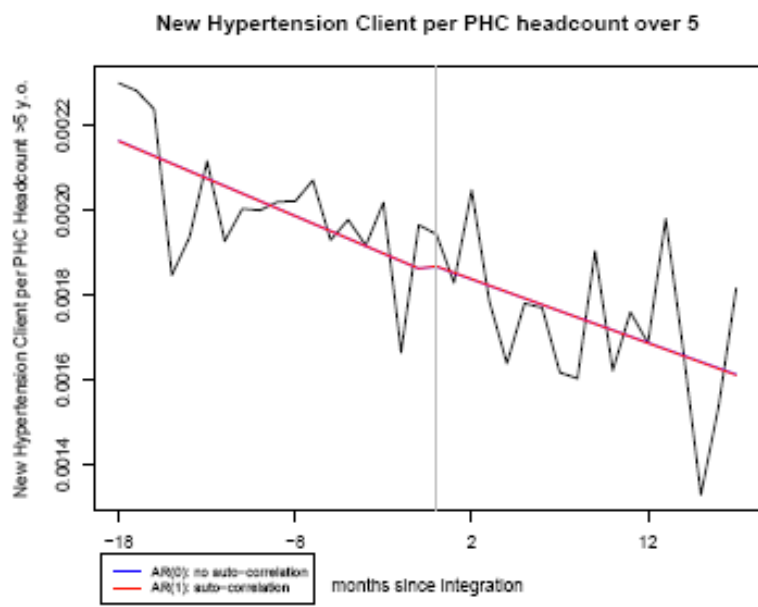
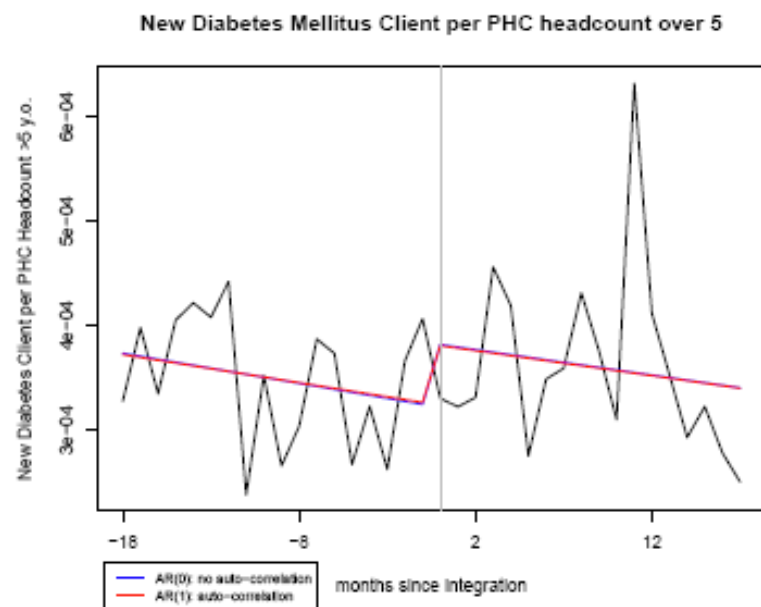
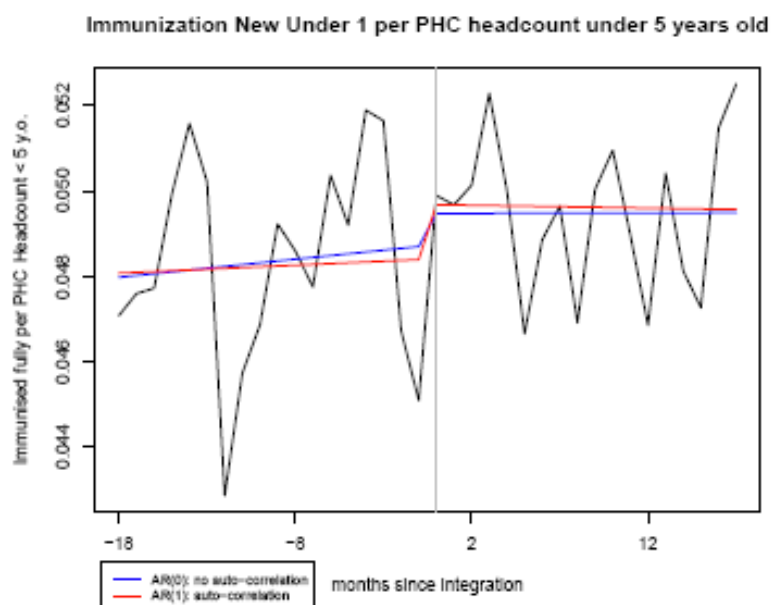
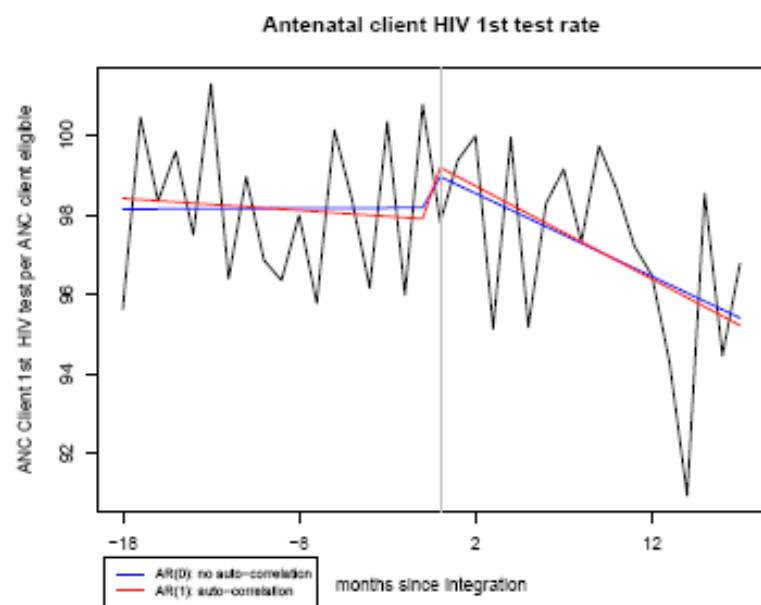
New Hypertension clients per population over 30 (annualised)



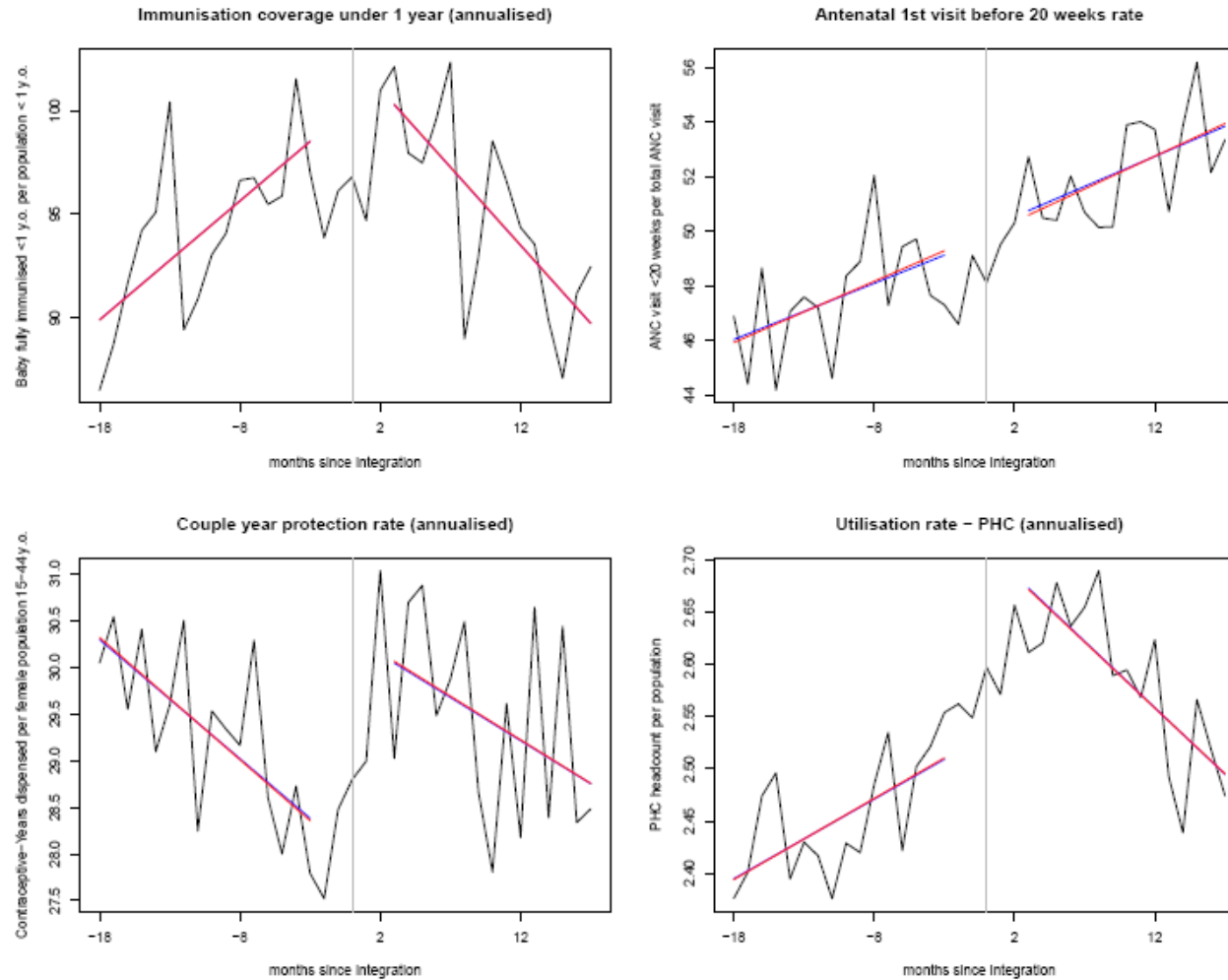
New Smear + Tuberculosis clients missing 2 month sputum result



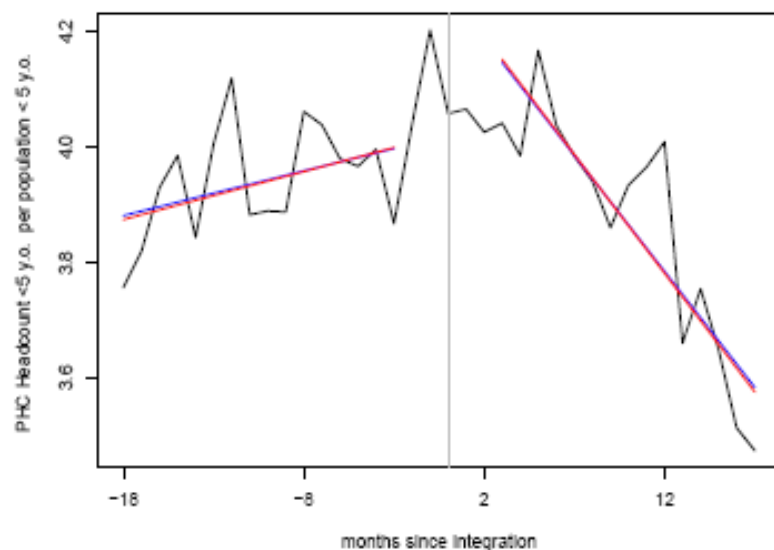




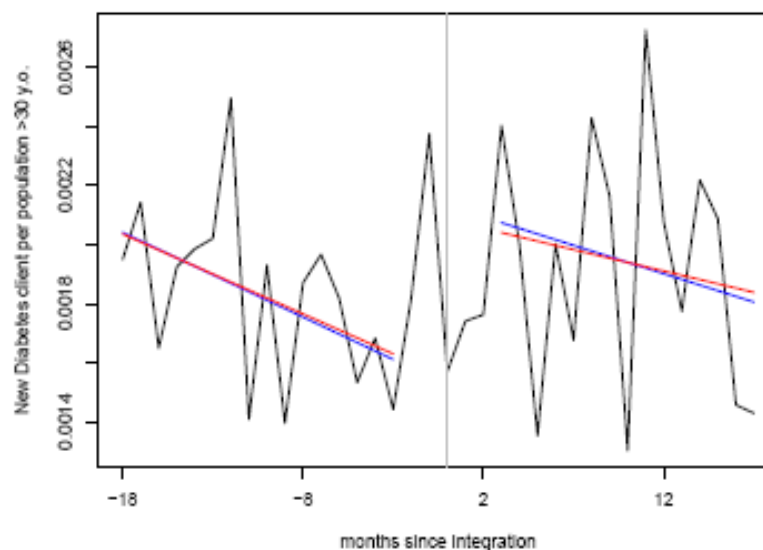
B.8: Interrupted time series graphs ± 18 months with lead and lag time



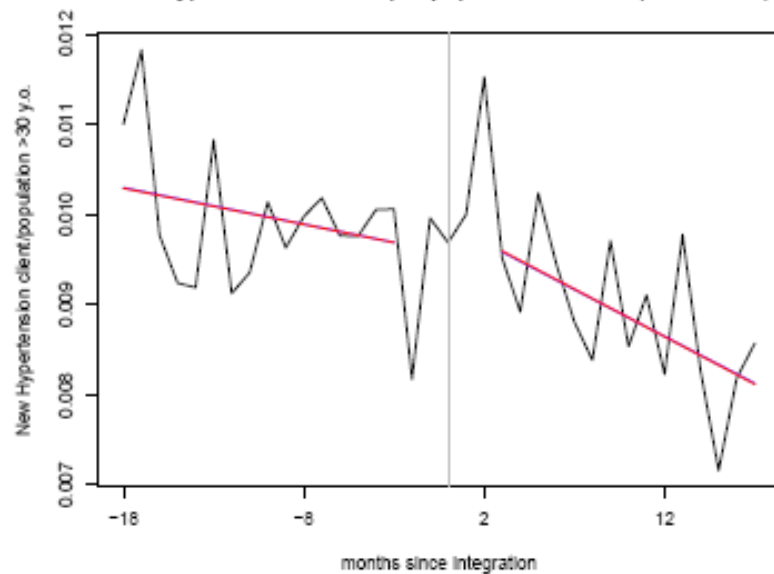
Utilisation rate under 5 years – PHC (annualised)



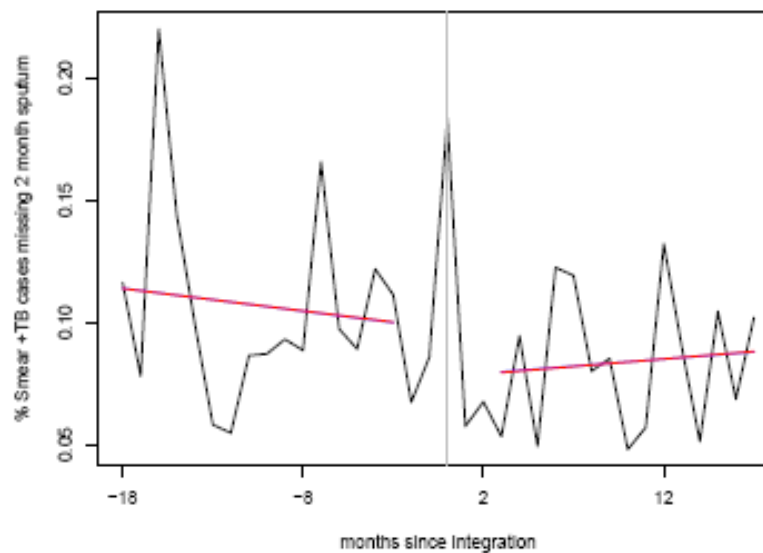
New Diabetes Mellitus clients per population over 30 (annualised)

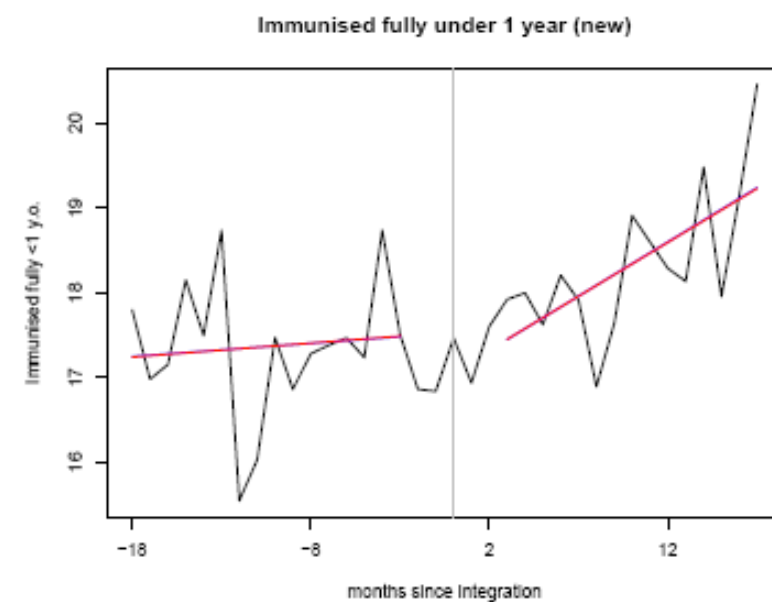
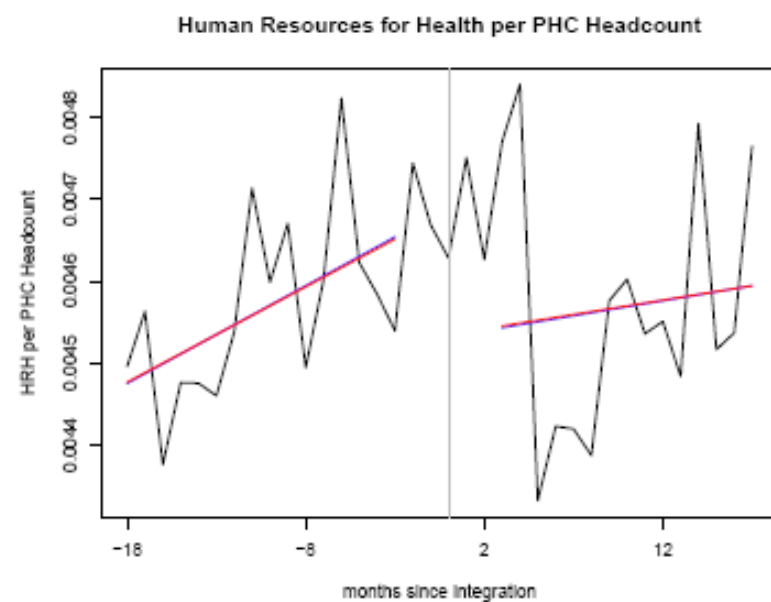
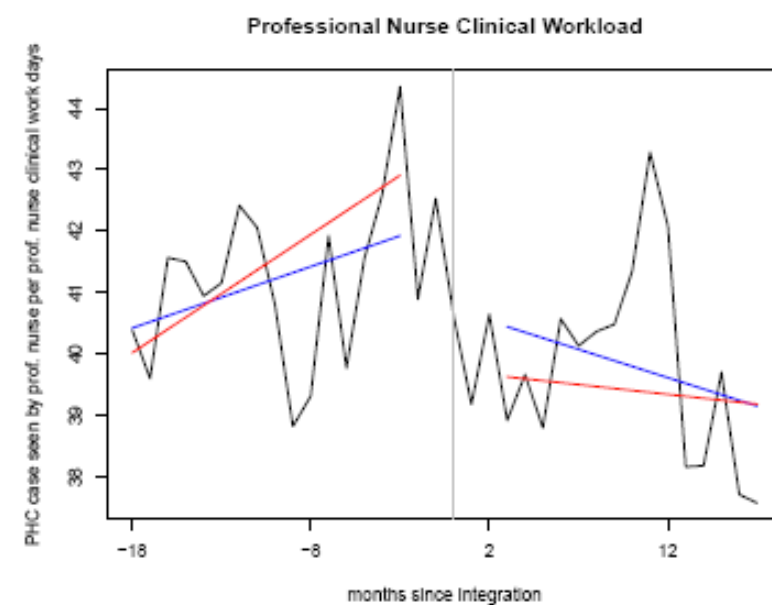
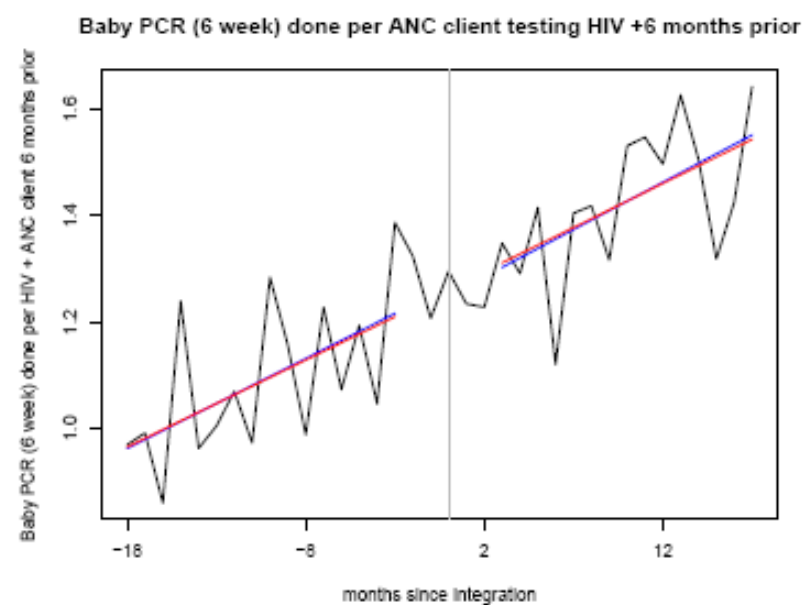


New Hypertension clients per population over 30 (annualised)

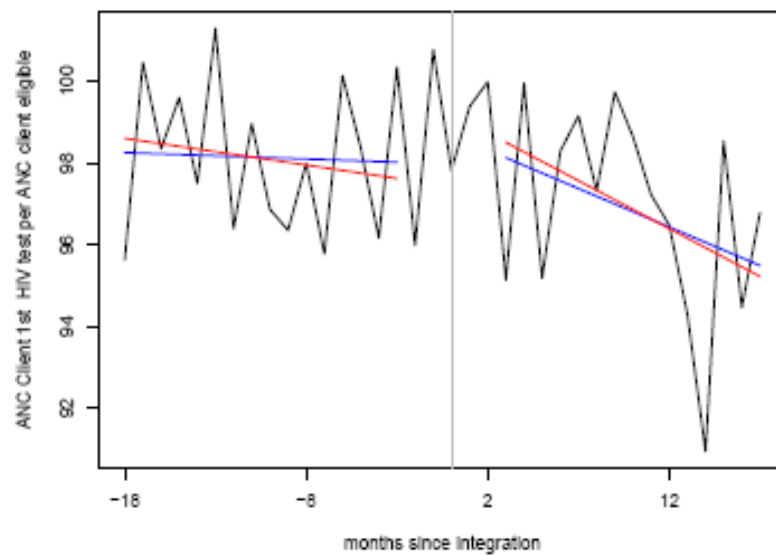


New Smear + Tuberculosis clients missing 2 month sputum result

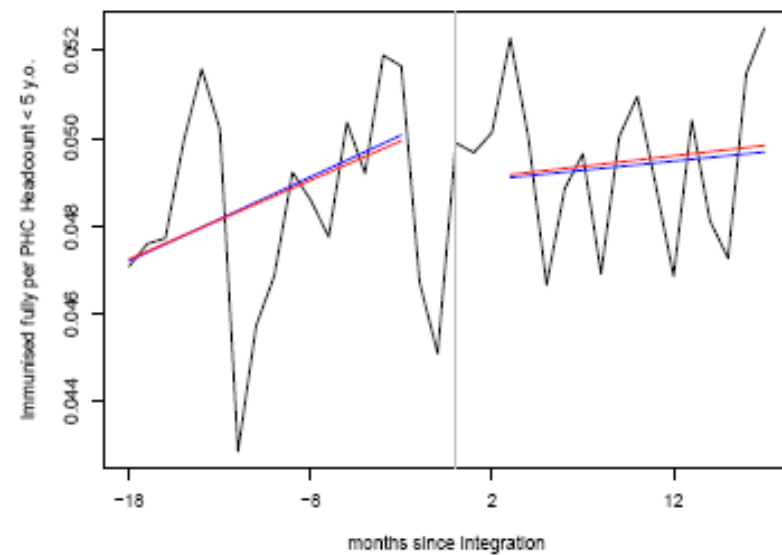




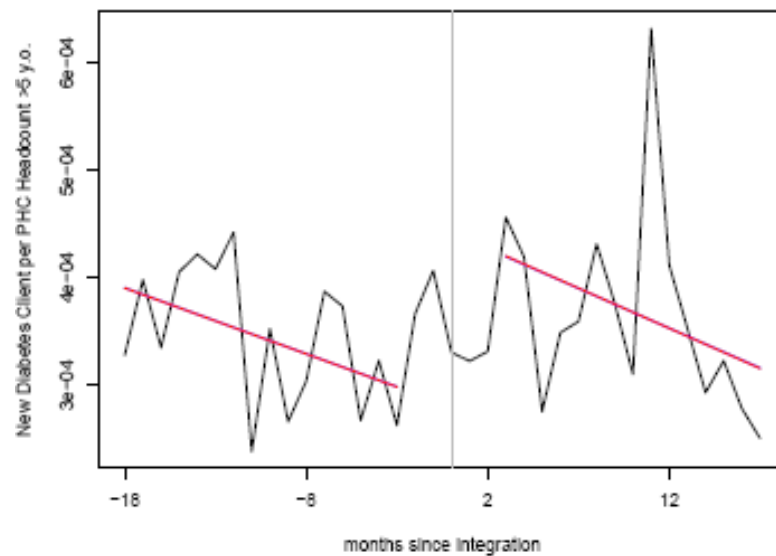
Antenatal client HIV 1st test rate



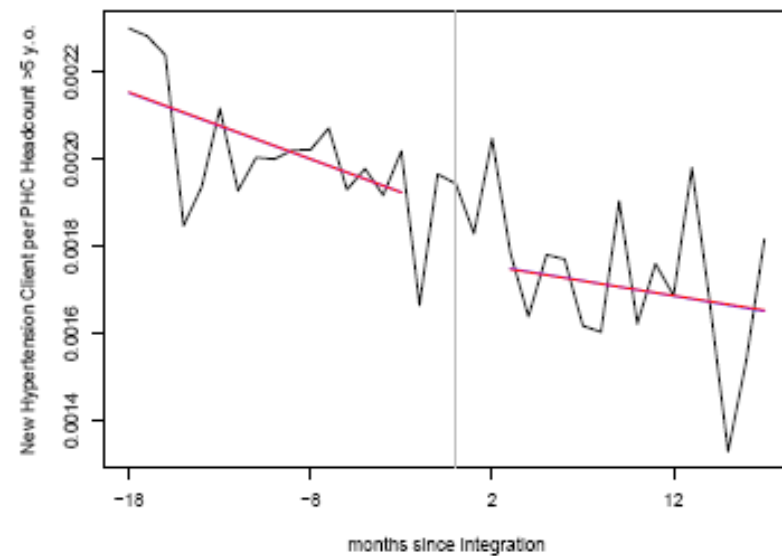
Immunization New Under 1 per PHC headcount under 5 years old



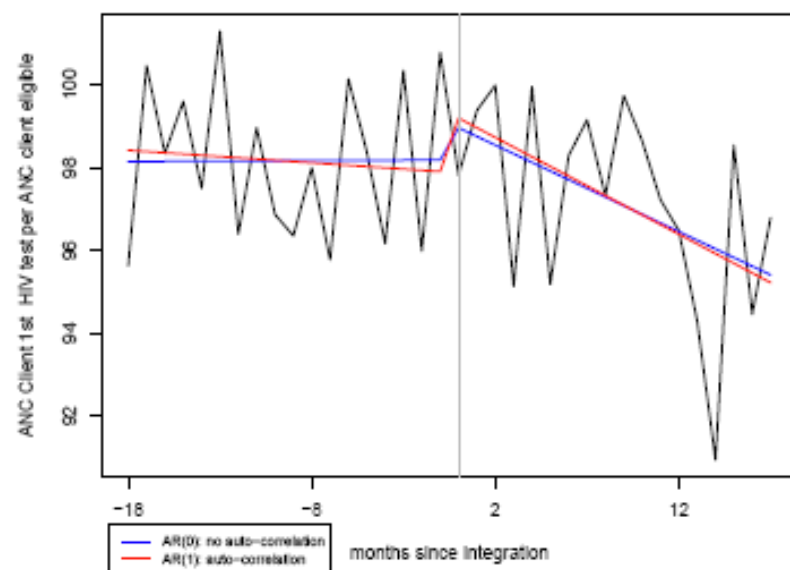
New Diabetes Mellitus Client per PHC headcount over 5



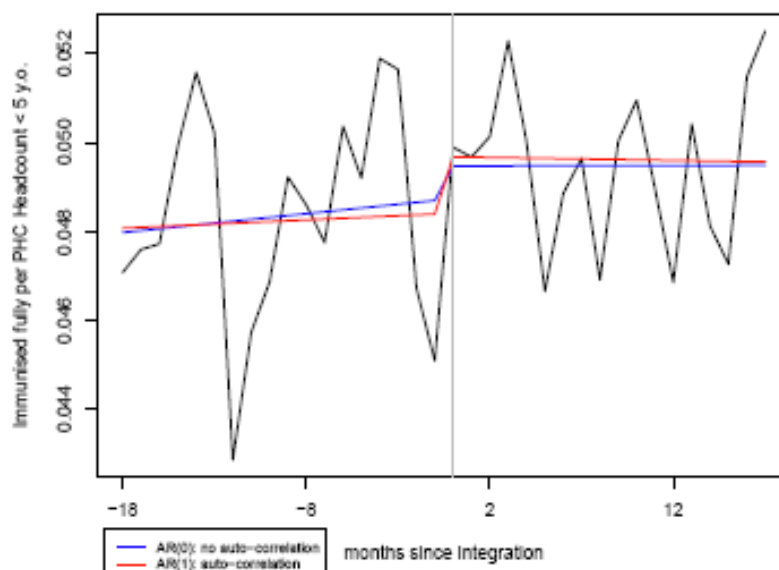
New Hypertension Client per PHC headcount over 5



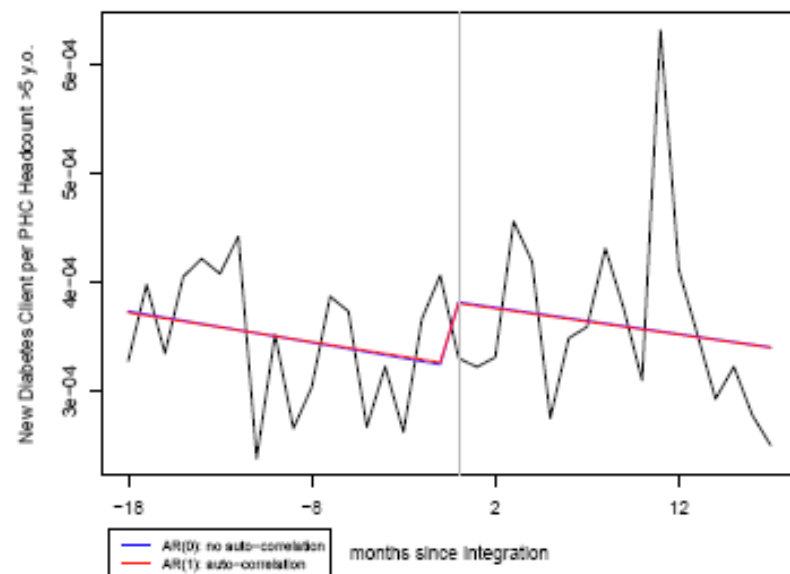
Antenatal client HIV 1st test rate



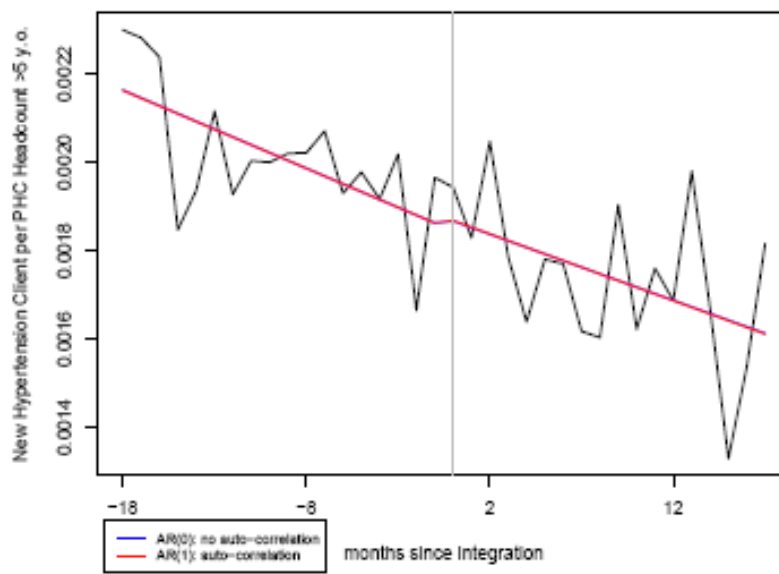
Immunization New Under 1 per PHC headcount under 5 years old



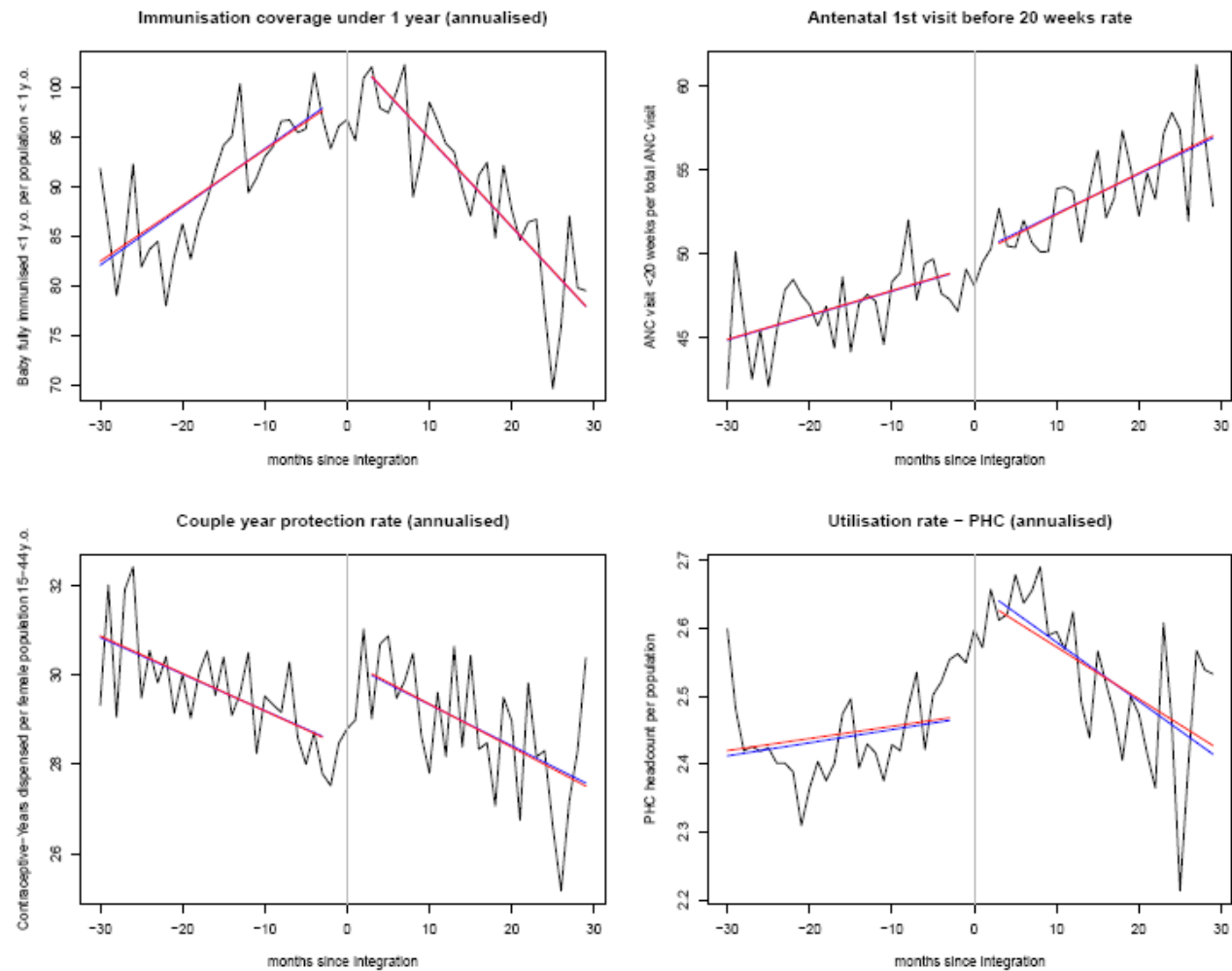
New Diabetes Mellitus Client per PHC headcount over 5



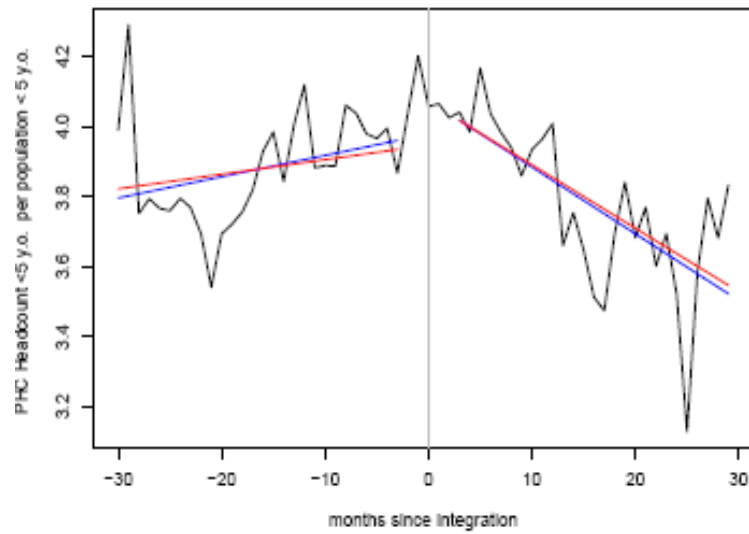
New Hypertension Client per PHC headcount over 5



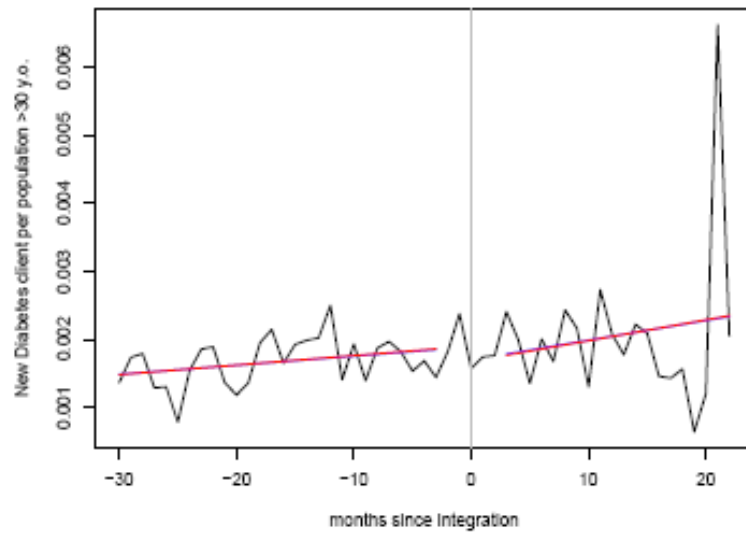
B.9: Interrupted time series graphs ± 30 months with lead and lag time



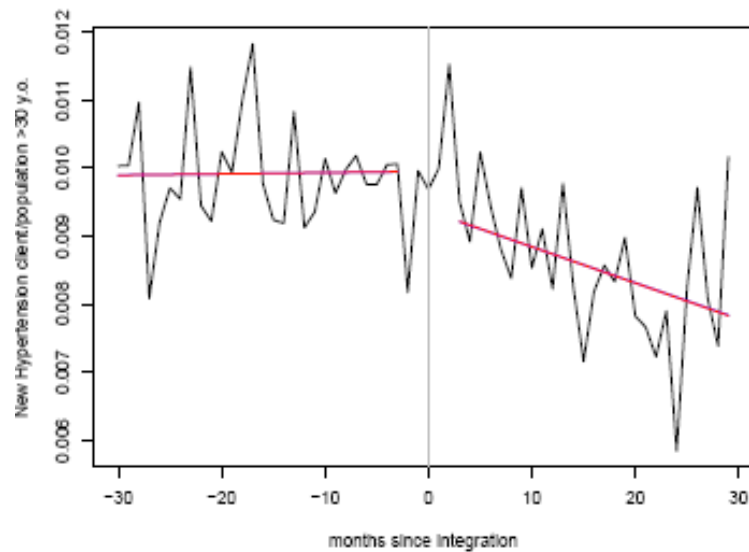
Utilisation rate under 5 years – PHC (annualised)



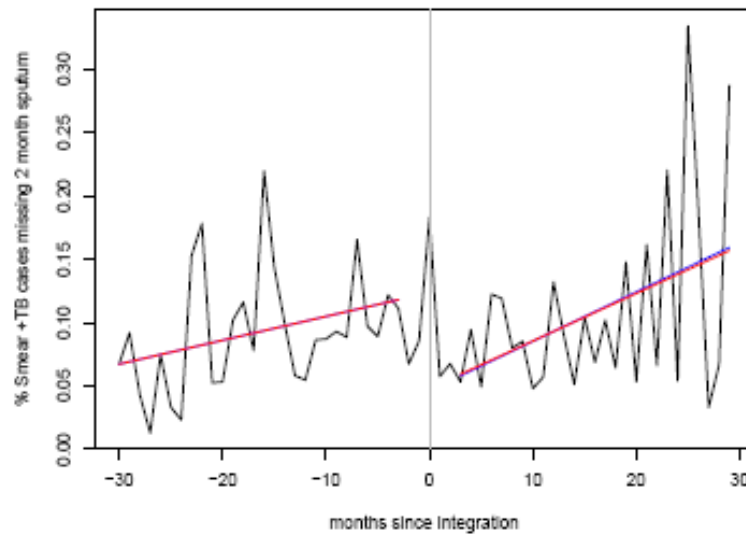
New Diabetes Mellitus clients per population over 30 (annualised)

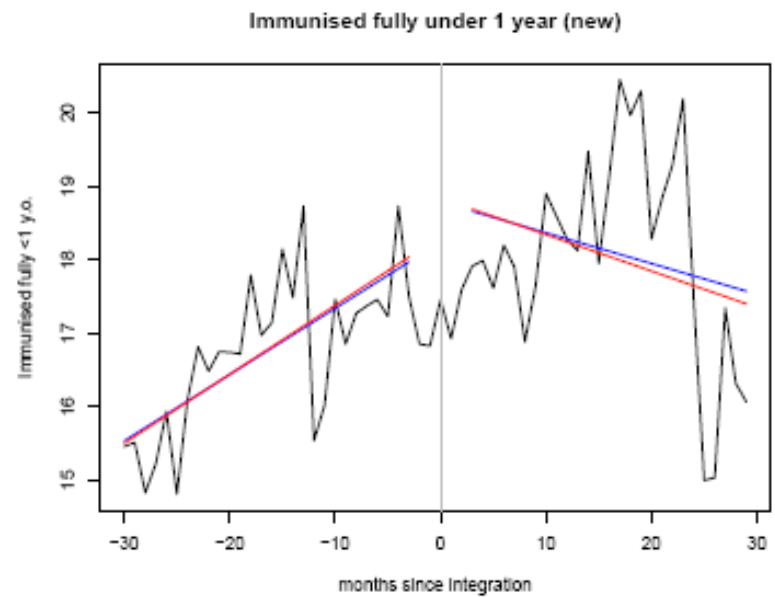
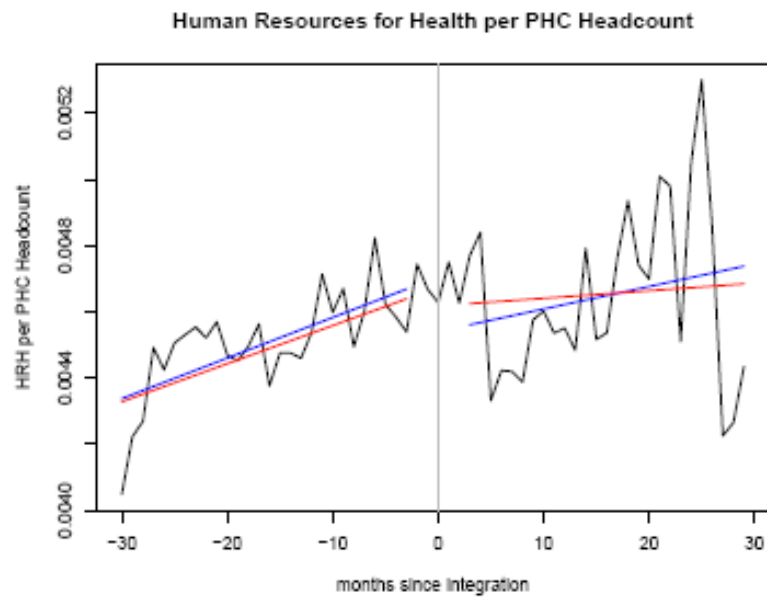
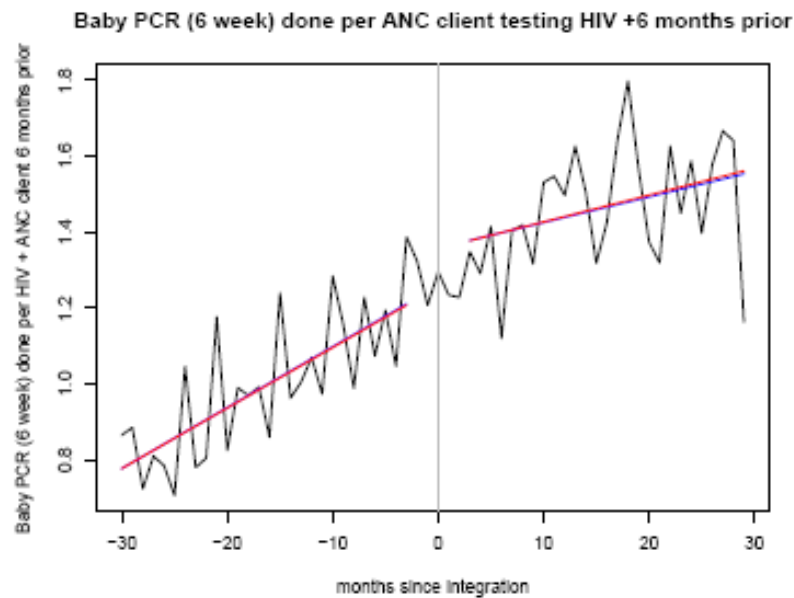


New Hypertension clients per population over 30 (annualised)

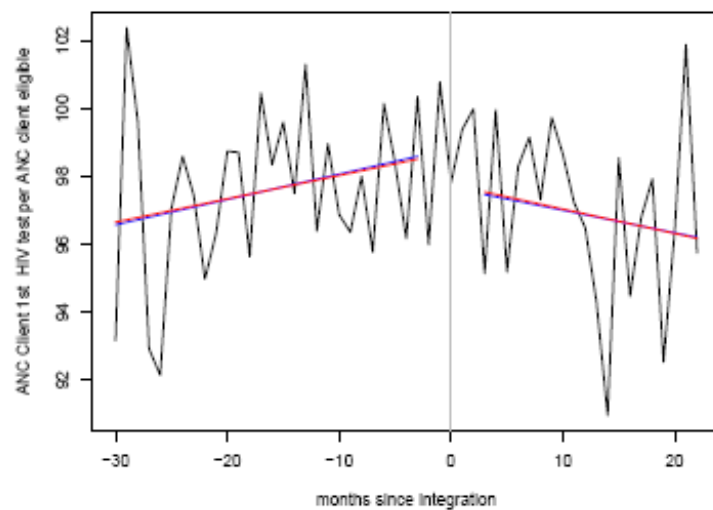


New Smear + Tuberculosis clients missing 2 month sputum result

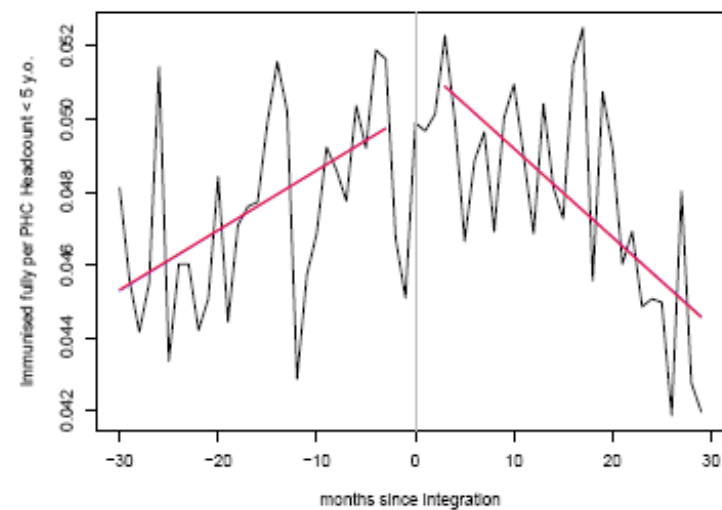




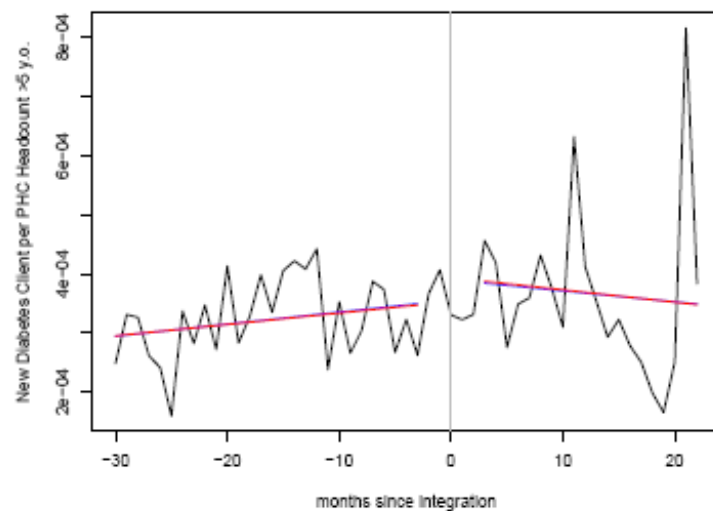
Antenatal client HIV 1st test rate



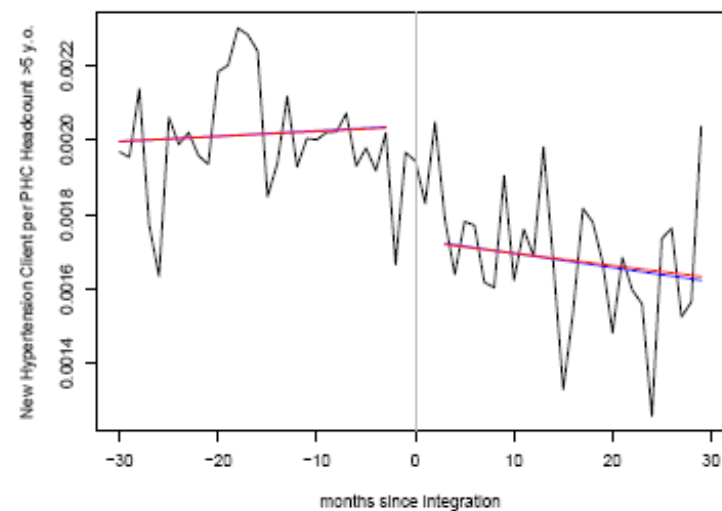
Immunization New Under 1 per PHC headcount under 5 y.o.



New Diabetes Mellitus Client per PHC headcount over 5



New Hypertension Client per PHC headcount over 5



B.10: Results of linear mixed effect models without HIV indicators

Primary Health Care Indicator		β coeff.	p-value
<i>Antenatal Care (ANC)</i>			
Antenatal 1st visit before 20 weeks rate ¹			
	Intercept	47.28	<0.001
	time	0.20	<0.001
	integration	0.12	0.904
	postslope	0.07	0.266
Antenatal client HIV 1st test rate ²			
	Intercept	98.67	<0.001
	time	0.18	<0.001
	integration	-1.55	0.301
	postslope	-0.14	0.342
<i>Sexual and Reproductive Health</i>			
Couple year protection rate (annualised) ³			
	Intercept	29.80	<0.001
	time	0.02	0.378
	integration	0.49	0.431
	postslope	0.01	0.856
<i>Child Health</i>			
Immunisation coverage 1 year (annualised) ⁴			
	Intercept	107.37	<0.001
	time	0.69	<0.001
	integration	0.14	0.955
	postslope	-0.94	<0.001
Immunised fully under 1 year – new per PHC headcount under 5 years old (per 100,000) ⁵			
	Intercept	5,056	<0.001
	time	3	0.562
	integration	207	0.091
	postslope	-20	0.014
<i>Infectious Disease (per100,000)</i>			
New Smear + Tuberculosis clients missing 2 month sputum result (per 100,000) ⁶			
	Intercept	9,802	<0.001
	time	130	0.027
	integration	-2,581	0.107
	postslope	-130	0.230
Baby PCR (6 week) done per ANC client 6 months prior (per 100,000) ⁷			
	Intercept	134,149	<0.001
	time	1,626	<0.001
	integration	575	0.920
	postslope	-109	0.769

Primary Health Care Indicator	β coeff.	p-value
Non-communicable disease (per 100,000 people)		
Diabetes Mellitus new per population over 30 years old (annualised) ⁸		
Intercept	212	<0.001
time	2	0.012
integration	-19	0.423
postslope	0	0.833
Diabetes Mellitus new per PHC headcount over 5 years old (annualised) ⁹		
Intercept	39	<0.001
time	0	0.040
integration	1	0.859
postslope	0	0.532
Hypertension new per population over 30 years old (annualised) ¹⁰		
Intercept	900	<0.001
time	-2	0.290
integration	42	0.467
postslope	-7	0.065
Hypertension new per PHC headcount over 5 years old (annualised) ¹¹		
Intercept	165	<0.001
time	-1	0.009
integration	2	0.837
postslope	-1	0.190
Workload and productivity		
Profession Nurse Clinical Work Load ¹²		
Intercept	41.75	<0.001
time	0.05	0.162
integration	-1.47	0.070
postslope	-0.01	0.921
Human Resources for Health per PHC Headcount (per 100,000) ¹³		
Intercept	479	<0.001
time	2	<0.001
integration	-10	0.315
postslope	0	0.942
Utilisation rate PHC (annualised) ¹⁴		
Intercept	2.61	<0.001
time	0.01	<0.001
integration	0.08	0.003
postslope	-0.01	<0.001
Utilisation rate under 5 years PHC (annualised) ¹⁵		
Intercept	4.28	<0.001
time	0.02	<0.001
integration	-0.09	0.197
postslope	-0.02	<0.001

Note: Bolded values indicate $p < 0.003$. All results are adjusted for 1st level auto-correlation, PHC is Primary Health Care