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Aligning vertical programmes with health systems: a case study of the HIV programme at district level in South Africa

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Thesis submitted for the degree: Doctor of Philosophy

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9 October 2015

Candidate declaration

I MARY KAWONGA do solemnly declare, in accordance with Rule G27 that this thesis is my own work. This thesis is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg, and has not been used as a submission for any other degree or submitted at any other university.

Signature: 

Date 9 October 2015

Dedication

This work is dedicated to the memory of my late father Frighton Chambo Kawonga and my mother Winnie Nakabala Kawonga. I am grateful to them both for teaching me the importance of hard work and perseverance.

To my husband Michael Taurai Madziva for your friendship, patience, and support.

Thanks to almighty God for His grace and mercy.

Acknowledgements

I am so privileged to have encountered many different people who supported me in varied ways while doing this PhD.

First, I am immensely grateful to my supervisors Prof Sharon Fonn and Dr Duane Blaauw for their support and guidance and giving me the opportunity to learn so much along the way. The journey was an exciting exploration. Thanks to my supervisors for always bringing me back to earth to focus on finishing.

I also thank all the research participants for sharing their time and information, and willingly sharing their opinions and experiences with me.

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I also thank the Commonwealth Scholarship Commission for the split-site scholarship that enabled me to take time off my busy work schedule to spend a few months (in 2011 and again in 2012) at the London School of Hygiene and Tropical Medicine to make progress on my PhD. My thanks also go to Kara Hanson and Dina Balabanova from the London School of Hygiene and Tropical Medicine Department of Global Health and Development for hosting and providing support.

Last but not least, I thank many PhD students and academic staff – too numerous to mention – at both the Wits School of Public Health and the LSHTM who shared their ideas and experiences with me and provided moral support.

Abstract

Rationale

It is widely recognised that population health can be improved by strengthening health system capacity to deliver health services that tackle a wide range of diseases and that people can use when they need them. However, many low- and middle-income countries (LMICs) have established disease control programmes (DCPs) that employ dedicated machinery (e.g. health workforce, drug delivery, health infrastructure) to deliver health services that tackle a specific disease (traditionally termed the 'vertical' approach). DCPs have beneficial (increased coverage of disease control interventions) as well as detrimental effects (hamper holistic care because patients are seen on the basis of their disease, increase duplication and fragmentation in service delivery, and draw scarce resources from overall health systems that are designed to tackle a wide range of diseases). Integrating DCP services within overall health systems (traditionally termed the 'horizontal' approach) is thus increasingly proposed. Some suggest that DCPs should also be integrated within other health system functions (e.g. planning, financing, monitoring and evaluation [M&E]) in order to minimise fragmentation in managing health services. With increasing interest in integration, research is needed to inform discussions on how to achieve it. Since integration is not necessarily about abolishing all elements of 'verticality' but rather about finding ways in which beneficial aspects of DCPs can exist with health systems in a fruitful symbiosis, research is needed on how different extents of DCP integration may affect health systems. Understanding the extent of integration is important as the acceptable degree of 'verticality' may vary across different contexts.

In South Africa several DCPs exist – notably HIV, tuberculosis (TB), maternal and child health (MCH) – but it is official government policy to integrate them within the district health system. As such, DCP services (e.g. HIV testing, TB diagnosis and treatment) are supposed

to be integrated at the point of care – provided by multi-skilled health workers through multi-functional health facilities. Policy also advocates integration at managerial level – in a context where district managers have been delegated the authority for implementing health services (planning, supervision, monitoring). As such, DCP managers should relinquish responsibility for DCP interventions to district managers to whom they should provide specialist support. There is however no policy guidance on how to implement integration. Existing policy also makes no mention of DCP integration within district health system functions such as planning or M&E, and yet it seems important that district managers have administrative authority over these in order to effectively manage integrated services at district level.

Evidence to inform implementation guidance is limited. While there is some research on service integration at the point of care, integration at managerial level (administrative integration) is less understood. The limited available evidence suggests there has been little progress with achieving administrative integration, but there is no research exploring why. For example, administrative integration may require changes to health system organisational structure (how roles are allocated and lines of authority), and culture (actor attitudes, behaviours and values). However, whether the prevailing health system organisational structure and culture would support integration has not been researched. Further, collaboration (communication, joint working) between programme and district managers is necessary for integration to succeed, but the extent to which it happens is little researched. This PhD addresses some of the afore-mentioned gaps in understanding by measuring the extent of integration between DCPs and the district health system in South Africa, and exploring how organisational structure and culture may influence integration. The four studies that make up this PhD explore these questions using the HIV programme as an

example of a DCP and monitoring and evaluation (M&E) as an example of a health system function.

Aims

The aims of this PhD are: a) to explore the use of methods for measuring the nature and extent of HIV programme integration within district health system M&E in South Africa (studies 1 to 3); and b) to explore the influence of the health system organisational structure and culture on integration (study 4).

HIV M&E is a system (people, technology, processes, and management structures) for producing HIV information and using it for monitoring HIV services. In the absence of policy guidance defining what M&E integration means, this research hypothesises a model of HIV M&E integration that has the following characteristics:

a. *Operational integration*: processes, technology and personnel for producing HIV information (collecting, collating, analysing and disseminating) are integrated within the district health information system (DHIS);
b. *Administrative integration*: district managers exercise administrative authority over HIV M&E – oversee HIV data collection and collation (check data quality, compile and submit reports) and use HIV data for monitoring progress with implementation of HIV interventions in districts; and DCP managers at sub-national level provide specialist support (e.g. on technical aspects of data quality, and interpretation of HIV data).
c. *Collaborative actor relations*: district and sub-national DCP managers share task-related communication (talking one-on-one about HIV M&E tasks), and attend the same committees where HIV data are discussed and used for monitoring HIV services.

Methods

The research was conducted in two of nine provinces (one urban and one rural) during 2009 to 2012. One district per province was studied. Quantitative and qualitative data were collected in three phases through: a) interviews with 51 health managers located at sub-national level (health facility, sub-district, district and provincial) which included: district, programme (HIV, TB and maternal and child health) and health information managers; b) interviews with eight participants at national level (HIV programme, health information and health system managers); c) document reviews (policies, health plans, operating procedures, M&E tools and documents); and d) audits at 11 health facilities.

Given the dearth of methods for measuring the extent of integration, the research adapts and applies existing health system research methods in new ways and uses methods traditionally used in organisation and social science research and applies these methods to health systems research. To assess operational integration, an existing analytical framework – developed by Atun and colleagues for measuring the extent of integration of DCPs within health system functions – was adapted and applied to rate the extent to which HIV data collection and collation forms and processes for reporting, analysing and disseminating HIV data were integrated within the DHIS as 'no integration', partial' or 'full integration'. To assess administrative integration, Bossert's decision-space analysis – traditionally used to assess if and how managers exercise authority over health system functions following decentralisation – was adapted to quantify the degree of exercised authority over HIV M&E (the extent to which managers perform HIV M&E tasks) as 'low', 'medium', or 'high'. The degree of exercised authority and HIV M&E knowledge were compared between district and programme managers. The extent of communication was quantified using social network analysis (SNA). SNA measures were computed to describe: actor centrality (identify actors with the lowest and highest number of communication links to others, and those who connect

otherwise disconnected actors); density (quantify cohesiveness of task-related communication); and homophily (quantify extent of communication within versus outside manager groups). Block modelling was applied to identify management committees that link programme and district managers. Finally, Mintzberg's organisational configurations framework was applied to describe three organisational parameters of the health system: a) the type of decentralisation (whether the locus of decision-making about the design of the HIV M&E system lies at higher or district level); b) the key part of the organisation (whether sub-national programme or district managers are the key role players in HIV monitoring); and c) coordination mechanisms used (highly formalised versus output-based mechanisms). The study then analysed how the observed organisational configuration influence integration.

Key findings

The results show that operationally the HIV M&E system has two separate sub-systems. One produces information only on anti-retroviral treatment (ART) services, is not integrated within the DHIS and limits availability of ART data at district level. The second produces information on non-ART services (e.g. HIV counselling and testing or prevention of mother to child transmission) and some aspects of it are not integrated (data collection forms) while others are partially (personnel) or fully integrated (software). District managers exercise high degrees of administrative authority over HIV data collection and collection, but there is duplication as programme managers perform some of these tasks as well and seldom perform HIV M&E specialist support roles (partial integration). HIV data use is not integrated as: district managers (many of whom have low HIV M&E knowledge) exercise low degrees of authority in using HIV data; while programme managers (usually with high HIV M&E knowledge) exercise high degrees of authority and use HIV data in silos excluding district managers.

In both sites task-related communication networks of all managers are moderately cohesive, but provincial HIV programme managers as a group seldom talk to the district managers to whom they should provide specialist support. Though several management committees discuss and use HIV data for monitoring, few connect district and programme managers to potentially foster joint monitoring. Finally, the health system organisation is characterised as Mintzberg's machine bureaucracy that is incongruous with integration policy objectives. It is centralised (district actors play a peripheral role in decisions regarding HIV M&E design); highly formalised (use rules to enforce compliance and control how M&E work gets done rather than defining outputs that should be achieved); . The organisational culture promotes programme managers as the lead role players (district actors not valued as key players, investment in capacitating programme and not district managers), and leadership styles fail to foster collaborative relations amongst programme and district managers.

Implications

High degrees of 'verticality' were observed which potentially hamper prospects of integrated health services within the district health system. First, the ART M&E system limits availability of HIV data at district level and district managers oversee the production of HIV information while programme managers use it, which limits the extent to which district managers can manage health services in a holistic manner. Setting up a parallel system to fast-track data submission to higher levels is a missed opportunity to strengthen DHIS capacity to produce HIV (and other) data in a timely manner. Second, provincial programme managers largely communicate amongst themselves and seldom with the district managers for whom they should provide specialist M&E support. This means the HIV M&E expertise resides at provincial level and is not available at district level where it is needed. Third, a centralised and highly formalised health system that promotes and values programme

managers as key role players in programme operations at district level undermines policy intentions of district managers assuming this leadership role.

This research identifies where interventions can be targeted to achieve higher degrees of integration for district health system and potentially patients' benefit, and recommends organisational change that is needed to better enable translation of stated policy intents into practice. Lessons learned from this specific HIV M&E case may be relevant for the integration of other programmes in South Africa, and applicable to other LMICs, particularly those seeking to integrate programmes within the health system at district level.

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Preface

I decided to do this PhD because of my keen interest in health systems development and a desire to contribute to improving the delivery of health services in ways that enhance access and utilisation. I have worked in the South African health system for 20 years as a medical practitioner as well as a public health practitioner and researcher. My research work has focussed on assessing different aspects of health service delivery, seeking to identify pragmatic ways of improving quality, access and use of services. When I started thinking about a PhD topic, I knew I wanted to do more challenging research that extends beyond merely describing health services to start exploring why health systems fail to deliver accessible and quality services. From my own experiences, conversations with others, and reading the literature it was apparent that an important factor that is little understood in South Africa was poor integration between actors and structures responsible for disease-specific services and those responsible for general health services. I discovered that while various health system strengthening were proposed for South Africa, there were no explicit proposals for achieving synergies between disease-specific and general health services.

Understanding that integration is one way of strengthening a health system, I decided to undertake this PhD, aiming to measure the extent to which integration exists, identify barriers to integration, and generate data that could inform explicit integration strategies. However, I soon discovered that methods for measuring the extent of integration were not available in the health system research (HSR) literature. Therefore, a significant part of my PhD research became about adapting or developing innovative methods and tools and applying these to test the extent to which integration exists in South Africa's health system. I undertook this PhD through the route of thesis with publications. The thesis thus comprises two parts. The first part is an integrating narrative which provides the background, rationale, overall research

approach and key findings, outlines the contribution of this thesis to knowledge and discusses the implications of the findings for policy and practice. The second part comprises the four published research papers that form part of this PhD.

Introduction and thesis overview

Introduction

Health system strengthening is a public health priority that has taken centre stage in global (1) and African regional health policy (2) and academic discourse (3-6). This is particularly in the light of evidence attributing the low coverage of interventions for HIV, tuberculosis (TB) and malaria control (LMICs) (7-11) and poor population health outcomes in low- and middle-income countries (1, 7, 11-12) to health system weaknesses. Health systems are defined and conceptualised in various ways (13-14). A commonly-used definition by the World Health Organization (WHO) refers to the health system as "*all the organizations, people, and actions whose primary purpose is to promote, restore or maintain health*" (15). In the WHO's conception, health systems improve health by ensuring high coverage and accessibility of quality health services – through generating and allocating resources (finances, skilled health workers, drugs, vaccines and technologies), producing and using information to guide decisions, and effective leadership and governance (1, 15). These ideas are encapsulated in the WHO's 'building blocks' framework (Figure 1) [1] (1).

Despite global recognition that well-functioning health systems are essential for improving population health (15), there have been debates about whether health improvement is best achieved by strengthening health systems or investing in disease control programmes (DCPs). DCPs refer to "*coherent sets of activities, know-how and resources designed to control a single or a limited number of related diseases*" (16). They represent what has classically been

[1] This framework characterises health systems as primarily focussed on delivering health care services. This is the notion of the health system is applied in this thesis. However, it is recognised that health systems are conceptualised more broadly in literature. For example, as encompassing actors and activities beyond the health sector, thus recognising the centrality of social determinants of health (Frenk, 2009; Smith & Hanson, 2012). For example, stronger inter-sectoral linkages with other sectors can enable: tobacco control; road traffic accident reductions; action on the social determinants of health; and delivery in other 'health spaces' beyond health facilities in order to achieve greater access (Frenk, 2009). This thesis, while acknowledging the centrality and importance of this wider understanding of health systems, focuses on the more narrow definition of the health system as defined by the WHO.

termed the 'vertical approach' to health improvement, which entails applying "*single-purpose machinery*" aiming to tackle one or more related diseases (17).

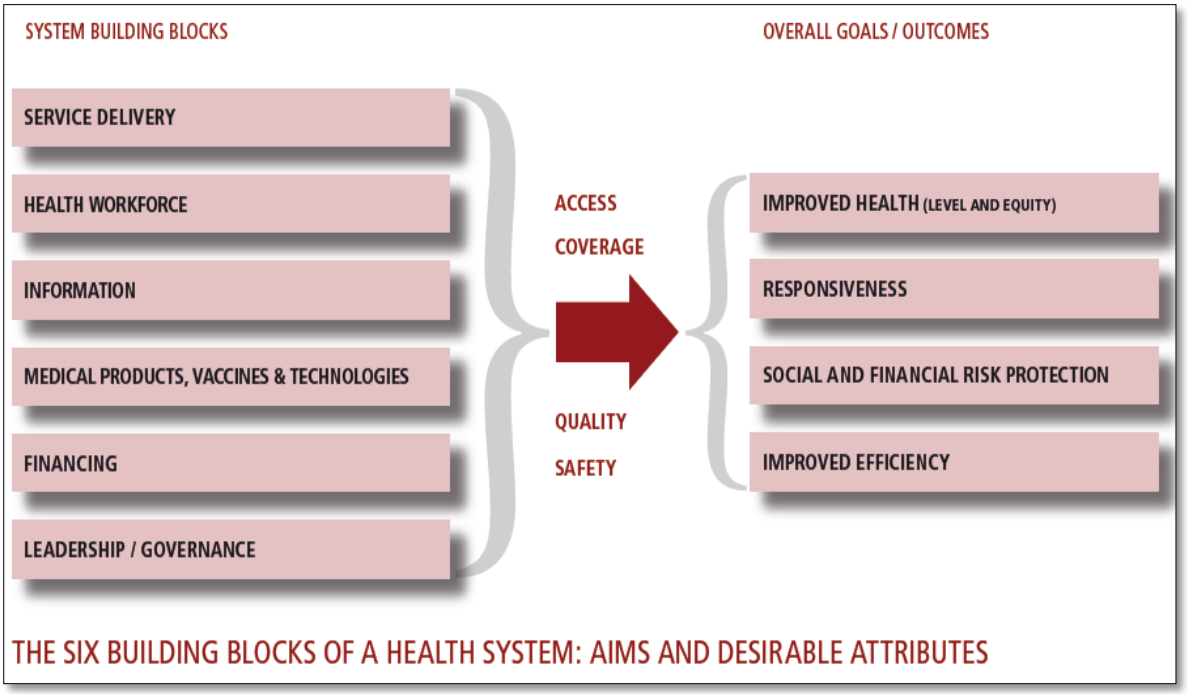


Figure 1 WHO health system 'building blocks' framework (1)

DCPs typically use dedicated service delivery platforms, health workforce, funding and health information mechanisms – that run parallel to those of the health system – to improve access to services related to a specific disease (16, 18). Investing in strengthening health system capacity to tackle a wider range of diseases and improve broader access represents a 'horizontal' approach (14, 19), which Gonzalez defines as that which "*seeks to tackle the overall health problems on a wide front and on a long-term basis through the creation of a system of permanent institutions commonly known as 'general health services*" (17).

Vertical versus horizontal debates have been raging since the 1970s (14). Though DCPs have increased the coverage of disease control interventions (such as HIV treatment (20)), their disease-specific focus (18, 21) and parallel machinery undermine health systems (22-24) –

for example by exacerbating inefficiencies due to duplication, and exacerbating health service weaknesses by drawing personnel away from general health services (7, 22, 25). Though evidence on effectiveness of a 'horizontal' approach is lacking, integrating DCPs within health systems is viewed as one way of minimising these kinds of consequences (26-27), and an opportunity for overall systems strengthening (7). Integration is also viewed as an opportunity to maximise synergies between DCP and health system actors. This is important in the wake of evidence that synergies amongst disparate health system actors is a key attribute of a well-functioning health system (3).

The challenge lies in implementing integration. First, it is a complex notion that is applied in different ways with varied context-dependent effects – so there are no one-size-fits-all models (28). Second, integration is not an all-or-none state, and so some elements of 'verticality' may be necessary even in an integrated approach (21, 27-29). The vexing questions for decision-makers are: which elements could remain vertical, and how much verticality would be appropriate? Decisions regarding a suitable integration model – which depicts an appropriate balance of horizontality/verticality – should be informed by context-specific evidence on how different degrees of integration affect health system performance and outcomes (30). Research on the health system effects of different extents of integration has been lacking, but is becoming more available as measurement methods develop.

Evidence to inform integration models is lacking, but needed, in South Africa's decentralising health sector where policies propose integration of DCPs within the health system at district level (31-33). Several DCPs exist in South Africa, and despite enabling policy, integration remains elusive. It does not help that existing policies fail to clarify how and the extent to which DCPs should integrate within the district health system. Health authorities reportedly intend to develop integration guidelines (for the HIV programme) (34).

However, there is a dearth of evidence to inform decisions regarding suitable integration models. Research in South Africa focuses largely on understanding whether integration is happening but seldom explores what DCP integration should look like, and what is needed to achieve it. Research on these questions would begin to generate the kind of evidence needed to inform plausible integration models for South Africa.

This thesis contributes to this knowledge gap by exploring questions about what DCP integration in South Africa's decentralising health system context might look like, and what kind of organisational structure and culture can support it. This research does not question whether integration is an appropriate policy choice for South Africa. Rather, the point of departure is that a policy decision to integrate DCPs has been made, and evidence is needed to inform context-appropriate implementation guidelines. This research first proposes what a 'suitable' model of DCP integration within the district health system (DHS) should look like, explores the use of methods to measure the extent to which this model exists, and assesses whether the health system organisational structure and culture supports the hypothesised model.

Thesis overview and structure

Integrating narrative

The integrating narrative includes four chapters. **Chapter one** comprises the introduction and literature review, and includes six sections. The first is the background which depicts health systems as complex multi-actor environments in which DCPs have emerged consequent on differentiation of job roles. The age-old tension between DCPs and health systems, including why this tension exists and how it has been discussed in literature over the last two decades is discussed. The second section provides conceptual clarity regarding the notion of integration of DCPs within health systems. An overview is provided of how integration is conceptualised

in the literature and why definitional and conceptual clarity is essential if integration is to be measured. The third section provides the rationale for this research which seeks to understand the nature and extent of DCP integration within the district health system. First the South African health system context is described providing an overview of decentralisation policy and district health system development. The section continues to discuss: current South African evidence regarding interactions between DCPs and the district health system; gaps in understanding of interactions; why these interactions need to be better understood; and the kinds of evidence needed in order to inform the design and content of suitable integration models.

The rationale is followed by the fourth section which describes the HIV programme and M&E in South Africa and the use of a tracer – HIV monitoring and evaluation – as the lens though which integration is measured is justified. Section five outlines the research aims and objectives and the overall thesis framework (which draws the link between the four related studies that make up this PhD). Because a key part of this thesis focuses on the use of methods for measuring the extent of integration, the final section of the introductory chapter describes the overall approach to conceptualising and measuring integration, and the rationale for the approach. This final section draws on literature and an understanding of the South African health system which informs the hypothesised 'ideal' integration model. This model is tested and measured through the application of new methodologies in health systems research.

Chapter two provides a synthesis of the methods that were applied in the studies that constitutes this thesis (study design, setting, study sample and participants, and data collection and analysis). Detailed methods for each individual study are described in the appended Papers 1-4. Further, given the dearth of methods for measuring the extent of

integration, this chapter also describes how methods from social and organisation sciences were identified, adapted and applied; and how new methods and tools were developed to measure the extent of integration (Papers 1-3) and the influence of organisational structure and culture (Paper 4). Rationale for the choice of measurement methods is also discussed.

Chapter 3 synthesises the main findings of the four studies (detailed results are presented in the individual papers). The key cross-cutting themes that emerge from the work are discussed in **Chapter 4**, while highlighting the significance of the findings in light of the literature, and their implications for district health system strengthening in South Africa. This chapter also discusses the contributions of this thesis to knowledge, outlines research limitations, and makes recommendations for policy and practice for South Africa, while highlighting issues of relevance to other LMICs aiming to integrate DCPs within a decentralised health system. This chapter ends with a conclusion.

Original papers

Four related studies were undertaken as part of this PhD, and one original research papers was written for each study. These titles of the four papers are outlined below and the papers are appended as Appendices, A, B, C, and D. The first three papers explore the use of methods for measuring integration (published papers 1 to 3), while the fourth study explores factors that influence the extent of integration (submitted and under review).

1. **Kawonga M**, Blaauw D, Fonn S. Aligning vertical interventions to health systems: a case study of the HIV monitoring and evaluation system in South Africa. Health Research Policy and Systems 2012, 10:2.

   Candidate's role: conceptualisation, tool development, data collection and analysis, writing the first and subsequent drafts of the paper in light of co-author inputs.

2. **Kawonga M**, Fonn S, Blaauw D. Administrative integration of vertical HIV monitoring and evaluation coordination into routine health systems: a case study from South Africa. Global Health Action 2013, 6: 19252.

   Candidate's role: conceptualisation, tool development, data collection and analysis, writing the first and subsequent drafts of the paper in light of co-author inputs.

3. **Kawonga M**, Blaauw D, Fonn S. Exploring the use of social network analysis to measure communication between disease programme and district managers at sub-national level in South Africa. Social Science & Medicine 2015, 135: 1-14

   Candidate's role: conceptualisation, tool development, data collection and analysis, writing the first and subsequent drafts of the paper in light of co-author inputs.

4. **Kawonga M**, Blaauw D, Fonn S. The influence of health system organisational structure and culture on integration of health services: A case study of HIV service monitoring in South Africa. (Manuscript submitted – under review)

   Candidate's role: conceptualisation, tool development, data collection and analysis, drafting the manuscript.

CHAPTER 1 BACKGROUND AND LITERATURE REVIEW

A comprehensive literature review was undertaken at the beginning and updated at different stages of this thesis. Review of the literature was done to provide background and rationale for this research. The literature review was done to: describe the evolution and current state of the 'horizontal / vertical' debates, outline how integration is defined and conceptualised, and identify existing gaps in understanding on the extent of programme integration and how to measure it, as well as gaps in research on integration in South Africa. The literature review focusses primarily on published research on low- and middle-income countries, but grey literature on the South African health system was also reviewed. To identify published literature, various online databases were searched including: the Cochrane database of systematic reviews, Google Scholar, PubMed, and Web of Science. Text words used to search online databases included: a) terms used to describe integration debates: horizontal, vertical, diagonal; b) terms used to denote the concept of integration: positive synergies, integration, collaboration, interact, interaction. Truncation was used as appropriate (e.g. interact*, collaborat*). The search was refined to limit the published studies to low- and middle-income countries. For a review of literature on the health system and integration in South Africa, the search was limited to South Africa, and also included grey literature that was not published through the above-mentioned online databases (grey literature included research reports, policy documents, strategic documents, and government-commissioned assessments). Google was used as a search engine for the grey literature. This was supplemented by a search of the Department of Health website (national and provincial) as well as an extensive search of the Health Systems Trust website, including all back-issues of the South African Health Review (from 1995 to 2013).

1.1 Background

Health systems: complex multi-actor organisations

Health systems are complex organisations that are more nuanced than the WHO building blocks framework portrays. The notion of 'system' implies inter-related components (4), but the framework does not clarify how the building blocks inter-relate to form a system(14). As de Savigny and Adam argue, the building blocks themselves cannot in and of themselves constitute a system, but it is "the multiple relationships and interactions among the blocks – how one affects and influences the others, and is in turn affected by them – that converts these blocks into a system" (4).

Multiple actors operate at multiple levels

Further, though often characterised in terms of their structural components (the building blocks) – which some also refer to as health system 'hardware' (35-36) – health systems are also socio- cultural organisations comprising 'software' features (35-36). 'Software' refers to the people (actors); their varied and sometimes conflicting ideas, interests, norms and values; interactions amongst them; and power structures that underpin their relations and actions (35-36). Actors may be individuals – policy-makers, managers, health providers (operating in public, private, or not-for profit sectors), health service users, as well as citizens (36). Actors may also be groups, teams, units or departments, and institutions (e.g. hospitals) (37). A further complexity is that health systems operate at multiple levels (Figure 2) (36). The micro is the level of individual actors (and their roles and interactions) (36). These actors perform different roles, working towards a common end of improving health (4, 36). The meso-level is the local health system (e.g. district health system) and organisational level (e.g. hospitals, health agencies). Meso-level roles include: adapting and implementing national policy in

response to local needs, managing (services, activities and providers), training and supervision of providers, as well as coordinating local actors (36).

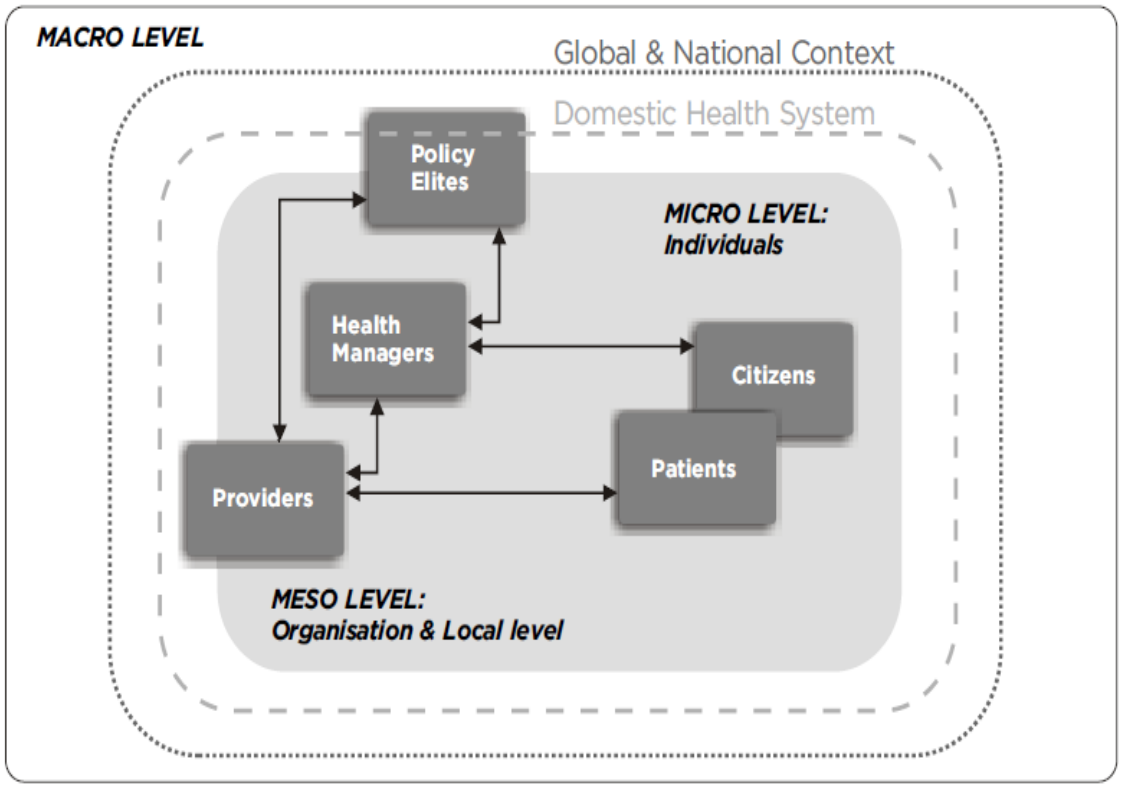


Figure 2: Multiple levels and actors in a health system (36)

The macro-level is the broader national health system, which performs strategic roles including: development of policy, strategy and regulations; resource allocation; coordination amongst health system functions, service activities and interventions; and interacting with actors within the health sector and other sectors that affect health – both domestic and international players (36). The macro level is influenced by and influences the broader national and global contexts – various international agencies, global public-private initiatives, and global foundations and donors that influence LMIC health policy and systems (by operating as funders or providers of technical assistance and services) (38).

Fragmentation in health systems consequent on disease programmes

Many LMIC countries have responded to complex health problems by creating disease-specific programmes (referred to as programmes from here on). Establishing programmes can be viewed as a form of differentiation (or specialisation). According to organisational theory, differentiation – of actor roles and tasks (functional differentiation) or different departments or units (structural differentiation) (39) – may be necessary to improve the performance of complex organisations (40-41). Organisations typically differentiate in response to external pressures or increasing complexity of problems that need addressing (39). One could thus argue that establishing programmes in LMICs represents differentiation in response to health system constraints (e.g. human resource gaps, low coverage and access (1, 7, 11-12)), pressure to meet national and global targets (e.g. the health Millennium Development Goals [MDGs], donor demands, or international normative standards) (38, 42). Functional differentiation is seen when some health workers are tasked to provide services for only one disease (43), or when programme managers are tasked with supervising interventions for only one condition (e.g. only HIV treatment) while generalist managers oversee a wider range of general health services (44). Structural differentiation is seen when programme management units are established and staffed with only specialist programme actors (45).

Differentiation aims to enhance efficiency and performance (39, 41), but warrants tight coordination amongst actors, the absence of which may result in fragmentation – "*a state of differentiation without the integration that is required to achieve unity of effort*" (39). In this regard, organisational theorists Lawrence & Lorsch define integration as: *the process of achieving unity of effort among the various subsystems in accomplishment of the organization's tasks"* (46). The likelihood of fragmentation is high in differentiated organisations because having been allocated differing tasks, actors develop divergent foci, attitudes and behaviours, which may result in a loss of unity of purpose (39). Some form of

integration is particularly warranted in highly differentiated organisations with high task interdependence – *"the extent to which the organisation's task requires its members to work with one another*" (47). It is said that successful organisations manage to achieve synergies amongst differentiated units, by attaining an appropriate balance between a state of differentiation and organisational integration (39).

These ideas are instructive for understanding the relationship between programmes and health systems in LMICs. It is well-documented that many LMICs fail to achieve synergies between a state of differentiation (specialist programmes) and integration (horizontal health systems) (18-19, 21). In many LMICs, differentiation in the absence of coordination has resulted in fragmentation (20, 24, 28, 48-50), which has manifested as: duplications, distortions, disruptions, and distractions (7). Duplications occur when both programme-specific and system-wide mechanisms perform the same tasks, thus causing inefficiency (7, 22, 51). For example, parallel drug delivery mechanisms mean: health workers and managers complete separate drug order forms for different programmes, and trucks deliver drugs for different diseases to the same clinic on different days (7); and resources and attention are diverted from improving overall supply chain management (52). Distortions can arise for example when personnel leave general services for better-paying vertical services which leads to unmotivated less well paid generalist staff (52), and exacerbates staff shortages within general services (7, 22, 25, 53-55). Disruptions are seen when multiple uncoordinated disease-specific campaigns or training initiatives take personnel away from service provision which interrupts routine service delivery (7, 22). Distractions also occur when multiple data reporting systems distract health workers and managers from performing their usual duties (7, 24). All of these have impacts at the patient level as one user may require integrated care (for example for a chronic cardiovascular disease as well as HIV treatment) yet these are not provided at the same time in the same place by the same person.

Integration: an option for minimising fragmentation in health systems

Integration of programmes within health systems has been proposed as one way of overcoming fragmentation and maximising positive synergies amongst programmes and health systems (43-44, 56-57). This thesis focuses on integration, but other approaches – besides integration – have been suggested and are discussed below.

Integrated versus vertical approach: polarised debates

Though integration is often proposed, the question of whether it is better than a vertical approach for improving health in LMICs has been contested for decades (18, 58). During the last five decades the focus of horizontal versus vertical discussions has shifted, influenced by evolving global health policy priorities (Box 1) (14, 59). Debates have been largely polarised, often representing tension between ideological and technical perspectives (18-19, 58, 60-61). A heightened intensity in the debates can be traced back to soon after the primary health care conference at Alma Ata in 1978, when primary health care (PHC) was adopted globally as an approach for improving population health (62). Amongst other issues, PHC emphasised an integrated (rather than disease-specific) approach to health improvement (14, 50, 58). PHC was not a politically neutral idea (58, 63) as it reflected a particular ideology driven by concerns for equity and social justice (50, 58), and a shift from centrally-driven colonial-era vertical programmes prevailing in many LMICs in the 1960's (14, 58).

Soon after the Alma-Ata conference, Walsh and Warren proposed an alternative – selective PHC (SPHC) approach – arguing that PHC was too idealistic and not realistically feasible for LMICs to implement (64). Presenting a technisist perspective, these authors proposed that only diseases with the highest burden should be tackled, through the provision of packages of selective cost-effective interventions (60, 64). Walsh & Warren's proposals (64) sparked polarised debates that continued through the subsequent two decades (19, 60, 64-65).

BOX 1: Evolution of debates regarding integrated versus vertical approaches

- **1960's**: International health focus on disease-specific programmes, aiming to eradicate priority diseases such as malaria, polio and tuberculosis (14). In the late 1960's doubts about the impact of these programmes, and recognition that targeted programmes required strong basic health service capacity sparked a movement advocating non-disease focussed investment (14).
- **1970's**: Emergence of terminology of 'vertical' and 'horizontal', highlighting the contrasting approaches to delivering and managing health services (14). The declaration of Alma-Ata reflects international focus on PHC and integrated health systems, sparking interest in a horizontal approach (14, 50, 58). Notion of selective packages of cost-effective interventions (SPHC) is favoured by donors and international agencies alike and soon displaces PHC as a global health priority.
- **1980's to1990's**:
    - Health sector reform initiatives in LMICs begin in the 1980's, driven by the World Bank and focussing on market-related approaches – including financing reforms, privatisation, and limiting government role in health provision (14). World Bank's World Development Report published in 1993 reinforces these ideas and promotes limited cost-effective packages of care (66). Vertical programmes continue to attract donor funding.
    - The International Conference on Population Development in 1994 sparks a movement advocating sexual and reproductive health (SRH) and rights for all (ICPD, Berer). A renewed focus on integration, which envisages merging disparate SRH interventions (family planning, HIV, maternal health, STIs) within comprehensive horizontal services (50, 67-68). Principles of PHC (particularly the notion of community participation and empowerment) are revisited (50, 68).
    - The era of the MDGs: the race to meet MDG targets leads to proliferation of GHIs. Reflection on 30 years post Alma-Ata (59), WHO's renewed emphasis on PHC (14), and the global human resources for health crisis (11) coupled with recognition that vertical approaches alone cannot achieve MDG targets re-invigorate focus on health system strengthening (2, 5-6) and integrated approaches (69).

Detractors of PHC argued that the broad focus of PHC (in contrast to the focussed SPHC) leads to a loss of technical quality and made it difficult to monitor and demonstrate benefits (19, 58, 60, 65). Successes with vertical programmes (eradication of smallpox and control of guinea worm) bolstered their arguments (18, 21). Though population health improvements

were observed following integration of schistosomiasis programmes in Saudi Arabia and Brazil (21), PHC was never applied on a wide-enough scale to be properly tested (19, 65). Instead, SPHC was well-received and adopted by UN agencies and donors, more for its potential to reduce disease burden at least cost and the promise of disease eradication through quick fix solutions than for its proven effectiveness (19, 50, 65).

Other options for minimising fragmentation

The 'diagonal' approach

Debates have not all been polarised as some have argued for a middle way, viewing horizontal and vertical approaches as complementary rather than mutually exclusive (6, 19, 61, 70). The 'diagonal approach' proposed by Frenk and Sepúlveda (70-71) is such a middle way, that is conceptualised as using programme interventions "*to drive the required improvements into the health system"* – by working through and improving generic issues such as resources and financing, facility planning, and drug supply (70). Sepúlveda et al., attribute the significant decline in child mortality in Mexico during 1980 to 2005 to the 'diagonal' approach which achieved sustained coverage of multiple interventions that were initially provided vertically but incrementally scaled up as system capacity was built (71). Others, have proposed a diagonal approach to health system financing (6, 21, 72), including Ooms et al who view it as investing in programmes ("islands of sufficiency") while incrementally leveraging their successes to improve broader systems and create "generalised sufficiency" (72). Application of this approach is however limited in practice.

Time-limited vertical programmes

Time-limited vertical programmes are also proposed as an option for health systems where integration is not feasible (due to a poor resource base) (29, 43) or where a vertical approach is deemed more appropriate (27, 29, 56). This approach may be necessary when: the health system is too weak to address health priorities; a rapid response to a disease priority is needed; there is a need to deliver very complex services that require a highly skilled workforce (27, 29, 56); or to address the needs of hard-to-reach groups (27, 56). The reality is that LMICs that choose an integrated approach may have to retain vertical programmes in the interim due to poor health system capacity (27, 29). Tight collaborative links between horizontal and vertical elements of the health system are essential in such instances (27, 29).

1.2 Integration of programmes within health systems

Integrating programmes within health systems: what is it?

A commonly-cited definition by the WHO conceptualises integration as: "*the process of bringing together common functions within and between organizations to solve common problems, developing a commitment to shared vision and goals and using common technologies and resources to achieve these goals"* (57). However, integration is a complex notion that is defined in multiple and varied ways in the literature and encompasses various ways of harmonising the delivery, organisation and management of health services (44). Given the vast amount of published literature on integration, and the multiple ways in which it is defined, in order to focus the review on how integration is conceptualised in the literature, a published structured literature review by Shigayeva and colleagues was used as a starting point (73). These authors conducted an extensive and structured review of peer-reviewed literature published in English on definitions, conceptual frameworks, analytical

and methodological approaches to integration". The search included publications on LMIC and high income countries, dating back to the 1950s (73). That review by Shigayeva and others (73) underscores the complexity of integration. It identifies 40 theory-based conceptual frameworks (73), eight of which are applied to LMIC health systems – specifically describing integration as merging programmes within health systems (19, 44, 57, 74-75) (Table 1) or as bringing together two or more programmes (this latter notion of integration is not the focus of this thesis, but is described briefly in Box 2). That review also identifies thirteen practical frameworks that are not theory-based but describe various ways in which integration can happen.

BOX 2: Integration conceptualised as combining one or more disease programmes

The notion of integration as merging two or more programmes is well-documented in the literature. It is largely understood as: adding one or more programme interventions to existing ones at the point of care in order to expand access to a wider range of interventions for a broader group of beneficiaries (50, 57, 79); integrating disparate programme management structures at administrative levels, aiming to avoid duplication and enhance coordination amongst control activities for related interventions (49, 67, 80-81); and integrating financing, policies and plannng processes at higher levels (50, 67, 80-81).

At service delivery level integration has been described in various ways, commonly as: adding sexual and reproductive health interventions to existing ones – such as (FP with MCH, cervical screening with HIV) (49, 67); and in the HIV era it is increasing described in terms of providing HIV interventions (e.g. counselling and testing and HIV treatment [ART]) together with TB services (82-84), or with various sexual and reproductive health (SRH) services including family planning, STIs, cervical screening, and maternal health (67, 80, 85-87). For example, research in African countries shows that models of SRH and HIV integration at the service delivery level include: a) unidirectional SRH within HIV (e.g. family planning within HIV testing services), b) unidirectional HIV within SRH (e.g. ART within antenatal care), or more commonly: c) bi-directional integration of these respective interventions (80).

Table 1: Some frameworks conceptualising integration of disease programmes within health systems in LMICs

Authors	Definition of integration and concept	Health system function and programme aspects	
WHO (1965) (57)	Definition: the process of bringing together common functions within and between organizations to solve common problems, developing a commitment to shared vision and goals and using common technologies and resources to achieve these goals Sharing of resources and technologies for coherence in service delivery	Service delivery	Health care delivery operations or activities, supervision of services (***operational or functional integration***)
Criel et al (1997)(43)	Definition: General health services take the responsibility to operate specific activities designed to control a health problem. Merging the operational (service provision activities) and administrative aspects of programmes within general health services.	Service delivery	Health care delivery operations or activities and functions (***operational or functional***); Health service administration and management structures (***administrative or structural integration***)
WHO (2008) (44):	Definition: The organization and management of health services so that people get the care they need, when they need it, in ways that are user friendly, achieve the desired results and provide value for money Concept: integration of service provision as well as management support systems; aligning policies.	*Service delivery:*	Health care delivery operations or activities Management support systems (budgeting, financing, health information, human resources development); Planning, functions and national policies
Atun et al (2010) (74)	Definition*:* The extent, pattern, and rate of adoption and eventual assimilation of health interventions into each of the critical functions of a health system Concept: Integration of programmes within critical health system functions (service delivery, planning, financing, governance, demand generation, monitoring and evaluation). Draws upon diffusion of innovation theory: programmes are viewed as innovations that are gradually assimilated within health systems.	Service delivery	Human resource, infrastructure, service delivery operations, referral systems, care guidelines, procurement, supply chain.
		Financing	Pooling of funds, provider payment methods
		Planning	Needs assessment, priority setting, resource allocation
		Governance	Accountability mechanisms, reporting, performance management
		Demand generation	Financial incentives, population interventions (e.g. promotion)
		Monitoring and evaluation	Information technology infrastructure, data collection and analysis

Table 1 (cont'd): Some frameworks conceptualising integration of disease programmes within health systems in LMICs

Authors	Definition of integration and concept	Health system function and programme aspects	
Shigayeva et al (2010) (73)	Definition*:* The structures and functions (i.e. the what of integration) associated with establishing and sustaining a health system and its components in order to ensure effective efficient and equitable use of resources Concept: Integration of communicable disease programme within health system functions (or within other communicable disease programme) Communicable disease programmes comprise all organisations and individuals whose efforts are directed towards disease prevention and control	Service delivery	*Structures***:** human resources (providers, managers), drugs, infrastructure, medical technologies & supplies, laboratories; *Functions*: training and HR development, drug procurement & distribution, provision of interventions.
		Financing	*Structures:* funding sources; *Functions*: pooling of funds, provider payment methods
		Governance	*Structures:* organisational structures, accountability mechanisms, reporting, performance management
		Information system	*Structures:* information technologies and infrastructure; *Functions:* data management (collection, analysis dissemination), monitoring and evaluation of programme activities

Later elaborated by Unger et al (2003) (56) into a practical implementation framework. These authors define integration as: a process where disease control activities are functionally merged or tightly coordinated with multifunctional health care delivery*. In their conception, full integration entails merging health care operations or activities (***operational integration***) as well as the administrative oversight of these operations (***administrative integration***) within general health services.

The review by Shigayeva et al., also highlights that research on high income countries commonly conceptualises integration as collaborative relations – amongst individuals, teams or departments within the same organisation, or between different organisations (e.g. inter-sectoral collaboration between health and social service agencies) (37, 39, 76-77). These ideas, often reflected in organisation science literature, are based on organisational theory highlighting that differentiated organisations require some form of integration to minimise fragmentation (39, 47, 78). Despite the multiplicity of frameworks and definitions, ideas can be distilled from literature to clarify what integration means.

The rest of this thesis focuses specifically on literature on the notion of integration of programmes within health systems. The literature reveals that in LMICs this notion of integration is commonly understood in relation to integration of programmes within the health system service delivery function. Briggs and others encapsulate these ideas, defining it as: "a *variety of managerial or operational changes to the health systems to bring together inputs, delivery, management, and organisation of service functions*" (6). In a vertical approach, at the service delivery level (point of care) specialist staff – often located in dedicated health centres – provide disease-specific interventions only to users with their targeted disease (50). Integration at the point of care thus typically refers to merging the provision and organisation (of disease-specific care within general health services (19, 28, 43, 56-57, 73, 75, 79). Some refer to this as *operational integration* (43, 56). This form of integration is most commonly applied as multi-skilled workers providing disease specific-care within multi-functional health centres (43, 57). Examples include: integrating sexual and reproductive health (50, 68, 88), HIV and/or TB (84, 89-90), or maternal and child health interventions within general health services (91-92). Other integration models include: locating disease-specific services in multi-functional centres but using specialist workers and

establishing referral links with general services within the centre (80, 84); or providing disease-specific services in dedicated centres but establishing referral links with multi-functional centres (80).

Integration can also happen at administrative level. In a vertical approach the oversight of disease-specific services falls under the control of programme management structures (49, 88, 93-94). This has been shown to result in duplication (overlapping roles, plans, policies, training initiatives and supervision mechanisms) and consequent inefficient use of resources (49, 93). Integration at the administrative level means merging the managerial oversight of disease-specific services within general health service management (43-44, 56, 73). Some refer to this as *administrative integration* (43, 56). Unger and colleagues conceptualise it as: placing all programme staff under the chain of command of general health system middle managers, transferring administrative authority over programme operations from programme lower and middle managers to general health service middle managers, and programme managers providing specialist support (56).

With increasing interest in health system strengthening, it has been proposed that programmes should also be integrated within other health system functions besides service delivery. At meso-level this means integrating generic *support functions* that facilitate administrative oversight of services. This might mean integrating supply chain mechanisms, operational planning, budgeting, human resource management and health service monitoring (44, 74). Integration within health system functions at the *macro level* is understood as aligning domestic (24, 28, 73, 95) or global programmes to national health system functions (30, 53-54, 96-99). For example, integrated financing means funding programmes through a unified system-wide national health budget (28), and integrated governance means merging the planning, accountability, reporting, and performance mechanisms of programmes within

those for the overall national health system (24, 28). With the increasing presence of global actors within LMICs, integration at macro level is also understood as harmonising the planning, financing and M&E mechanisms of externally-funded global health programmes that operate within domestic health systems (100-101).

A review of the literature finds that integration research in LMICs focuses largely on the service delivery function – mainly on understanding operational integration while administrative integration is less researched. Further, integration of administrative support functions is also less understood. Additionally, integration is largely described in terms of macro-level interactions between global programmes and national health systems, while integration at sub-national level (e.g. district or regional) is less understood. Finally, the notion of integration as collaboration amongst individual actors (micro-level interactions amongst programme and health system actors) is little researched in LMICs.

Integration of programmes within health systems: why study it?

Increasing investment in disease programmes by Global Health Initiatives

During the last two decades there has been a significant increase in the number of programmes in LMICs following an unprecedented escalation in funding for disease control activities by Global Health Initiatives (GHIs) (22, 24, 102). Brugha defines GHIs – also referred to as Global Public-Private Partnerships or Global Health Partnerships – as "*a blueprint for financing, resourcing, coordinating and/or implementing disease control across at least several countries in more than one region of the world"* (38). GHIs focus on specific health problems and directly invest within countries where they operate (38). Prominent GHIs include: the Global Fund for AIDS, TB and malaria (The Global Fund), the Presidential

Emergency Plan for AIDS Relief (PEPFAR), and the Global Alliance for Vaccines and Immunization (GAVI) (22, 38). GHI investment in LMICs has escalated in the wake of pressure to meet health-related Millennium Development Goal (MDG) targets (7).

The presence of GHIs has resulted in increased availability of technical, human and financial resources for disease control in LMICs, improved quality and availability of health infrastructure (6, 20, 22, 59, 103), and increased coverage of and access to disease control interventions (20, 53, 98), including antiretroviral treatment for HIV (53). GHIs have also had some system-wide benefits. For example GHI-funded training has improved health managers' generic management skills (98), and the focus on performance has heightened awareness and practice of performance-based monitoring within countries (53-54). Evidence demonstrating that a vertical approach funded by GHIs improves population health has largely been limited (20, 104). Other concerns are that GHIs exacerbate fragmentation, limit sustainability and undermine LMIC health systems (24, 103), which sparked renewed calls for integration (7, 22).

Running parallel mechanisms undermines health systems

The significant GHI investment in LMICs has prompted discussions about the effects of GHI programmes on health system strengthening (24-25, 38, 103, 105). This is particularly in the light of evidence that GHI investment undermines national and sub-national health systems (24, 106-108). A key concern is fragmentation consequent on GHIs establishing separate planning and coordinating mechanisms and channelling investments through nominated in-country agencies that operate outside government systems (24, 53, 107-108). Another concern is that GHIs invest in establishing duplicate disease-specific drug supply, financial management, and monitoring systems but have traditionally invested little in strengthening

health system capacity to perform these functions (7, 22, 53, 98, 106). Another factor that affects sustainability is that GHI investment sometimes eclipses total Ministry of Health budgets (22). For example, at one point the Global Fund financed 100% of the TB programme and 60% of the HIV programme in Lao (98). Concerns are the reduction or collapse of activities once funders withdraw (21), and the absence of clear exit strategies to ensure governments can sustain any gains achieved (53). Further, an over-concentration of GHI resources in one programme often leaves other areas under-resourced (22, 24), and investing in short-term gains limits the willingness of recipient governments to invest in strengthening their own health systems to achieve sustained long-term gains (53, 109).

There is thus increasing recognition – including amongst GHIs themselves – that investing in disease control initiatives in LMICs is unlikely to attain MDG targets without improving overall health system capacity (7, 22, 102, 110). This recognition has prompted some GHIs to include health systems strengthening foci in their strategies. For example, in 2005, GAVI established a new funding mechanism specifically for health system strengthening activities (14), and Global Fund proposals increasingly emphasise common drug and supplies management and greater M&E alignment (53). Further the "three ones" principle of UNAIDS (101) as well as the Paris Declaration on Aid Effectiveness and Accra Agenda for Action (100) were created to promote greater harmonisation and coordination amongst GHI activities within LMICs, and several GHIs have committed to these (14). Some authors however argue that while GHIs speak the language of health systems strengthening in practice they bolster only those mechanisms necessary to deliver their specific interventions and not systemic constraints (22). For example increased Global Fund investments in laboratory and service infrastructure in Papua New Guinea has increased coverage of HIV interventions but not provided intended cross-cutting system-wide benefits (53).

Integration accrues potential demand- and supply-side benefits

Integration has also been proposed because it can potentially accrue benefits for users (demand-side benefits), as well as for managers and providers of services (supply-side benefits). These ideas are captured in another definition of integration by the WHO as: *"the organization and management of health services so that people get the care they need, when they need it, in ways that are user friendly, achieve the desired results and provide value for money" (2).* For example, integration at service delivery level enables seamless and continuous care for users who have fewer stages during one visit and can receive care for different conditions in one facility (44, 75). Supply-side benefits include: increased efficiency and availability of a wide range of services (50, 57, 79) and increased service uptake and coverage due to improved user acceptability of services (50, 79, 91). Integration at administrative level accrues benefits such as: reduced duplication in management, training and systems for supervision of health workers, and enhanced coherence amongst disparate technical and management guidelines (27, 49, 75). Integrating management support functions also has benefits for users (less interruption in care due to fewer shortages of drugs and supplies (50, 79), and better retention in care due to use of unified monitoring systems (111)), as well as for providers and managers (unified drug lists and supply chain enhance efficiency in the use of resources (44, 49), and integrated patient monitoring systems reduce duplication of effort by health providers, and enable better tracking of patients in care (44, 111)).

Ultimately, investing in parallel disease-specific machinery is viewed by some as a missed opportunity to focus on building LMIC health system capacity to sustainably respond to health problems (7, 22, 24, 107). As Travis and colleagues opine: *"although we do not yet know for certain whether (and when) broader architectural responses are necessarily better than disease-specific ones, the imposition of a disease-specific lens means that broader health system-wide responses are not even part of the solution set considered"* (7).

Integrating programmes within health systems: issues to consider

Because integration is such a complex notion, it is often difficult to implement in a standardised manner, even within the same country (28). Despite decades of debate and research on integration, there has been little advance in understanding how best to integrate services in LMICs in ways that can improve health (74). Over the years, several systematic reviews have consistently shown that despite the plethora of research, there is inconclusive evidence regarding the effectiveness of either an integrated or vertical approach (28, 91, 112-115). Systematic review evidence remains inconclusive because there are not enough rigorous studies that measure effectiveness (28, 48, 91, 112, 115). Methodological limitations include: insufficient or poor quality data on integration activities (115), use of varied definitions of integration (91, 112-113), lack of analytical frameworks that can measure programme effects on health systems (28), and incomparable evaluation methods and outcome measures (28, 48, 112, 115).

Further, it has emerged that notions of 'vertical' and 'horizontal' are not as clear-cut as they have often been presented in the literature (21, 28). There is no universally-accepted model of a vertical or integrated programme (21), and various programme types can exist within a given context – ranging from vertically managed and implemented interventions such as the global polio eradication initiative (the most vertical), to comprehensive primary health care (the least vertical) (21). Further, a programme can integrate within different health system functions to varied extents (28-29). As demonstrated in former Soviet Union countries, immunization programmes tend to be vertically financed but horizontally delivered (29). A systematic review (28) and primary research (53-54, 95-99) also reveal that programmes in LMICs tend to be predominantly integrated within the service delivery function but integrate to a limited extent within the monitoring and evaluation function often due to capacity constraints. These insights reveal the heterogeneity of integration models and highlight that

some elements of verticality may be part of the model (27, 29). How much verticality to accept in an integrated approach should be informed by the context as well as evidence on: a) how different programmes currently interact with each health system function (the nature of integration), b) the extent of integration within each function ('degree of verticality'), and c) how different extents of integration may affect health system outcomes (30, 74)?

While the nature of integration in various contexts is well-documented, there is a dearth of research on the extent of integration, especially because the integration research agenda has traditionally focussed on describing integration activities (74) and discussing whether integration should or should not be happening. Since programmes can integrate within health systems to varying degrees, the health system effects of integration can be better understood if the extent of integration is taken into account in the analysis (30). Health system research has only recently begun to advance beyond the traditionally narrow foci to measuring the extent of integration. As analytical frameworks (28, 30) and indices (89) that can rate the extent of integration have emerged, research evaluating how different degrees of integration affect outcomes has started to become available. For example research by Uebel and colleagues in South Africa reveals that a higher degree of HIV service integration within general health care improves HIV patient outcomes (116); and exploratory analysis by Coker and others demonstrates a weakly positive correlation between Global Fund investment and under-five mortality (a system-wide outcome) in five Asian countries regardless of the level of integration of GHI-funded HIV and TB programmes within the health system (30). These advances highlight that the degree of integration may affect health system outcomes, and that analysing the extent of integration is a step towards generating the kind of evidence needed to inform plausible integration models. These issues are relevant for South Africa where evidence is limited but needed to inform the design and content of integration models.

1.3 Rationale for research on integration in South Africa

South Africa's health system context

South Africa is a lower middle-income country with a population of 51.9 million at the last census in 2011 (117). The top contributors to the disease burden include: a dual HIV and tuberculosis (TB) epidemic, poverty-related illnesses (infectious diseases, maternal deaths and malnutrition), a rapidly escalating non-communicable disease burden, and violence and injuries (118). Health services are provided through public (government), private (for-profit), and non-governmental (not-for-profit) sectors (118). During 2010 to 2014, expenditure on health constituted approximately 8.9% of gross domestic product – exceeding the proportion in many other middle income countries (119). However, only 48% of this expenditure is in the public sector (119) which caters for 82% of the population (those without medical insurance) (120). External donor funding contributes 2.1% of total expenditure on health and government expenditure on health constitutes 12.9% of total government spending (119). This thesis focuses only on health services provided and funded by or through government.

The district health system

South Africa's health system has been undergoing decentralisation reforms since the 1990's. The reform entails devolution of authority from national level to nine semi-autonomous provincial governments (creating a quasi-federal system of government) and over 200 local government municipalities (121). In relation to health, provincial and local governments are responsible for implementing personal health services and "*municipal health services*" (non-personal environmental health services), respectively (121). Decentralisation also entails deconcentration of administrative authority over implementing personal health services from provincial level to geographically-defined administrative areas at lower level termed health

districts (creating the district health system) (DHS) (31, 122). A lower administrative level (sub-district) was later created in 2003 (122). Responsibility for strategic oversight of the health system and formulation of policy and standards remains with the national level, while the provincial level is responsible for policy implementation, and supports and monitors the performance of districts (93, 123). The reforms are still on-going – the district health system is not fully established, and some roles (related to human resource management and financing) have not yet been delegated to districts (124).

District health system development was first proposed in the early 1990's as a strategy in accord with the newly-democratic government's ideological focus on a unified national health system based on the principles of primary health care – including equity, accessibility, and placing the locus of decision-making authority at local level to allow local response to health problems, and community participation in health (31). This focus represented a shift from the highly centralised, curative-focussed and inequitable apartheid-era health system that was fragmented along racial lines (124). Districts are viewed as the foundational building block of the health system. As stated in health policy formulated in 1997: *"the health system will focus on districts as the major locus of implementation"* (31). In recent years, district health system strengthening has been re-affirmed as a priority (32, 125-126). At the time of this research, there were 53 districts, each under the leadership of a district health management team (DMT). DMTs are headed by and largely comprise generalist front-line managers located at district and sub-district levels (referred to as district managers in South Africa) who are supposed to be responsible for managing all health activities within their respective jurisdictions (31-32). As more recent health policy states: "*DMTs need to be given the responsibility and the consequent accountability for managing the district and being responsible for the health of the population*" (33).

Districts are key service delivery platforms through which services are provided at different levels of care, including: household and community, primary care (through 8-hour nurse-driven clinics and 24-hour community health centres [CHCs] that are largely nurse-driven facilities with some medical doctor support), and secondary level (through districts hospitals staffed by generalist medical officers that are referral centres for clinics and CHCs) (127). District managers are supposed to oversee personnel and services at these facilities. The term 'district manager' denotes: frontline managers located within districts – the overall head of the district, sub-district heads, primary health care managers, and local area managers (also referred to as clinic supervisors as they supervise clusters of clinics).

Reforms aiming to integrate programmes within the district health system management

As decentralisation reform has been on-going, several programmes have been established (notably for HIV, TB and maternal and child health (MCH)), largely in response to the high and increasing burden of disease due to these kinds of priority health problems (45, 79, 128). Since the 1990's programme management units have been established at national and provincial levels and have traditionally been responsible for overseeing implementation of programme interventions (45, 93). Since 2003 some programme managers have been located also within districts – typically one manager per programme (129).

There is no specified integration policy, but government policy defines districts as the place where all health services are to be integrated and holistically managed under the leadership of district managers (31, 130). Integration ideals are reflected in various policy documents and statements which propose that: a) programme interventions should be provided through general health services rather than in separate facilities by different health workers (31-32) (the notion of operational integration). Further, district managers – who have delegated authority over all services within districts (32-33, 45, 131) – are supposed to assume

administrative authority for planning, supervising and monitoring programme interventions (the notion of administrative integration) (34, 45). Though neither programme nor health system policies explicitly clarify district and programme managers' respective roles (132), it is generally understood that programme managers should support implementation of services rather than perform day-to-day oversight roles (45, 79).

There has been some progress with operational integration, though to varying extents and some barriers persist (34, 133-134). Available research provides some insights regarding the nature of operational integration at the service delivery level, focussing largely on HIV and TB services. For example, non-antiretroviral treatment (non-ART) interventions (HIV counselling and testing, prevention of mother-to-child transmission of HIV) (89, 133-134) and TB control interventions (sputum testing, diagnosis, treatment, and adherence monitoring) (90) have progressively been integrated and provided largely by multi-skilled health workers in multi-functional health facilities. Further, ART services – which initially were provided only by doctors in dedicated ART centres – are now largely located within multi-functional primary care facilities, provided by either specialist HIV nurses (34, 89) or multi-skilled generalist nurses (135).

There has been less progress with achieving administrative integration. While in principle district managers should assume programme oversight roles, in practice programme actors continue to play this role. Research to better understand the extent of and barriers to administrative integration is limited. Existing studies demonstrate that: efforts are being made to integrate disease-specific services at the point of care, their administrative oversight remains largely under the control of programme managers who operate in respective silos at district and provincial levels (136-138), and district and programme managers fail to work together effectively (34, 93). Administrative integration is important because running

programme silos (led by programme managers) within a district health system model (lead by district manages) has been shown in LMICs to exacerbate duplication of effort, contestation over authority and resources, dual lines of accountability, and confusion because programme design and oversight lie outside the control of district management structures that are supposed to have authority over all service activities (88, 93-94, 139). Further, programme silos at administrative level hamper integration at the point of care (88, 93-94, 136). For example, in South Africa, providers and managers at the point of care struggle to integrate the provision of TB and HIV services within general health services because they are required to apply different disease-specific clinical protocols and guidelines and report on activities to different programme managers (82, 136-137, 140). Consequences include: duplication of effort (a wasteful use of scarce human resources) and poor continuity of care for users who are seen on the basis of their disease rather than holistically (82, 137). Running administrative silos also means different programme managers perform supervision visits to health facilities separately, which causes duplication of effort in management and discourages facility managers from integrating activities and reports at service provision level (34, 138).

An aspect that is not adequately addressed in policy and discussions in South Africa is the integration of programme-specific management functions such as planning, budgeting, drug supply and M&E within the district health system. This seems important because district managers would require some control over programme-specific planning, budgeting, and M&E if they are to manage holistically the delivery of integrated health services, (44). This would also be in keeping with policy intents that the district "*should be responsible for the overall management and control of its health budget and the provision of a full range of comprehensive primary health care services within its area of jurisdiction"* (31).

Integrating programmes within the district health system: issues to consider

Though integration is proposed, there is no policy guidance on what it should look and how it should be implemented (34, 141). Implementation guidance is an important step in the process between agenda setting and policy implementation (142). The absence of such guidance may explain why integration is understood and applied variably in South Africa (141). Policy guidelines on integration are reportedly being developed (though specifically for the HIV programme) (34), but are not yet available. This thesis argues that since the district is envisaged to be the "*locus of implementation*", integration guidelines should clarify what programme integration within the district health system should look like (integration model) and carefully consider how to put in place the conditions necessary for its success.

Considering the design of possible integration models

Insights from the literature on integration in South Africa (as outlined above) indicate that any integration models that are proposed need to clarify a number of issues, including: a) the nature of integration (within which health system functions should a programme be integrated; b) which specific aspects of the programme should be integrated (e.g. care provision at service delivery level or administrative roles and responsibilities); c) the extent of integration; and d) the degree of verticality that would be appropriate with minimal detrimental effects on the health system (27, 29, 143). Data on these kinds of issues should ideally inform possible models of programme integration within the district health system in South Africa. A review of the literature on integration in South Africa however reveals a dearth of evidence that can inform these kinds of considerations.

While research data on the nature of operational integration (including on different delivery models) are available for South Africa (as outlined earlier), data on administrative integration of the health service delivery and other health system functions at meso-level are lacking.

Further, decisions on what would be the appropriate extent of verticality at district level should be informed by evidence on how different degrees of integration affect district health system performance, but research on the extent of integration in the South African context is limited. A search of published literature on integration in South Africa found only two studies that specifically measure the extent of integration, and both focus on operational integration within the service delivery function. The first, a study by Uyei and colleagues, examines the extent to which HIV services are integrated within TB services in public sector health facilities (83). These authors compare the extent of integration across three service delivery models: clinics with co-located TB and ART, clinics providing TB only, and those providing ART only (83). They find that clinics with co-located services have the highest degree of TB/ART integration (the same personnel providing both ART and HIV care), suggesting that co-location may facilitate higher degrees of operational integration (83). The second study, by Uebel and others, measures the extent of integration of HIV services within primary care clinics (89). These authors categorise clinics according to the degree to which pre-ART and ART services are integrated within their general health services (89). Uebel and colleagues further use data on the degree of integration in a clinical trial and find that HIV patients needing ART care who attend clinics with high levels of integration (pre-ART and ART care provided by all primary care nurses) have reduced risk of mortality (116). This work suggests that an integrated model in which disease-specific care is provided by multi-skilled providers has potential benefits regarding the health outcomes of users.

Evidence to inform what administrative integration should look like is however lacking. Based on the Unger's conceptualisation (56), administrative integration of programmes within the district health system in South Africa might mean district managers have and exercise administrative authority over programme operations within their districts, and programme managers support them in this role (56). Issues that could be considered when

considering a model of administrative integration, that have not heretofore been discussed in the South African health system, include how much administrative authority should district managers have over programme functions at district level; and in which circumstances would lesser/greater degrees of administrative integration be appropriate? Since data to answer these kinds of questions are not available, a useful starting point is to assess the extent to which administrative integration is happening – the extent to which district managers currently exercise authority over disease-specific service delivery and the extent to which programme managers perform specialist support versus day-to-day frontline oversight tasks. Data are also lacking but needed on the extent to which district managers exercise authority over functions other than service delivery (e.g. planning and monitoring of programme interventions).

Since administrative integration does not mean abolishing programme actors (43), but requires them and district managers to work together, another consideration that seems important is whether district and programme actors perform interdependent tasks and collaborate. Collaborative interactions between actors in differentiated units might include communication, information sharing, and joint working (37). Dialogue amongst programme and health system actors is important because eexperiences in LMICs show that a lack of it may hamper integrated service delivery (36, 48, 70, 131). Only study was found (done in 2003) that explicitly explores respective roles and tensions amongst programme and district managers in South Africa (93). That study (done in 2003) highlights that poor dialogue between district and programme managers hindered joint working and undermined efforts to integrate reproductive health services at the point of care (93). At the time of that study, programmes managers were located only at provincial level, but the health system has subsequently become more differentiated (sub-district level has been established, and programme actors are now also located within districts). That programme and district managers operate at multiple levels (provincial, district, sub-district), located in different

units (programme or district management structures), signals the need for coordination and collaborative actor relations in order to minimise fragmentation (37, 39). Whether programme and district managers collaborate (across levels and units) in ways that would minimise fragmentation thus needs to be understood but has not been researched.

Considering conditions that may affect the success of integration

Capacity of the health system to absorb programme functions

Besides model design features, it is also important to consider whether the conditions necessary for integration success exist (43). Factors considered important for integration success include: a functioning health service, adequate resources, and a functioning middle management (27, 43, 49). Research evidence shows that integration of schistosomiasis and malaria programmes in Zimbabwe reversed previous gains in health outcomes because health system weaknesses were not addressed (143). Other experiences demonstrate that implementation of integration reforms in LMICs is hampered when district managers lack the requisite technical and managerial capacity to assume programme roles (88, 94, 143). More broadly, research on decentralisation shows that a lack of managerial capacity (144-145) may inhibit district managers from exercising the administrative authority that has been delegated to them, over district health system management functions in general.

A supportive health system organisational culture and structure

Integration and decentralisation reforms in South Africa are integrally linked (31), and together entail: changing the way services are organised, delivered and managed; transferring formal authority from higher to district level; vesting formal authority over programme operations within district management structures (necessitating new lines of formal reporting); and re-allocation of roles between higher and lower level and district and

programme managers). Integration within the district health system is thus not merely about changing discrete activities at service delivery level but may require adjusting organisational structure – which "*depicts formal reporting relationships among organisational units, illustrates how the organisation differentiates among the tasks and activities, and shows how the activities of different units are to be integrated and coordinated"* (143). Integration also requires programme and health system actors to accept their respective new roles, value each other's roles, and be willing to work jointly with unity of purpose (43). It may therefore be necessary to manage the organisational culture – which reflects "*what is valued in the organisation as well as behaviours and routines of employees"* (146). Organisational culture may manifest as employees being committed to collective objectives (146-147), or the adoption of leadership and management styles that foster shared values and expectations and unity of effort amongst differentiated actors (146-147).

A supportive health system organisational structure and culture seems important to facilitate administrative integration in South Africa, but this question has not been researched. Analysing the influence of organisational structure and culture on administrative integration may perhaps shed some light on why there has been little progress in achieving this reform in South Africa. This research addresses this and some of the afore-mentioned gaps in evidence by exploring the use of methods to describe the nature and extent of programme integration within the district health system, and exploring whether the prevailing health system organisational structure and culture support integration.

1.4 Overall research approach

This research is guided by the following definition of integration, which is adapted from definitions proposed by the WHO (57) and Atun et al., (74), and informed by an

understanding that if the district health system is to be the locus of implementation in South Africa, integration should denote aligning programmes with district health system functions.

> *The process of bringing common coordination and management functions between programmes and district health system functions, under the overall control of district health management to solve common problems, develop a commitment to shared vision and goals and use common technologies and resources to achieve these goals*.

As there are no proposed integration models in existing policy, this research hypothesises what integration should look like in the decentralised health system context of South Africa. The hypothesised model defines: a) the district health system functions within which programmes could be integrated, and b) the programme aspects that should be integrated within each function (the nature of integration). The model – which encompasses the following characteristics – is described in detail in section 1.6:

a) Integration of programme operations (operational integration);

b) Integration of programme administration roles (administrative integration); and

c) Collaborative actor relations.

The research then tests the extent to which this model exists in South Africa. To focus the analysis, the HIV programme is used as an exemplar, and integration is assessed within only one district health system function – monitoring and evaluation (M&E).

Using the HIV programme as an example of a 'vertical' approach

The HIV programme is used as an exemplar because it is one of the biggest programmes in South Africa and consumes a significant amount of health resources. The HIV programme is described in Box 3.

BOX 3: The HIV programme in South Africa

The programme was established in the early 1990's when the HIV epidemic was beginning to escalate (128). The programme has been governed by various policies over the years (151-152), the most recent being the Strategic Plan for HIV, STIs and TB (2012-2016) which provides an integrated response to the dual HIV and TB epidemics (153). At national level, the HIV unit (HIV cluster) that has strategic oversight of all public sector HIV activities is located within the HIV/TB/MCH branch which is directed by a senior manager. There is an HIV programme unit also in each province, located at provincial level. The programme initially focussed on prevention and HIV counselling and testing (HCT), but later expanded to include prevention of mother-to-child transmission (PMTCT) of HIV, antiretroviral treatment (ART), post-exposure prophylaxis (PEP) for sexual assault victims, and medical male circumcision (153).

Since its inception, the HIV programme has received ring-fenced government funding (128, 154). In 2012, 85% of the HIV response was financed with government funds, and private and external sources (largely PEPFAR and the Global Fund) funded the balance (34). Since introduction of ART services in the public sector in 2004, the government HIV funding model is such that provinces receive a HIV conditional grant from National Treasury (primarily for ART provision) (154), while non-ART HIV interventions are largely funded through non-ring-fenced provincial health budgets. HIV programme managers at national level manage the conditional grant and account to National Treasury for its use (155). In 2012, just over 50% of government funding for HIV was being spent on ART services (34). The grant has enabled rapid scale up of ART services. By 2011, South Africa had the largest public sector ART programme globally, with 1.8 million people on ART (149).

HIV is one of the biggest contributors to total disability-adjusted life years lost (148). At the time of this study (2011) HIV prevalence in the national population was 10.6% and 5.6 million people were living with HIV (149). In 2013 HIV was the third leading cause of death, contributing 5.1% of all notified deaths (150).

The HIV programme lends itself to this analysis because: it has traditionally been vertically implemented (though this is progressively changing at operational level) and vertically managed; and includes complex interventions such as the scale up of ART which have potential system-wide effects (4). Though HIV may represent one of the more extreme

examples of vertical programme management, it is anticipated that lessons from this specific case are relevant for other programmes. The research focuses on the public sector HIV programme in South Africa, and does not include private sector or GHI-run HIV services.

Using M&E as an example of a health system function

M&E is essentially a sub-component of a functional national health information system (HIS), which the WHO defines as: "*one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance, and health status*" (1). M&E systems comprise essential HIS features including: resources (people, money, and hardware), processes for producing information (data collection, collation, analysis), technology (paper-based or electronic data collection and collation forms, hardware and software), mechanisms to ensure data quality (rules – e.g. policies, guidelines, written procedures), a management structure that makes HIS resources available and manages the system; and the dissemination and use of information for public health action (156). Health information refers to any information used to make decisions about individual or population health (157). M&E entails producing and using health information to monitor services and evaluate health outcomes and impacts (158-159).

Drawing on these ideas, in this research HIV M&E is defined as:

A system (technology, people, processes, and management structures) for:

- *Producing HIV information*: HIV data collection, collation (verify, aggregate, and submit reports) and analysis (convert raw data into useable products e.g. coverage rates, health indicators), and dissemination of HIV information; and

- *Using HIV information* to monitor implementation of HIV interventions within districts. This includes reviewing and interpreting HIV indicators, deriving implications for services, and taking decisions based on these.

M&E represents the information building block of a health system (1). Important in its own right, health information is essential for the functioning of all the other building blocks – so it has potential system-wide effects (1). Health information can be used: to enable the leadership and governance roles of a health system (for priority-setting, policy formulation, strategic and operational planning), and to inform resource generation and allocation (health workforce, money, infrastructure and supplies) (1, 160-161). Disseminating information within the health system (including to citizens) can also enhance transparency and accountability (also important leadership and governance roles) (6, 160-162). Information can be used to inform the design of services, track progress towards achievement of objectives (monitoring) (158), and assess whether intended objectives are achieved (evaluation) (158).

Rationale for studying integration within the district health system M&E function

In South Africa, a system-wide district health management information system (DHMIS) was established more than a decade ago to generate health indicators which district managers can use for management decisions, including for routine monitoring of health services at district level. The policy governing this DHMIS was however published only in 2011 (163). A programme-specific HIV M&E system has also been established to generate HIV indicators (166-167). While managers at sub-national level are expected to perform routine monitoring of services, evaluation is typically not part of their role. Thus, though the term M&E is used in this context, it often implies routine monitoring and not broader evaluation of services and programmes.

The DHMIS entails collection of data on health service delivery activities at the point of care. These data are collated monthly at health facilities, and reported to the district level where they are captured electronically on district health information system [DHIS] software and reported to provincial and ultimately to national level (164-165). The HIV M&E system was establish in 2003 as a fully vertical system which entailed health workers recording data on HIV service delivery activities on paper-based tick sheets, and collating and submitting summary data monthly and quarterly to HIV programme units at provincial level, and subsequently to national level. During the course of this PhD research the HIV M&E system evolved to include provision for the collection and collation of ART data on an electronic register (Tier.Net), to better enable longitudinal monitoring of ART patient outcomes. At the start of this PhD work in 2009, the HIV M&E system was reportedly poorly aligned to the DHIS, and there were no standard operating guidelines defining the respective roles and responsibilities of programme and district managers in either the DHMIS or the HIV M&E system. Poor compatibility of operating systems and lack of data linkages between the HIV M&E system and the DHIS have been reported as factors which may impede efforts to integrated HIV service provision and management (34). Programme-specific M&E systems are however not unique to the HIV programme – others exist in South Africa (such as for TB and for chronic diseases), often using dedicated data collection, collation and analysis mechanisms (168).

Existing policy suggests that district managers should oversee the production of health information (verify data quality, compile and submit reports) as part of their job (163). In a context where parallel disease-specific M&E systems exist, the respective roles that district and programme managers should play in using programme data also needs to be clarified. Role clarity is important because district managers are supposed to use programme data for manage services but programme data (not specifically for HIV) that are produced outside the

DHIS are often not available to them (169-170). Poor access to programme data may potentially limit the extent to which district managers use it for monitoring services. Using health information is the ultimate measure of a good M&E system (1, 160), and sub-optimal information use contributes to poor health system performance in LMICs (1, 160, 169). One could thus argue that programme-specific M&E systems that are not aligned to the DHIS may undermine district health system functioning by hampering district managers' use of programme data for the holistic management of health services. Research to assess the extent to which district managers use HIV programme data (a measure of integrated HIV M&E) and how this may affect the district health system is needed but has not been done in South Africa.

The extent to which district managers use HIV data for monitoring HIV services and factors that influence their use of data have also not been researched. Technical concerns (e.g. poor quality and unavailability of data) are not the only determinants of information use; behavioural and institutional factors are also important (157, 171). As Aquil and others describe in their PRISM framework, behavioural determinants of information use are factors relating to the individual actors who use data (e.g. their motivation, competence and confidence to use data for decision-making, their understanding of the utility of data) (171). Institutional factors relate to the organisational context in which actors operate (e.g. whether managers are enabled to use data for decisions, or whether the organisational culture values data-led decision-making) (171). Whether and how behavioural and institutional factors influence district managers' exercise of authority in the use of programme data for monitoring in South Africa is however little understood.

The dearth of evidence on M&E integration is not unique to South Africa; a published systematic review of 55 studies in LMICs found that there is significantly less research on

M&E integration than on other health system functions (28). Available research shows that programmes in LMICs tend to integrate within the M&E function only to a limited extent or not at all (28, 53-54, 95-99). This research explores, through various methodologies, approaches to quantify the extent of HIV M&E integration within the district health system M&E function. The exploration of methods is prompted by the dearth of methods in health systems research literature, particularly for measuring the extent of administrative integration of M&E and collaborative actor relations. Data on the extent of integration can provide a nuanced understanding of programme interaction with the district health system, and provide a basis for further work to generate the kinds of evidence needed to inform plausible integration models for South Africa. It is desirable, but beyond the scope of this study, to measure associations between the extent of integration and health system outcomes – because a model of integration within the district health system has never been defined, let alone measured.

1.5 Research aims and thesis framework

This PhD has two overall goals: to contribute new knowledge about interactions between disease programmes and the health system at district level; and to contribute new methods for measuring the extent of programme integration within the health system at district level.

Aims and objectives

AIM 1: To explore the use of quantitative and replicable methods to assess the nature and extent of programme integration within the district health system M&E function, with a view to contributing new methods for measuring the extent of programme integration.

The specific objectives for Aim 1 are to explore the use of methods for:

1. Describing the extent to which processes and personnel for the collection, collation, analysis and dissemination of HIV data are operationally integrated within the district health information system.

2. Describing whether and the extent to which administrative oversight of HIV M&E is integrated within the district health system M&E function.

    a. Assess the extent to which district managers (horizontal managers) exercise administrative authority over HIV M&E;

    b. Determine factors (including managerial and M&E technical capacity) that may influence the degree of exercised authority; and

    c. Explore the extent to which programme managers undertake support (rather than day to day oversight) roles in HIV M&E.

3. Assessing the extent to which district and programme actors at sub-national level collaborate in producing and using HIV information for monitoring services in districts.

    a. Describe patterns of HIV M&E task-related communication between programme and district managers;

    b. Identify central actors who could potentially forge links between programme and district managers in communication networks.

    c. Quantify the extent of communication (regarding HIV data use tasks) within and between respective manager groups;

    d. Describe whether these managers may be linked through co-participation in management committees where HIV data are reviewed and used for monitoring.

AIM 2: To assess whether the health system organisational structure and culture supports integration of programmes within the district health system.

Specific objectives for Aim 2

1. To describe organisational structure and culture of the provincial health system.

2. To assess whether and the ways in which organisational structure and culture affect administrative integration of HIV M&E within the district health system.

Thesis framework

This research includes both micro- and meso-level analyses, as shown in Figure 3. The district is the primary level of analysis. However, since districts operate within a provincial health system, provincial level actors are also included and both provincial and district levels are characterised as the health system meso-level.

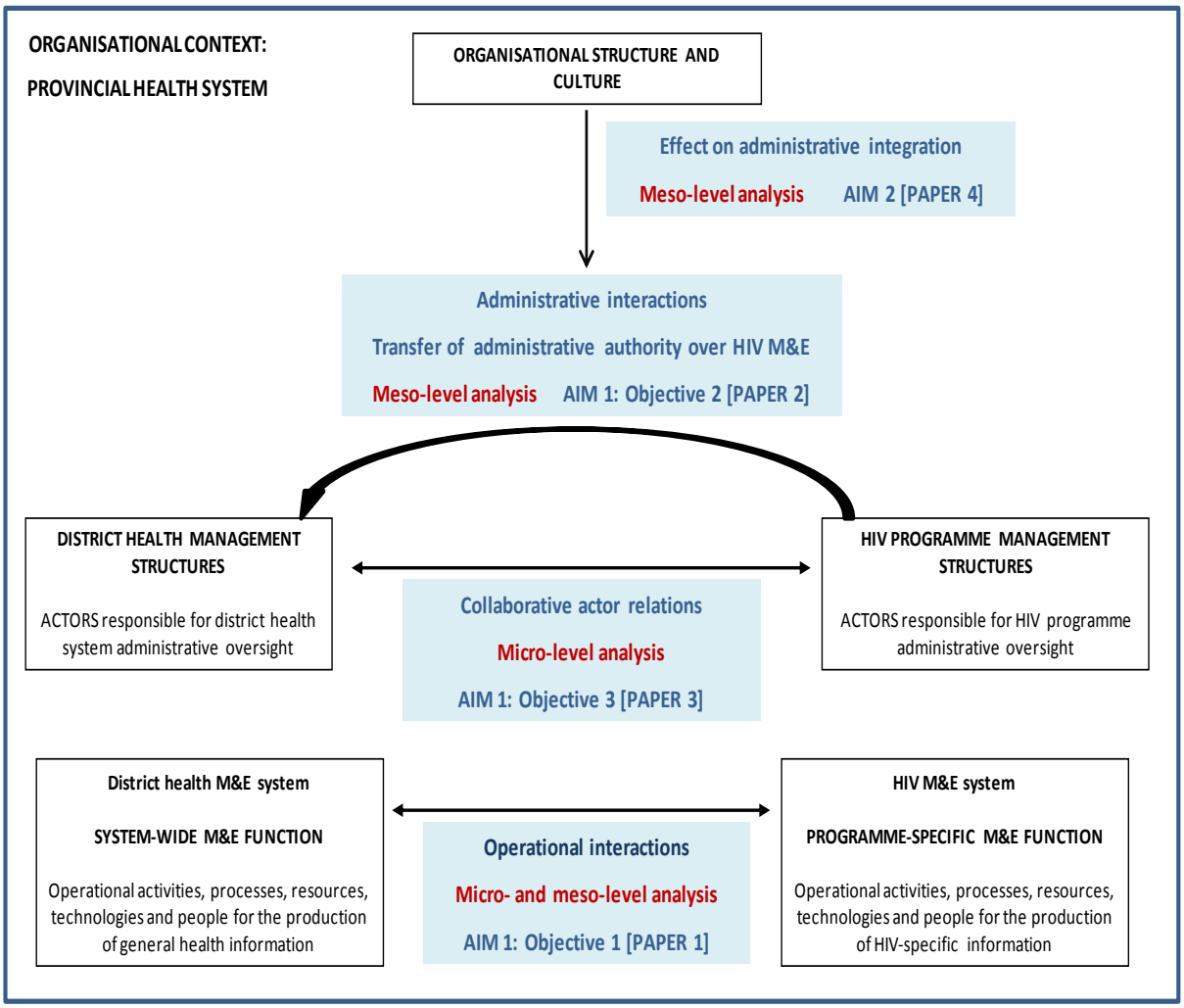


Figure 3: Thesis framework – linking the research objectives to the papers

1.6 Conceptualising and measuring programme integration within the district health system: approach and rationale

This section clarifies the concepts that are measured in this PhD. First, it conceptualises what programme integration within the district health system might look like, informed by ideas from the literature and an understanding of the South African health system context. Second, since this PhD focuses only on HIV M&E, this chapter also specifically conceptualises HIV M&E integration within the district health system and clarifies the M&E elements that can be measured in order to assess extent of integration – this includes an overview of how M&E integration is conceptualised and measured in the literature. Finally, the notions of organisational structure and culture are conceptualised as are the structural and cultural parameters that can be measured. The overall approach for analysing the influence of organisational structure and culture on administrative integration is also outlined.

Conceptualising a model of programme integration

Two questions are considered when conceptualising the model: within which district health system function could programmes be integrated (74); and which programme aspects should be integrated (the nature of integration) (28, 44, 73)?

Defining the district health system functions within which programmes can be integrated

The proposed model defines six district health system functions within which programmes could be integrated (though this PhD focuses only on the M&E function). These district health system functions are defined according to the WHO building blocks framework (1), as shown in Table 2. This table also depicts the roles that the district level is supposed to perform within each function, based on South African policy.

Table 2: District health system functions where programmes could be integrated

District health system functions	Broad operational and managerial roles within each function
Service delivery	Health facilities (clinics, district hospitals); interventions provided at primary care facility, community, and district hospitals levels *Roles:* Providing care; organisation of services (where, when and who will provide care); supervision of staff and service provision; referral for continuity of care between facilities.
Health workforce	Human resources (providers and managers) *Roles:* Distributing staff (providers and managers) within district; managing staff (includes performance management).
Financing	Budgets and accounting systems *Roles:* Budgeting (defining resource needs, developing budget); accounting; monitoring, reviewing and reporting expenditure.
Medical products, vaccines, and technologies	Stock control systems *Roles:* Ordering and distributing drugs, vaccines and medical supplies to health care facilities; managing stock levels.
Health information (monitoring and evaluation)	Information systems (technology and infrastructure); data management processes (for collecting, collating, analysis of data). *Roles:* Oversight of the production of information; using information for planning and monitoring services within districts.
Leadership and governance	Planning and accountability mechanisms *Roles:* accountability for health activities and district performance; operational planning (setting targets, defining activities, outputs), reporting, co-ordination amongst actors and amongst functions.

It should be noted that since decentralisation reforms are still on-going, districts can perform only those roles that have been formally delegated to them – so only these roles are included in Table 2. For example, within the health workforce function, district managers have delegated authority to only supervise staff (day-to-day support and supervision and performance assessment) while authority to recruit, train and dismiss staff remains with the provincial level (124). Similarly, managing budgets, allocating resources, and procurement and distribution of drugs and supplies remain provincially-controlled (124).

Others have also used the 'building blocks' framework. For example, Rao and colleagues use it to analyse integration of HIV, TB and malaria programmes within the health system in India (172), and Topp and others use it to assess integration of HIV interventions within outpatient clinic services in Zambia (111). In other work, Atun and colleagues define "*critical health system functions*" as: governance, planning, financing, service delivery, M&E, and demand generation (74). Shigayeva (73) and Coker (30) adapt this characterisation and define the functions as: governance (includes planning), financing, information, and service delivery. The last three cited authors conceptualise service delivery as encompassing inputs (human resources, technologies, health facilities, medical supplies, and infrastructure), health workforce training, and supplies procurement and delivery (30, 73-74). In another adaptation of Atun's framework, Hope and others – in their work to analyse integration of SRH services – define the functions as governance, policy and planning, financing, health workforce organization, and M&E (80).

Defining the programme aspects that could be integrated

This thesis proposes that a suitable integration model should encompass integration in three dimensions: a) integration of programme operations; b) administrative integration; and c) collaborative relations between programme and district managers. These features are summarised in Table 3 and described below.

Operational integration

The notion of operational integration – as described in the hypothesised model – is guided by existing definitions of integration in literature as sharing of resources and technologies (57, 74).

Table 3: Hypothesised model of programme integration at district level

Aspects of the programme model	Description*
Operational activities, processes, people **(operational integration)**	Provision of care (clinical activities) is integrated; multi-skilled providers at primary care level provide all interventions. Organisation of services is integrated – disease-specific services are located within multi-function primary care facilities (56, 173). Operations to support provision of care are integrated – providers, processes, resources and technology for performing the following are shared / merged (44): - Data recording, collation, analysis and reporting; - Ordering and dispensing drugs, stock control at facility level; Co-operation between specialist and generalist health professionals (83).
Administrative oversight roles, and structures **(administrative integration)**	Administrative authority over all programme service delivery operations within districts (including supervision of services) is transferred from programme managers (located at provincial and district levels) to generalist district managers (56, 174). District managers also have administrative authority over other health system functions – including: planning, stock management, human resource management, budgeting, and monitoring. Administrative integration also entails: • Merging management structures: all programme managers located within districts are accountable to district and sub-district managers (56). • Re-orientation of respective manager roles: district managers should be front-line managers (day-to-day oversight of the delivery and management of all programme interventions and activities within districts); programme managers should support district managers rather than oversee services (support roles might include training staff within districts on technical guidelines, ensuring technical quality of interventions, provide technical inputs into district service planning, helping district managers to optimally use programme data for service improvement) (174).
Actor relations **(collaborative actor relations)**	Collaborative interactions (e.g. communication, joint planning, joint decisions) between district and programme managers in order to optimise sharing of knowledge, information and expertise; as well as joint working (29, 43). Programme managers located at provincial level (who fall outside the chain of command of district managers) work jointly with district managers in planning, budgeting for, supervising and monitoring programme interventions (45, 88).

*Assumptions underlying the hypothesised model are that: district health services are functional; district managers are equipped with the necessary management and technical skills to manage all health activities in districts, and are enabled and supported to exercise authority over programme interventions at district level.

In the literature operational integration conventionally refers to the direct provision of care at service delivery level (43, 56). Research in South Africa largely describes it as integration of clinical activities, provision of all care by the same health worker, and referral between providers or facilities (82-83, 89-90, 133, 136-137, 175). Some also view it as: sharing clinical protocols and guidelines, and co-operation between health professionals at the point of care (83). However, health workers also undertake other activities related to supporting (but not directly providing) care. For example, they prescribe and dispense drugs, maintain and monitor levels of drugs and other stock, and record and aggregate data which they and their managers may use to monitor quality, retention in care, and adherence to treatment (111, 176). This thesis thus views operational integration as also about integration of activities that support the provision of care (performed by the same health personnel, using shared processes, resources and technology).

Administrative integration

The concept of administrative integration included in the model is informed by ideas in the literature that integration entails the sharing or merging of health service administration responsibilities (43, 56, 112). Based on the conceptualisation by Unger et al., (56) this research defines administrative integration as: placing all programme staff located within districts (including those at the point of care) under the chain of command of district managers; and transferring administrative authority for managing implementation of disease-specific interventions from programme lower and middle managers to district managers. In the literature administrative integration is viewed as the transfer of authority over the service delivery function. In this thesis it is extended to mean also transferring authority over other programme functions besides service delivery (i.e. planning, budgeting, M&E) to district managers. This is essential if district managers are to assume responsibility for the holistic

management of integrated health services. Administrative integration also entails re-orienting programme manager to providing specialist support (43, 56). Specialist support could mean: training health workers and district managers on programme-specific protocols or technical guidelines (174), ensuring technical quality of interventions and data, or helping district managers with planning, budgeting, and monitoring of programmes within districts (45). The inclusion of both operational and administrative integration in the model is informed by Unger's characterisation of programmes that are operationally but not administratively integrated as "*indirect*" (56) (Figure 4). These authors argue that donors often prefer indirect programmes, driven by their desire to retain control over the financing and monitoring of programmes that they fund in LMICs (56).

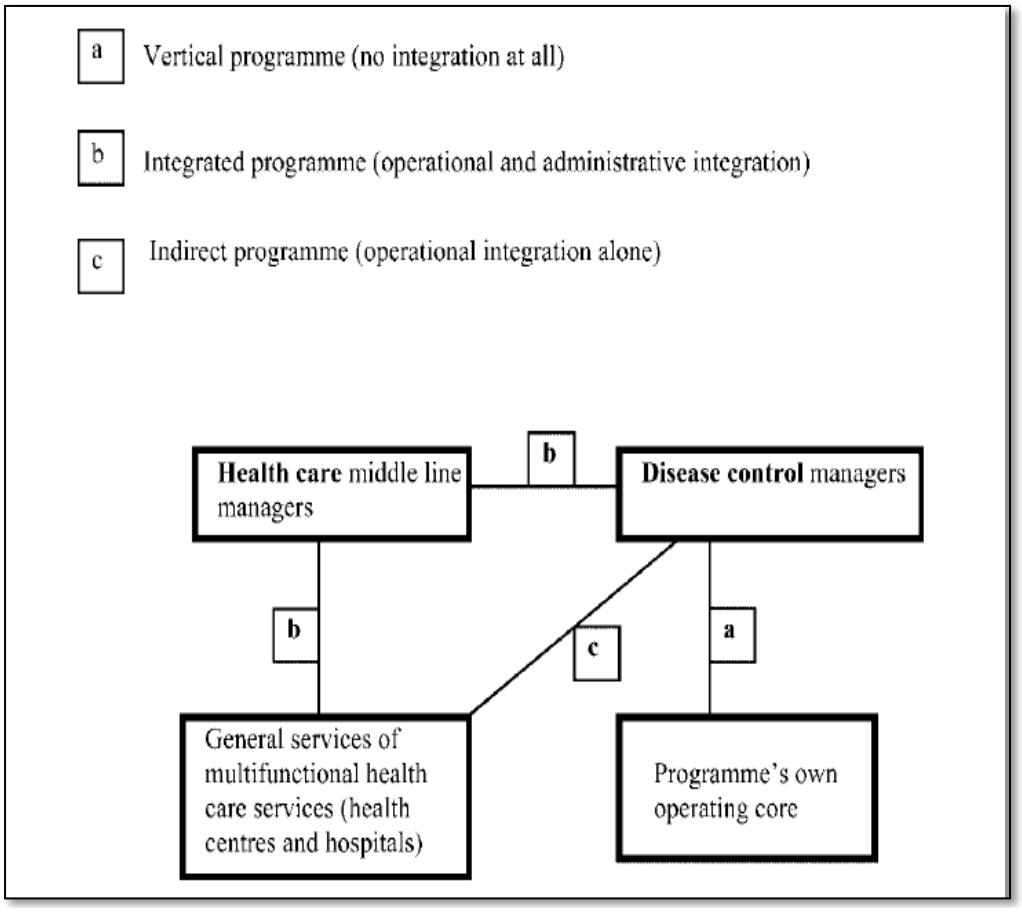


Figure 4: Unger's typology of programmes (56)

Collaborative actor relations

Collaborative actor relations is included as an integral feature of the model, informed by the notion that health system 'software' (35) (including relations amongst actors) is also an important consideration (35, 39, 73, 177). Further, even in an administrative integration model, programme managers will continue to exist, many of them located in provincial management units that fall outside the chain of command of district managers. This kind of differentiation "*between units based on the orientation of members and the nature of the tasks they perform*" (41) necessitates collaborative linkages amongst players to minimise fragmentation (37, 39, 178).

Conceptualising and measuring HIV M&E integration

Measuring the extent of HIV M&E integration requires conceptual clarity regarding what HIV M&E integration means and the specific HIV M&E elements that should be measured. Table 4 depicts the specific HIV M&E elements that could be integrated within the district health system M&E (in accordance with the hypothesised integration model).

Conceptualising operational integration of HIV M&E

Various M&E elements have been measured in research assessing HIV M&E integration in LMICs, including: information technology and infrastructure (30, 73); processes for collecting, analysing and reporting data (28, 30, 53-54, 73, 95, 97-99); as well as monitoring and performance management functions (28, 30, 53-54, 73, 95, 97-99). Some of these M&E elements are included in the conceptualisation of HIV M&E for this thesis (Table 4).

Table 4: HIV M&E aspects that can be integrated within district health system M&E

M&E aspects	Integration of these element within the HIV M&E function means:
M&E activities, processes, technology, and personnel ***(Operational and functional integration)***	*Processes for collecting, collating and reporting* HIV data at the point of care and at administrative levels (sub-district, district and province) are shared or merged within overall DHIS M&E processes. *Technology*: forms, registers and software for the collection, collation and analysis of HIV data are shared or merged within overall DHIS information technology and infrastructure. *Processes for reporting and disseminating* HIV data (formats and pathways for reporting data) are integrated within DHIS processes. *Personnel:* health workers, who collect, collate and report HIV data at the point of care are those who also collect and collate general service DHIS data. *Personnel*: the same managers (at sub-district, district and provincial) who collate, analyse and report HIV data also collate, analyse and report general service data.
M&E administrative oversight tasks and roles ***(Administrative integration)***	Programme staff (located in districts) who collect, collate, analyse and report HIV data fall under the formal authority of district managers, to whom they account for these roles. Administrative oversight for the production of HIV information (HIV data collection, collation and analysis) and using HIV data for monitoring is transferred from programme to district managers. Which means: • District managers exercise administrative authority over the production of HIV information, and over using HIV information for monitoring HIV interventions in districts. • Programme managers provide technical support to district managers in order to ensure HIV data quality, and to help them appropriately use HIV data for monitoring services.
Communication related to M&E tasks and roles ***(Collaborative actor relations)***	Individual actors (district and programme managers share collaborative relations, specifically: a) one-on-one communication; and b) jointly participate in management committees (group communication) – in order to: • Discuss issues related to their HIV data management and HIV data use tasks. • Share HIV M&E knowledge and expertise (also an opportunity for programme managers to provide M&E support to district managers). • Jointly review and use HIV data for monitoring implementation of HIV interventions in districts.

No studies were found that measure micro-level aspects of M&E integration (whether programme M&E tasks are undertaken by the same generalist staff at either operational or administrative levels). This research addresses this gap.

Conceptualising administrative integration of HIV M&E

No studies were found that measure the extent to which district managers exercise authority over programme M&E (administrative integration of HIV M&E). This notion of M&E integration is conceptualised as follows in his study (129).

- *District managers have and exercise authority over the production of HIV information*: they undertake tasks to oversee HIV data collection (supervising personnel who collect HIV data at the point of care), HIV data collation (verify and the quality of data, compile and submit summary reports);
- *District managers exercise authority in using HIV information for monitoring HIV services within districts*[2]: setting targets and including these in operational plans, reviewing HIV indicators to assess progress against targets, deriving implications for services, and making decisions for service improvement based on these; and
- *HIV programme managers support district managers on the above HIV M&E tasks:* providing technical advice on the definition of data elements and indicators; and helping facility and district managers to verify HIV data for completeness and quality as well as derive implications and appropriately use the data.

Conceptualising collaborative actor relations regarding HIV M&E

No research was found describing the extent to which programme and health system managers collaborate regarding M&E. In order to measure the extent of collaborative relations it is important to clarify what collaboration means. Ideas from organisational sciences literature are instructive. Collaboration is viewed as a continuum of actor relations

[2] Since district managers in South Africa do not routinely evaluate health services – and are not expected to do so as part of their role the analysis focuses only the monitoring aspect of M&E.

ranging from no integration through informal linkages (communication and co-operation), coordination, and formal collaboration, to full integration (merger of units, departments, or previously separate organisations) (37, 39, 179). Two studies were found that apply these ideas to assess integration in LMICs. In a study to assess integration amongst different neglected tropical disease programmes, Grépin & Reich map the extent of interactions along a continuum ranging from no integration, through informal linkages, co-operation, and collaboration to full merger (173). In other work, Shigayeva maps interactions between communicable disease programmes and national health systems on a continuum ranging from no integration, through informal linkages (e.g. communication for information sharing, joint meetings or working groups, informal agreements to cooperate), coordination (e.g. coordinating committees) and collaboration (joint budgeting and decision-making), to full integration (180). In these afore-mentioned studies the actors were not individuals but organisations (programmes). The notion of collaboration as a continuum (rather than a binary state) is however useful and is thus applied in this thesis to measure collaborative relations between individuals (programme and district managers). Two types of relations are defined (Table 5): task-related communication (talking one-on-one about M&E tasks) and co-affiliation to management committees (attending the same committees where HIV data are reviewed and used for monitoring services). These relations are viewed as linkages through which managers could exchange information and expertise, in order to foster joint working. Communication falls at the lower end of the collaboration spectrum, but is an indication of whether the minimal level of collaboration is happening.

Approach to measuring the extent of HIV M&E integration

Table 5 summarises the HIV M&E aspects that are measured in this PhD to assess the extent of integration.

Table 5: Measuring the extent of integration of HIV M&E within the district health system: hypotheses

Dimension of integration	Objectives (specific objectives for Aim 1)	Hypotheses
Operational integration **(paper 1)**	To describe the extent to which the collection, collation, analysis and dissemination of HIV data are operationally integrated within the district health information system.	1. Technology and processes used for producing HIV information are shared with those for the DHIS; and staff who collect, collate, analyse and report HIV data are the same as those for the DHIS.
Administrative integration **(Paper 2)**	To describe whether and the extent to which administrative oversight of HIV M&E is integrated within district health management. 2. Assess the extent to which district managers (horizontal managers) exercise administrative authority over HIV M&E. 3. Determine factors (including managerial and M&E technical capacity) that may influence the degree of exercised authority. 4. Explore the extent to which programme managers undertake support (rather than day to day oversight) roles in HIV M&E.	5. All staff involved in the production of HIV information fall under the formal authority of district managers. 6. District managers exercise greater degrees of administrative authority – than programme managers – over the production and use of HIV information (independent of the greater degrees of than programme manager. 7. Programme managers perform specialist M&E support roles more than they do routine M&E oversight roles.
Collaborative actor relations **(Paper 3)**	To assess the extent to which district and programme actors within the provincial health system share collaborative interactions during the production and use of HIV information for monitoring services in districts. 8. Describe patterns of HIV M&E task-related communication between programme and district managers. 9. Identify central actors who could potentially bridge links in communication networks. 10. Quantify the extent of communication (regarding HIV data use tasks) within and between respective manager groups. 11. Describe whether managers may be linked by co-participation in committees where HIV data are reviewed and used for monitoring.	• District and programme managers share cohesive communication networks – both across levels (provincial and district) and within the same level. • District and programme managers are affiliated to the same management committees where HIV data are reviewed and used for monitoring HIV interventions in districts.

Measuring the extent of HIV M&E integration requires analytical approaches that can capture the HIV M&E elements defined above (Table 4) and rate the degree to which these are integrated within district health system M&E. A search of the health systems research literature was conducted, to identify peer-reviewed published research that applies specific analytical and methodological approaches for measuring the extent of integration. The literature reveals that measuring the extent of programme integration is a relatively new area of research, and only 6 published research papers were found that report on the development and application of an analytical approach for measuring the extent of integration – based on research in LMICs (28, 30, 83, 86, 89, 181). These published papers reveal that while analytical frameworks, tools and indices are available for measuring the extent of operational integration (28, 30, 83, 86, 89, 181), none were found for measuring the extent of administrative integration. Furthermore, while methods for quantifying the extent of collaborative actor relations are available, these are rarely used in health systems research in LMICs and no studies were found that quantify the extent of interactions amongst programme and health system actors. In the light of these gaps, a key part of this thesis involves adapting an existing analytical framework to measure operational integration, as well as adapting and applying methods that are traditionally used in social science and organisation management research in novel ways to quantify the extent of administrative integration and collaborative actor relations. The application of these methods in this PhD (and rationale for the choice of methods) is summarised in chapter 2 and described in greater detail in Papers 1 to 3 (129, 182-183).

Conceptualising and exploring organisational structure and culture

In order to perform the analysis for Aim 2, this thesis: a) conceptualises the notion of organisational structure and culture; b) applies an existing framework to describe the

organisational structure and culture of the provincial health system within which districts are located; and c) explores how the observed structural and cultural features may influence administrative integration of HIV service monitoring.

Conceptualising organisational structure and culture

According to organisational theory, features of organisational structure include: a) *specialisation:* the extent of differentiation (division of labour); b) *formalisation*: the extent to which an organisation relies on rules and standardisation of procedures versus more flexible mechanisms to coordinate the work or direct employee behaviour; and c) *centralisation:* the extent to which the "locus of decision-making authority lies" at higher levels of hierarchy (41, 184). Some add hierarchy – the number of levels and the extent to which coordination is achieved through hierarchical chain of command (184). An organisation's culture "*is reflected by what is valued, behaviours and routines as well as the types of managerial and leadership styles that are dominantly used to coordinate employees"* (146). The relevance is that organisations may use features of organisational structure and culture to direct employee behaviour (40-41, 147) and achieve coordination – "*the extent to which the work activities of organizational members are consistent and coherent* (47). For example, organisations that achieve coordination through a high level of formalisation or centralised decision-making may stifle agency amongst employees, especially those at lower levels (41).

Organisational theorists classify organisations into different types based on the mechanisms that are predominantly used to coordinate activities and direct employee behaviour. For example *mechanistic* organisations described by Burns rely on structural mechanisms (highly formalised and centralised) (185) as do Weber's classical *bureaucracies* which coordinate through hierarchy (184, 186). *Adhocracies* – described by Mintzberg – are less formalised and tend to apply flexible mechanisms such as relying on members to coordinate amongst

themselves through informal communication and ad hoc working groups (40). *Organic* types rely on cultural mechanisms, for example employing leadership and management styles that foster shared values amongst members (184-185).

Approach to measuring organisational structure and culture

Extending these ideas, Mintzberg proposes that organisations shape themselves into one of six types (configurations) based on: a) the component of the organisation that is the key part; b) the main coordination mechanisms used; and c) the type of decentralisation (40) (Table 6).

Mintzberg's configurations framework provides a useful template for measuring the aforementioned parameters in order to describe the type of organisation. The framework defines six configurations: simple structure, machine bureaucracy, professional bureaucracy, divisionalised form, adhocracy, and missionary. In Mintzberg's conception, one configuration emerges as dominant depending on main coordinating mechanism used and the component that is the key part. When conditions favour the technostructure (who emphasise standardisation of work processes), a highly formalised machine bureaucracy emerges (Table 7) (40). When conditions favour the middle line (who emphasise standardisation of outputs and some discretion over how they do the work), a divisionalised form emerges.

Table 6: Parameters that define organisation type – according to Mintzberg (40)

Parameter	Description
The component of the organisation that is the key part	This is based on differentiation or division of labour, recognising that different components of an organisation are allocated different roles and tasks in order to optimise performance and achievement of organization goals. Often one component emerges as key (dominant). The components may be parts or people and include (40): - *strategic apex*: top / strategic management team; - *operating core*: operational staff who do the basic work of producing products; - *middle line*: line managers who formally supervise the workers; - *technostructure*: analysts or specialists who design work processes (but have no formal authority over the workers) and support strategic apex and middle line; - *support staff* : individuals who provide indirect support services – e.g. accounting, legal, human resources, public relations, etc; and - *ideology*: system of beliefs about the organisation
The main coordination mechanisms used	In Mintzberg's view, an organisation use one or more mechanisms to coordinate its work. The prime mechanism that is used determines the type of organisation that emerges. Coordination mechanisms include (40): - *direct supervision*: one person supervises all organisation members - *high level of formalisation* (standardisation of processes): defining how work is to be performed – through written rules, policies, operating procedures; - *less formalisation:* standardising of skills (through training) or standardisation of outputs (specifies quality of quantity of outputs, allows some discretion over how these are achieved); - *mutual adjustment*: coordinate through informal communication or joint working through ad hoc groupings; and - *standardisation of norms*: coordinate through shared beliefs
The type of decentralisation	The type of decentralisation (the extent to which lower levels of hierarchy are involved in decision-making) may be (40): - *vertical decentralisation* (transfer of formal authority from higher to lower levels of the organisation; or - *horizontal decentralisation* (transfer of informal authority from a manager who has formal authority (e.g. middle line) to another without formal authority (e.g. a technical specialist) who is located at the same level of hierarchy.

Only two published studies were found that apply Mintzberg's ideas to describe organisational configurations of African (174, 187) and European (187) national health systems. Mintzberg's framework simplifies a complex reality but provides a useful approach for describing organisations. This approach is applied in this PhD to describe the organisational configuration of the health system at sub-national level.

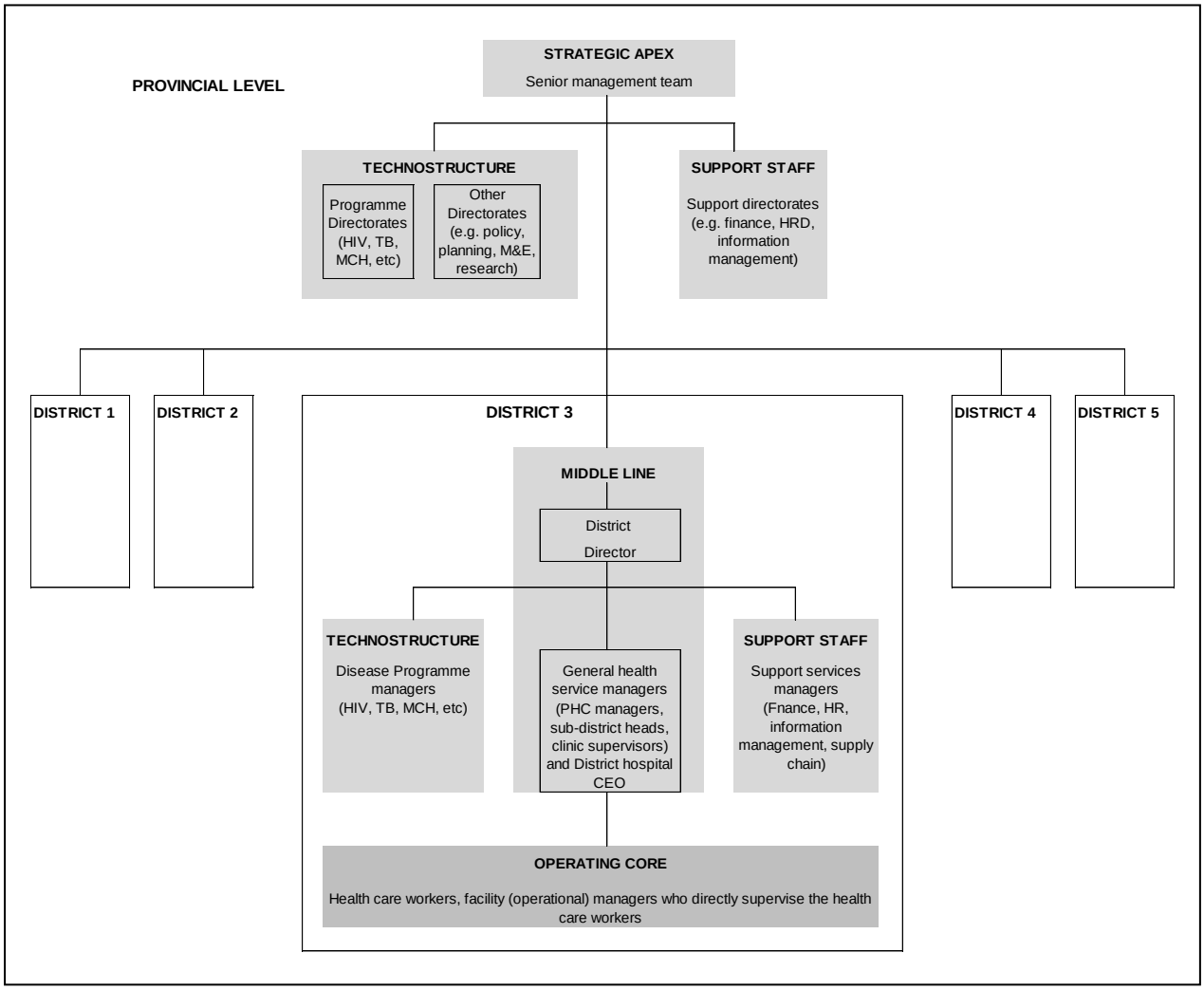
Table 7: Mintzberg's organisational configurations framework (40)

Structural configuration	Prime coordinating mechanism	Key part of organisation	Type of decentralisation
Simple structure	Direct supervision	Strategic apex	Vertical and horizontal centralisation
Machine bureaucracy	Standardisation of work processes	Technostructure	Limited horizontal decentralisation
Professional bureaucracy	Standardisation of skills	Operating core	Vertical and horizontal decentralisation
Divisionalised form	Standardisation of outputs	Middle line	Limited vertical decentralisation
Adhocracy*	Mutual adjustment	Support staff	Selective decentralisation
Missionary	Standardisation of norms (socialisation)	Ideology	Pure decentralisation

Exploring how organisational configuration may affect integration

Another way of applying Mintzberg's framework is to view the configurations as representing tensions – between differentiated components and/or coordination mechanisms (40). Mintzberg's framework has been applied in this way – as a useful starting point for exploring how tensions in organisational features may influence the success of health reforms (174, 187), but not integration. This research applies the framework to analyse tensions between disease programme actors (characterised in this research as *technostructure)* and

district managers (characterised in this research as the *middle line)* (Figure 5). The research thus primarily explores tensions in the division of labour – whether programme versus district managers are the key role players in HIV service monitoring at district level. Paper 4 describes this as well as the type of decentralisation and coordination mechanisms used; and explores how the observed organisational features may influence administrative integration of HIV M&E (district managers exercising authority over HIV service monitoring in districts).



Notes:

- *Middle line*: district managers who supervise the operating core – district head, sub-district head, primary health care [PHC] managers and clinic supervisors;
- *Technostructure*: specialists – who include programme managers located at provincial and district levels;
- *Operating core: includes* health care providers at facility level as well as their immediate supervisors (operational managers)

Figure 5: Component parts of the provincial health system

CHAPTER 2 METHODS

This chapter describes the overall methodological approach for the four inter-linked studies. Details on the specific methods are provided in the appended published papers (129, 182-183), and in Paper 4 (manuscript under review (188)).

2.1 Overview and summary of research methods

Study design, setting, sampling and participants

The research was conducted in two of nine provinces in South Africa – one rural (Site A) and one urban (Site B). This was a cross-sectional analysis involving the collection of both quantitative and qualitative data. Data collection was done in three phases: during 2009 (phase 1), 2010-2011 (phase 2), and 2012 (phase 3).

Setting

The two provinces were selected because there were existing research relationships between the Wits School of Public Health and these sites. Site A comprises five districts while Site B has three. Districts are further demarcated into smaller geographical areas (sub-districts). Within districts, public sector health services are delivered through primary care facilities – clinics (8 hour service, nurse-run) and community health centres (CHCs - 24 hour service, nurse-run and supported by visiting doctors) – and a referral district hospital. At the time of data collection, various HIV interventions were provided through these facilities, including: HIV counselling and testing (HCT), antiretroviral treatment (ART), TB screening for HIV positive patients (HIV/TB), prevention of mother to child transmission of HIV (PMTCT) and HIV pre-exposure prophylaxis [PEP].

Primary care facilities are overseen by facility (operational) managers who are nurses with dual roles as managers and providers of care. Primary care facilities are grouped into clusters (or local areas), each supervised by a clinic supervisor (or local area manager). The local area is thus the lowest administrative level of management in both sites. In both sites, all primary care facilities refer patients who need a higher level of care to the designated referral district hospital. The district hospital is managed by a chief executive officer (CEO). At the time of data collection, both the nationally-standardised district health information system software and an HIV-specific M&E system were operating in both study settings.

Sampling and participants

In each province one district was selected for inclusion in the study. Firstly, one district was selected in Site A – for convenience because the researcher had on-going research in that location. Thereafter, one district in Site B was selected purposively – the one that most closely matched the sampled district in Site A in terms of the organisation, structure and governance of health services. The sample district in Site A is demarcated into five sub-districts, while the one in Site B has three. Within each district, one sub-district was selected – the one that had the highest number of health facilities. Thereafter, in each sub-district one local area (and all primary care facilities within this) was selected. Local areas were purposively selected to ensure representation of the full spectrum of HIV services, including: HCT, PMTCT, ART, HIV/TB collaborative care (HIV/TB), and PEP. Further, the sample also included the HIV clinic located at the referral district hospital. The sampled districts are managed by respective district health management teams. While the sampled sub-district in Site A has an established sub-district management team (the only sub-district in Site A with such a team), the sub-district in Site B does not (in this site only local area managers operate at sub-district level).

Research participants included health managers located at sub-national (provincial, district, sub-district, local area, and facility) and national levels (Table 8). Eligible participants included: those who were, as part of their job, supposed to oversee the collection, collation and analysis of HIV data (HIV data that were collected at health facilities) and / or use HIV data for managing services. Fifty-three sub-national level actors were eligible and 51 participated (Table 8).

Table 8: Actors who participated in the research

Managerial responsibility	Level of the health system				
	National*	Province	District (incl. sub-district)	Health facility	Total
HIV programme[@]	4	15	4	-	**23**
Tuberculosis (TB) programme only**	-	-	3	-	**3**
Maternal and child health (MCH) programme only**	-	-	2	-	**2**
HIV as well as other programmes (MCH and TB)	1	1	2	-	**4**
General health services [&]	1	1	7	-	**9**
Health information (general)	1	1	3	-	**5**
HIV-specific information	1	2	-	-	**3**
Health facility (general)	-	-	-	8	**8**
Health facility (HIV clinic)	-	-	-	2	**2**
Total	**8**	**20**	**21**	**10**	**59**

* National level actors participated only in study 4.

[@]At provincial level HIV managers were located in sub-programme clusters for ART, prevention [HCT, PMTCT, PEP, HIV/TB], and care and support)

**TB and MCH programme managers were included because they use TB/HIV and PMTCT data, respectively, as part of their job roles. These actors participated only in studies 1 to 3.

[&]General health service managers include district managers and managers at provincial and national level who were responsible for strategic oversight of district health services.

Eight national level actors were included in the research in order to explore national level perspectives. Eligible participants at national level included those with strategic oversight responsibilities (policy, strategic planning and management, monitoring) for district health services, general or HIV information, or HIV/TB/MCH programmes. Twelve national actors were eligible and eight participated (Table 8).

Data collection and analysis

Table 9 provides an overview of the data collection and analysis methods used in each of the four studies. Data were collected through: semi-structured key informant interviews (KIIs) with sub-national and national level actors. Two different data collection tools were developed for the KIIs – one for sub-national level actors (Appendix F), and the other for national level actors (Appendix G). At the end of each KII with a sub-national level actor, a social network analysis (SNA) questionnaire survey was administered, also by interview (Appendix H). Data were also collected through a review of M&E tools and documents at health facilities providing HIV services, and review of documents pertaining to the health system and M&E (health policy, district health plans M&E and health information policy and operating procedures).

Table 9: Overview of measurement and analysis methods used in the research

	Study 1 (Paper 1) (182)	Study 2 (Paper 2) (129)	Study 3 (Paper 3)(183)	Study 4 (Paper 4)
Issues analysed	Description of HIV M&E system Nature and extent of operational integration of HIV M&E within the district M&E function	Nature and extent of administrative integration of HIV M&E within the district M&E function	Nature and extent of communication regarding HIV M&E amongst programme and district managers at sub-national level	Whether the health system organisational structure and culture support administrative integration of HIV M&E within the DHS
Data collection	2009 (phase 1)	2010-2011 (phase 2)	2010-2011 (phase 2)	2010-2011 (phase 2) and 2011-2012 (phase 3)
Data sources	In-depth interviews with senior HIV managers Review of HIV data forms / registers at 11 health facilities Quantitative and qualitative data	Semi-structured interviews with 51 managers (HIV, TB, MCH programme and district managers) located at health facility, local area, sub-district, district and provincial levels Quantitative and qualitative data	Structured questionnaire interviews with 51 managers (TB, HIV and MCH programme and district) located at health facility, local area sub-district, district and provincial levels Quantitative data	Semi-structured key informant interviews with 8 managers at national level, and 46 health managers (HIV programme and district managers) at sub-national level. Document reviews Qualitative data
Analytical approach	Followed Atun's analytical approach (74) Rated extent of HIV M&E operational integration as "no", "partial" or "full" integration Descriptive statistics and thematic analysis	Adapted Bossert's 'decision-space' framework (189) Developed a scale to rate the extent of district managers' authority over the HIV M&E function as "low", medium" or "high" Data analysis in SPSS version 20. Bivariate analyses; ordinal logistic regression to assess factors associated with higher degrees of authority	Applied social network analysis methods (190) Computed network measures to quantify the extent of: a) task-related communication amongst district and programme actors, and b) joint participation in management committees Data analysis using UCINET (version 6). Applied Netdraw to generate sociograms depicting actor networks	Applied Mintzberg's organisational configurations framework (40) Employed the framework analysis approach to code and analyse data. Described the organisational configuration of the provincial health systems and discussed how this configuration may affect implementation of the hypothesised model of administrative integration

Ethical considerations

This research was granted approval from the University of the Witwatersrand Committee for Research on Human Subjects – ethics approval number M10460 (Appendix E), and provincial research committees in both study sites. All participants signed informed consent before participating in the interviews. Separate informed consent was also obtained to record the interviews. Twenty seven out of fifty nine interviews were recorded and details notes were taken for the rest.

2.2 Applying methods for measuring the extent of integration.

Methods for measuring the extent of operational integration

Methods and tools that can measure the extent of operational integration have become available in recent years. For example, Uebel and colleagues developed a 19-item scale to quantify the degree to which HIV services (pre-ART care and ART care) are integrated within multifunctional primary care facilities (89). These authors use five scores to measure and compare the extent of integration across different models of delivery and assess changes over time (89). In other work, a consortium of researchers – the Integra Initiative – developed the "Integra Index" which scores the extent of HIV and SRH service integration in four domains a) services provided in the same space, b) services provided on the same day and time, c) services delivered by the same provider, and d) users receive integrated service with one provider (181). This index has been applied to categorise clinics into "low" or "high" integrating groups and then assess effects of different levels of integration on service efficiency and provider stress and workload (191). Uyei and colleagues also developed an integration index, using a 35-point Likert scale to rank clinics based on the degree to which

they integrated HIV and TB services (83). The afore-mentioned methods and indices are useful, but all focus only on analysing operational integration of service delivery; they have not been applied to examine operational integration of M&E.

Another approach – an analytical framework developed by Atun et al. (74) – was instructive for this PhD as it qualitatively rates the extent of programme integration within the M&E function (and other health system functions) – as "no integration", "partial integration", or "full integration" (74). This approach has been applied in systematic reviews (of studies on integration of maternal and child health, communicable diseases, reproductive health, and nutrition programmes in LMICs) (28, 48), and in primary research to measure the extent to which national (95) and GHI-funded (53-54, 96-99) HIV and TB programmes are integrated within health system functions. Extending Atun's analytical approach, Coker et al., assess the extent of integration quantitatively. They developed a quantitative ordinal score to rate the extent of TB and HIV programme integration within different health system functions in five Asian countries as not / predominantly not integrated (score = 0), partially integrated (score = 1) and fully / predominantly integrated (score = 2) (30). Aggregating scores for the different health system functions within each country, these authors were able to rank countries by level of integration (30) and then explore the effects of level of integration on health system outcomes (30).

While Atun's analytical approach (and Coker's adaptation) advances the measurement of integration, it has been applied almost entirely in studies assessing macro-level interactions (Global Fund programmes and national health systems) (53-54, 96-99). In one study Consiell and others used Atun's approach to assess the extent of integration of non-GHI funded TB and HIV programmes in Thailand within health system functions (including M&E) at sub-national levels (95). These authors rate the extent of integration within six health system

functions (using 25 indicators – four on M&E integration) (95). In another study, Topp and colleagues adapt the approach to measure the extent of HIV service integration within primary care clinics in Zambia (111) – using 17 indicators (four of which measure integration of clinic-based M&E), these authors rate the extent of integration as 1 (no/minimal integration), 2 (partial integration), and 3 (full integration) (111).

Table 10: Variables measured to assess operational integration of HIV M&E

Objective	Variables and definitions (182)
To describe the HIV M&E intervention	Design of the HIV M&E system • Existence of an M&E framework and plan • Definition of data elements collected and HIV indicators generated • Availability of financial resources • Existence and staffing of an HIV M&E unit Processes, infrastructure, technology for the production of HIV information • *Data collection*: number and types of data recording forms in use; number and purpose of HIV data elements recorded. • *Data collation and reporting*: number and types of data collation forms; mechanisms to transmit data from facility to higher levels of health system, format for reporting the data and audience to whom reported and disseminated. • *Data analysis*: approach to HIV data analysis at different levels of the health system. • *Dissemination* of HIV data.
To determine availability of HIV information at district level	Whether and how HIV indicators are disseminated to and available at the district level.
To assess the extent of HIV M&E integration within the DHIS	Extent to which these aspects of HIV M&E are shared with those of the DHIS: • *Data collection*: personnel who collect the HIV data, and forms that are used to record HIV data. • *Data collation and reporting*: personnel who collate the HIV data; forms that are used to collate HIV data; pathways and mechanisms for reporting data to higher level; audience to whom HIV indicators are sent. • *Data analysis*: personnel who analyse the HIV data, and analytic approach for analysing the HIV data to generate indicators.

This thesis follows the approach of Atun, but extends it by also assessing M&E integration at health facility level and focussing the analysis at sub-national level. This research further extends Atun's approach by also analysing the extent to which HIV and DHIS data collection, collection, collation and analysis are performed by the same staff – an analysis that has not been done in previous studies.

The variables that were measured to assess the extent of HIV M&E integration in this thesis are outlined in Table 10 (182). **Paper 1** provides greater detail on the methods that were used and the analysis performed (182). Paper 1 also describes the HIV M&E system as it was implemented in the study sites at the time of the research – design of the system and processes for HIV data collection, collation, analysis and dissemination. Qualitative and quantitative data were analysed to rate the extent to which data collection, collection, analysis and dissemination processes were integrated within the district health information system as "no integration", "partial integration" or "full" integration" (182). Paper 1 also assesses whether HIV data were made available at district level after analysis at higher levels.

Methods for measuring the extent of administrative integration

The notion of administrative integration is conceptualised in literature (56), but little researched. As such, no methods that quantify the extent of administrative integration were found in the literature. This thesis therefore adapts and applies an existing analytical approach – Bossert's decision-space analysis (192). Decision-space analysis is based on principal-agent theory, and explores the degree to which administrative authority (over various health system functions) is transferred from national level (principal) to lower level health system actors (agents) during decentralisation reforms (192). It essentially measures the range of "decision-space" (choice or discretion) that is available to lower level managers following

decentralisation (189), and also to quantitatively rate the degree to which local managers exercise the authority that is available to them as 'narrow', 'moderate' or 'wide' (193). That it can measure the extent to which authority is transferred from one set of actors to another makes the decision-space approach an appealing framework for this research. **Paper 2** details how decision-space analysis was adapted and applied to measure administrative integration of HIV M&E as the extent to which district managers exercise administrative authority over HIV M&E and to rate this as "low", "medium" or "high" (129). The variables that were measured are depicted in Table 11.

Table 11: Variables measured to assess administrative integration of HIV M&E

Objective	Variables and definitions, approach to analysis
To assess the extent to which district managers (horizontal managers) exercise administrative authority over HIV M&E (relative to programme managers [vertical managers]);	Whether the manager performs tasks related to: a) oversight of HIV data collection, collation, and analysis; and b) use of HIV data. Scores on performance of HIV M&E tasks compared between horizontal and vertical managers.
To determine factors associated with the degree of exercised authority.	Data were collected on participant characteristics: - Duration in the current job (managerial experience); - Management capacity (whether received training in human resource, financing, or health information management) - Technical M&E capacity: M&E knowledge – whether correctly defines common HIV indicators, differentiates a count from a proportion, and understands the utility of three HIV commonly available HIV indicators. Analysis was assessed whether manager type (horizontal or vertical) was associated with degree of exercised authority, independent of the above-mentioned variables.
To explore whether programme managers undertake specialist HIV M&E technical support roles (rather than day to day oversight)	Scores on performance of M&E were also categorised as: • routine administration tasks score (represents day-to-day administrative oversight role) • problem identification tasks score, and • problem solving tasks score (represents HIV M&E specialist support role) Whether the manager (horizontal and vertical manager) performs routine versus problem-solving tasks.

"Exercised authority" was defined as: *"a manager undertakes tasks to oversee HIV data collection, collation and analysis, and uses HIV data"* for HIV service monitoring (129). Four sub-scales – one each for data collection, collation, analysis, and use – were developed (sub-scale items represented the HIV M&E task within each domain) (Figure 6). Based on the scores, degrees of exercised authority (for each HIV M&E domain) were then determined and compared between programme and district managers. The extent to which programme managers performed day-to-day oversight tasks (as opposed to problem-solving or support tasks) was also determined, and ordinal logistic regression was used to evaluate for factors associated with higher degrees of exercised authority (Table 11) (129).

Methods for measuring the extent of collaborative actor relations

Analysing the extent of collaborative relations required methods that could quantify the extent (cohesiveness or connectedness) of communication linkages between managers. A literature search for quantitative methods identified network analysis, an approach commonly used in organisation and social science research. Network analysis is premised on the idea that actors (individuals, groups, institutions) can be linked through one or more relations (190). A network is *"a synonym for 'partnership', 'collaboration', 'alliance' and 'group'"*(194), and a useful way of visualising diverse actors and the degree to which they collaborate (195). Policy network analysis is a form of network analysis commonly used in political science research to analyse "*linkages between governmental and other actors*" during the policy process (196). For example, some have applied policy network analysis in LMICs to describe how actor interactions during policy formulation and implementation shape policy outcomes (197-198). Those studies focus on the policy process and use qualitative methods, and do not quantify cohesiveness. Another network method – social

network analysis (SNA) – was thought to be more apt for this research as it can quantify the degree of cohesiveness (199-200).

SNA studies typically collect data on actor relations (e.g. communication, sexual relations, joint working, friendship, kinship) (190, 201) and uses these data to quantify the degree of connectedness amongst network actors (202). SNA was thus thought useful for analysing connectedness amongst district and programme managers in this PhD. SNA has further appeal as it provides quantifiable measures that identify prominent actors (those with the most ties to others, those who are isolated or excluded, and those who potentially forge linkages amongst otherwise disconnected actors) (202). SNA is extensively applied in social and organizational research (199-200) but rarely in health systems research in LMICs (203). SNA studies in the health sector are largely located in high income countries, often analysing communication networks of health care professionals at the point of care (194, 204-207).

Paper 3 explores the use of SNA to measure cohesiveness of communication between programme and district managers; an analysis that has not been done before. The relations that were measured and SNA metrics computed are outlined in Table 12 and described in detail in Paper 3 (183).

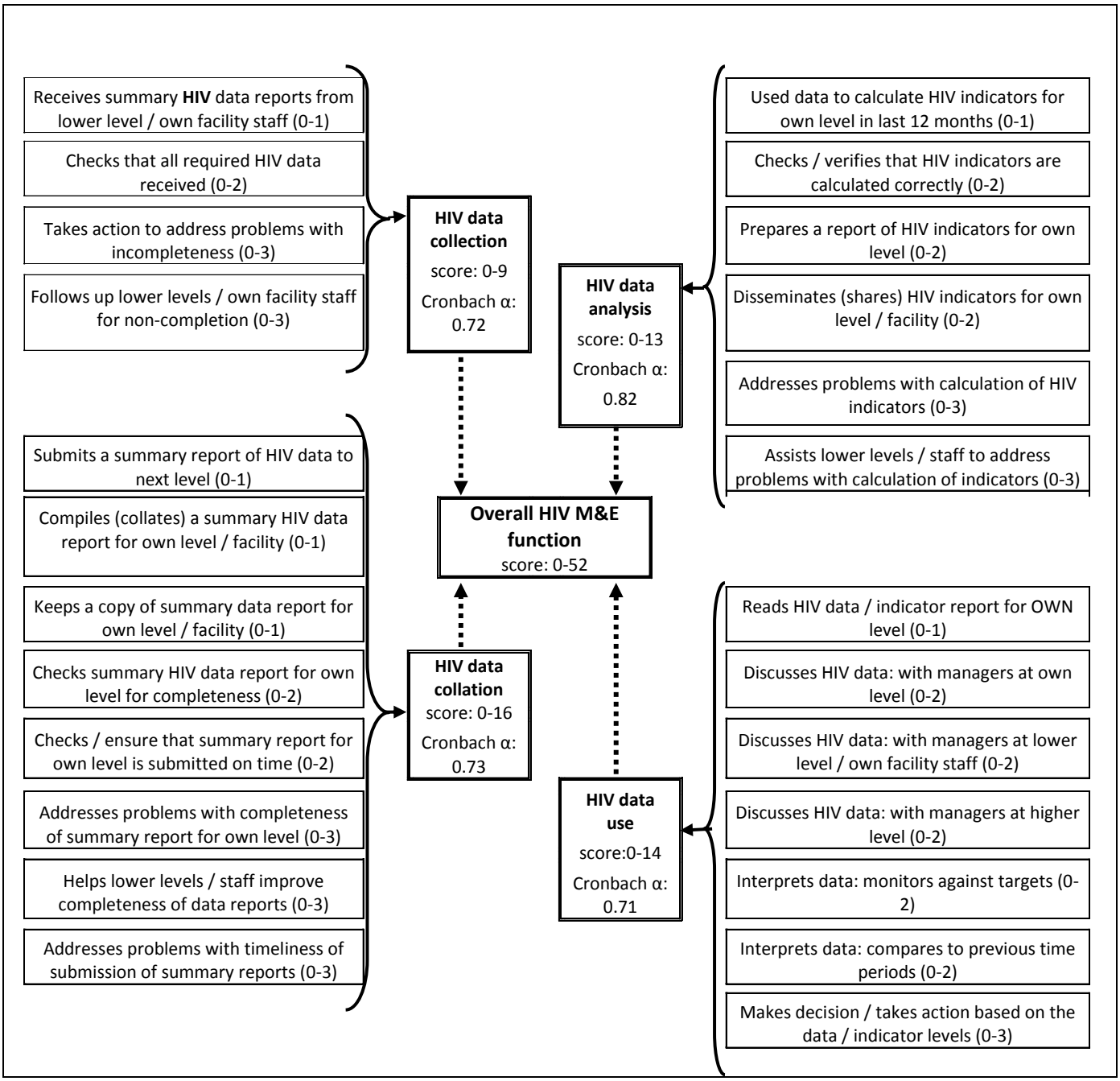


Figure 6: Scale and sub-scales used for measuring actors' performance of HIV M&E tasks (129)

Table 12: Network measures that were analysed to assess collaborative actor relations (183)

Objectives	Network measures computed	Analysis performed	What the analysis quantifies
Describe patterns of HIV M&E task-related communication between programme and district managers ***(for HIV data collation and HIV data use tasks)***	**Whole network density:** No. of possible ties / maximum possible ties. Values range from 0 (no ties) to 1 (all possible ties amongst network actors are present).	Density was computed and compared between HIV data collation and data use networks.	Cohesiveness of whole communication networks (a measure of the extent of collaboration).
	Freeman's normalised degree centrality: No. of ties each actor has (a normalised measures enables comparison).	Degree centrality scores were computed and actors with highest and lowest scores in each network type were identified.	Identifies the most prominent actors – who are the most 'connected' to others.
Identify central actors who could potentially forge communication links	**Freeman's normalised between centrality:** A measure of actors who fall along the shortest path between other actors.	Betweenness centrality computed and actors with the highest (top five) scores in each network type were identified.	Identifies actors who can potentially forge communication links between those in the network who would otherwise not be linked).
Quantify the extent of communication within and between manager groups	**E-I index:** Measures of within group and across group communication: values range from -1 (homophily) to +1 (heterophily).	Actors were categorised into sub-groups (district, provincial programme, and district-based programme managers) and E-I indices computed per sub-group.	Extent to which actors communicate only with those within (homophily) or outside their sub-group (heterophily).
(communication on HIV data use tasks only)	**Sub-group network density**	Network density was computed for each sub-group.	Cohesiveness of within-group communication. Also cohesiveness of communication between district and programme managers: a) at the same level (network of district-based programme and district managers), and b) at different levels (network of provincial programme and district managers).
To describe whether these managers communicate through co-participating in management committees	**Block modelling – factions**.	SNA software partitioned the network into two main factions.	Identifies factions (clusters of frequently co-occurring actors and events [management committee meetings where HIV data are reviewed and used] – so identifies events that potentially foster collaboration by connecting actors.

2.3 Assessing organisational structure and culture and integration

Paper 4 describes how Mintzberg's concepts were applied to: a) describe health system organisational parameters (coordination mechanisms used, key part of the organisation, and type of decentralisation) and b) explore how these features may affect integration (188). The data that were collected are summarised in Table 13.

Table 13: Variables that were measured to describe organisational structure and culture

Organisational features described	Data collected and analysed
Type of decentralisation - Whether the locus of operational (not strategic) decisions regarding HIV M&E lies at higher (provincial and national) versus lower levels (district).	Key informant interviews to describe: - Process for making decision about HIV M&E (the types of HIV data, the design of data collection and collation tools, how these tools should be implemented in facilities). - Who participates and each participant's own role in these decision-making processes. - Participants' perceptions and interpretations of their own role and that of other actors at higher and at lower levels than them.
Key part of the organisation - Which component (HIV programme managers [technostructure] versus district managers [middle line] plays the key part in the design of HIV M&E tools, and in the use of HIV data for target setting (planning) and monitoring HIV interventions in districts.	Key informant interviews to describe: - Document reviews to assess whether written documents describe and clarify district and programme managers' respective roles regarding HIV M&E. - Participants' own role in overseeing the production of HIV data (collation) and in using HIV data for setting targets (planning) and monitoring HIV interventions in districts; and their perceptions of other actors' roles. - Participants' perceptions theirs and other actors' roles in the above and in overseeing HIV interventions in districts more broadly.
Main coordinating mechanisms - The extent to which highly versus less formalised coordination mechanisms are used	Document reviews and participant interviews to describe: - How HIV M&E work is coordinated amongst districts – use of written rules and procedures versus less formalised agency-based mechanisms (standardisation of outputs), or other mechanisms.

Qualitative data were collected through 54 key informant interviews – with all eight national level actors and only 46 of the sub-national level actors (MCH and TB managers were excluded for this analysis) – and document reviews. Data were coded manually and analysed deductively using framework analysis – an approach that uses a thematic framework informed largely by pre-set objectives to derive themes from qualitative data, while also allowing inclusion of new emerging themes (208-209). A thematic framework was developed (based on the three parameters included in Mintzberg's configurations framework (40)) and used to code the qualitative data. Emerging themes were also considered. Based on this analysis, the observed features (type of decentralisation, main coordinating mechanism used and key part of the organisation) were used to characterise the organisational configuration of the provincial health system. Finally, whether and how the observed configuration might influence administrative integration of HIV M&E was discussed.

In summary, Figure 7 provides an overview of the progress of data collection for the thesis, outlining which data were collected in which site and the dates of data collection. Figure 7 also indicates the dates when the papers were published during the course of this thesis.

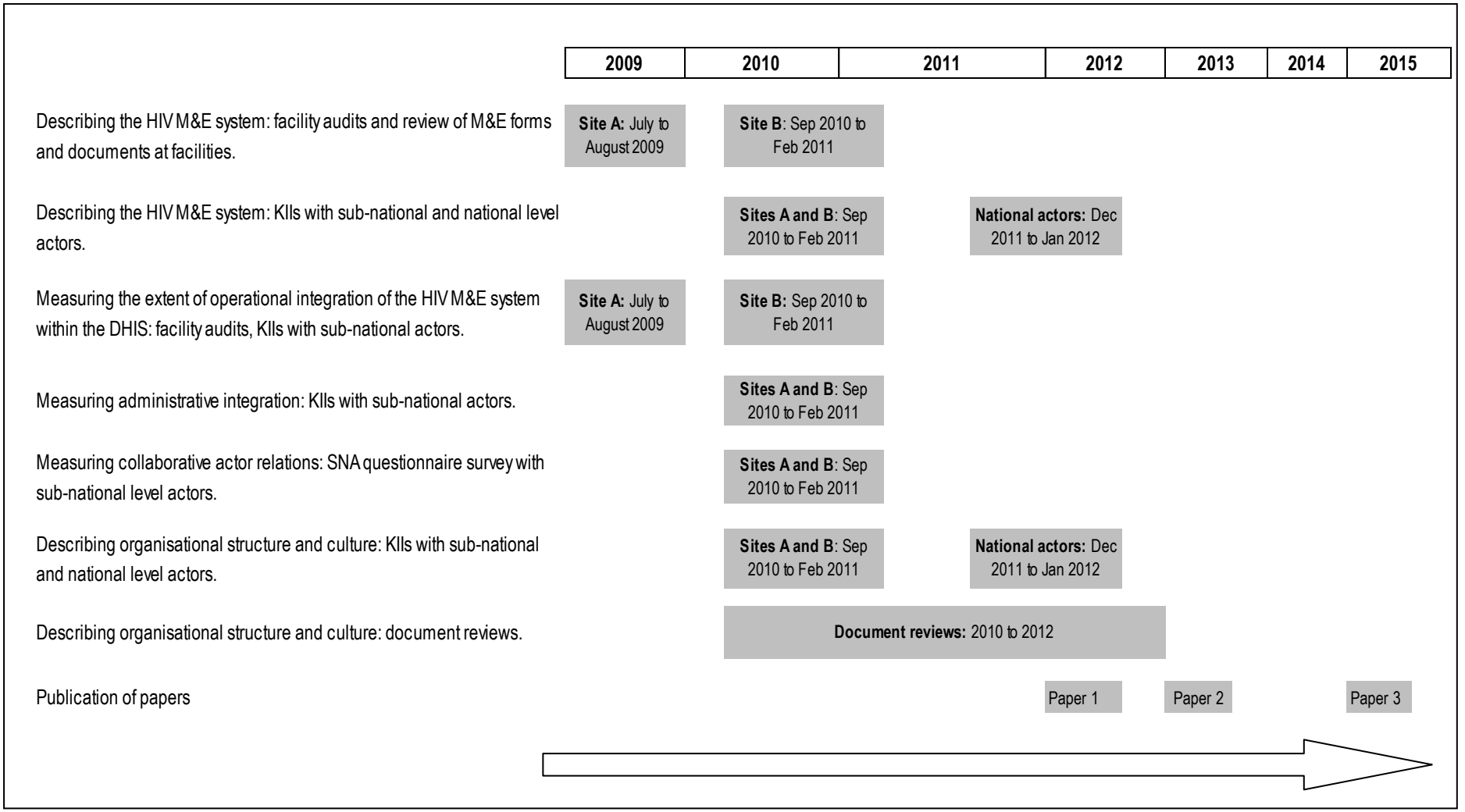


Figure 7: Progression of data collection and publications during the thesis

CHAPTER 3 SUMMARY OF KEY FINDINGS

This chapter summarises the main findings from the four studies; detailed results are presented in the appended papers. Papers 1 and 2 present findings on the extent of operational and administrative integration of HIV M&E, respectively, and Paper 3 presents data on the extent of communication amongst programme and district managers (129, 182-183). The results depict complex and varied interactions, with elements of both horizontality and verticality. Paper 4 reveals that the provincial health system within which districts operate can be characterised as highly formalised and centralised, with an authoritative leadership and management style, as well as a culture that values programme managers as the key role players HIV service monitoring. Paper 4 also depicts how these features may undermine administrative integration (188).

3.1 Nature and extent of HIV M&E integration

The results highlight that the HIV M&E system was designed at the national level (centrally), guided by a standardised HIV M&E framework. The HIV M&E system collected a large number of data elements that were not all analysed or used. There were numerous HIV data recording tools, some developed by staff themselves and so were not standardised across facilities. The M&E system comprised different data 'silos' – initially a parallel process was established for producing HIV prevention information (non-ART data) and later, with the introduction of antiretroviral treatment (ART) services, another parallel process was established solely for ART data (Paper 1 (182)). A summary of the extent of operational and administrative integration is presented in Table 14.

Table 14: Nature and extent of operational and administrative integration of HIV M&E

Nature	Extent of integration		
	No integration	***Partial integration***	***Full integration***
Operational[&]			
M&E system for Non-ART data	**Rural site**: Various forms were in use for recording HIV prevention data (non-ART data) separately (e.g. different forms for VCT, PMTCT, and HIV/TB). These forms were separate from those used for the DHIS. **Both sites**: dedicated HIV programme personnel (nurses and data capturers) record most data.	**Both sites**: Some sharing where generalist nurses record some PMTCT data.	**Urban site:** HIV prevention data were recorded on a single integrated PHC data recording form. **Both sites**: data collated on DHIS forms, reported through DHIS and analysed by general HIS staff at district and provincial levels.
M&E system for ART data	**Both sites**: ART data recording forms separate from DHIS forms. Dedicated data clerks capture only ART data. ART data collated monthly on summary forms that are separate from DHIS forms. **Rural site**: ART data reported through dedicated channels that by-pass the DHIS, captured in an ART dataset (excel spreadsheet) not linked to DHIS and managed at provincial level by HIV M&E manager located in HIV unit.	**Urban site**: ART M&E system evolved from fully vertical to one with formal links to the DHIS. ART data collected on paper-based forms and reported to the DHIS office where captured on electronic ART register (Tier.net). ART data on Tier.net exported to DHIS, and managed at provincial level by an HIV M&E manager who is however located within a general HIS unit.	
Administrative	HIV programme managers largely use HIV data in programme and sub-programme silos, excluding district managers. [#] Programme staff located within districts informally account to programme managers at provincial level (dual lines of accountability).	District managers exercise a HIGH degree of authority over HIV data collection and collation, but their tasks overlap with those performed by programme managers.* District managers exercise LOW degree of authority over the USE of HIV data, while programme managers exercise a HIGH degree Provincial HIV managers perform routine oversight tasks more than they do specialist support tasks.	All programme personnel and managers in districts are formally accountably to district managers - fall within the district management chain of command.

[&]For operational integration: results for the rural site are presented in Paper 1 ((182); data for urban site not published

[#] Factors predictive of higher use of HIV data include: HIV M&E knowledge, being a programme manager.

* Significant overlap of roles (duplication of effort) except programme managers focus only on programme data.

Nature and extent of operational and administrative integration

Table 14 shows the extent of operational and administrative integration varies depending on the type of data (ART or non-ART data) and across the two sites (182). In both sites non-ART data were mostly collected, collated, analysed and disseminated through the district health information system (some aspects of non-ART data collection were partially or not integrated while collation, analysis and dissemination were fully integrated). However, all processes and personnel for producing ART information ran completely outside the DHIS in the rural site (Site A) (182), while in the urban site (Site B) ART data collection and collation were not integrated while data analysis were partially integrated (Table 14). In the urban site, during the course of the research the ART M&E system progressed from an entirely vertical and paper-based system to one in which ART data are collected and collated on paper-based sheets at facility level and captured at district level onto electronic registers – on software termed Tier.Net. Tier.Net software is not compatible with DHIS software – the former processes individual patient-linked longitudinal data, including data on HIV treatment outcomes, while the latter processes non patient-linked data on service activities. Summary ART data could however be exported from Tier.Net to the DHIS. As such, the ART M&E system was rated as "partially integrated" in the urban site and "not integrated" in the rural site where no linkage with the DHIS had been created (Table 14) (182).

Further, the ART M&E system captured a significant amount of energy and resources to produce ART data, but since it by-passed the DHIS, it did not make ART data readily available to district managers. Paper 1 reveals that real and perceived poor DHIS capacity and strict reporting requirements attached to the HIV conditional grant (which was intended primarily for the rapid scale-up of ART services) are potential drivers of a parallel ART M&E system (182). It emerged the National Departments of Health and Treasury required

provinces to submit ART data to them monthly and quarterly, using dedicated reporting channels (a condition for receiving the grant). This was not a requirement for non-ART data.

Regarding administrative integration, the results depict a mixed picture with similar findings across the two sites (Table 14). As shown in Paper 2 (129), administration of HIV data collection and collation was partially integrated within district health management. This was rated as "partial" because though district managers exercised a high degree of authority over the collection and collation of HIV data (and statistically significantly higher than programme managers), there was some duplication of tasks as programme managers performed the same data collection and collation tasks (though focussing only on HIV-specific data) (129) Table 14). The results show that there has been little transfer of authority for using HIV data from programme to district managers – programme managers exercise high degrees of authority over HIV data, and statistically significantly higher than district managers who exercise low degrees of authority. Based on this finding and the tendency for programme managers to use HIV data in silos and not provide M&E specialist support to district managers, administrative integration of HIV data use was rated as "no integration" (Table 14) (129). HIV M&E is thus described as a "hybrid 'indirect' programme" (129) because operationally it is largely partially (non-ART data) integrated and administratively is partially (HIV data collation) or not integrated (HIV data use) within the district health system M&E function (129, 182)

Nature and extent of collaborative actor relations

The social network analysis study reveals complex and varied interactions, including some collaborative as well as siloed communication amongst programme and district actors. The results show that district and district-based programme managers shared more cohesive communication interactions than district and provincial-based programme managers about

using HIV data for monitoring services in districts (Figure 8 (183)). Figure 8 also depicts that communication also occurred in programme silos across levels of hierarchy. As shown, provincial programme managers shared more cohesive communication with their district-based programme counterparts than with district managers (however, this was more the case in the rural site). Other data show that provincial programme managers tended to talk about using HIV data amongst themselves as a group (a high degree of homophily) and seldom talked to other actors about HIV data use, especially the district managers to whom they were supposed to provide specialist HIV M&E support.

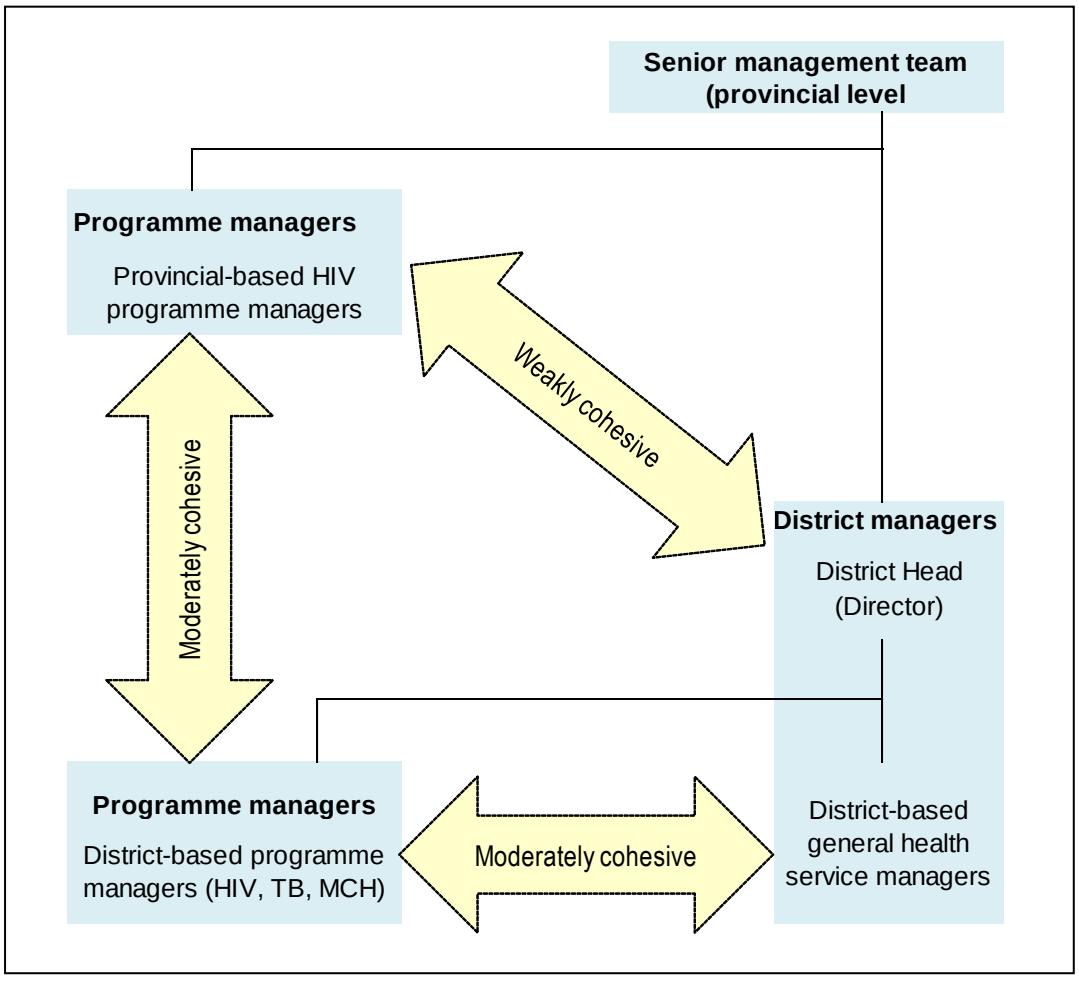


Figure 8: Extent of communication about using HIV data for monitoring services

Finally, unlike programme managers, district managers were largely excluded from management committee meetings where HIV data were reviewed and used for monitoring HIV interventions within districts) (183).

3.2 Influence of organisational configuration on integration

Paper 4 characterises the provincial health system organisational structure and culture as a machine bureaucracy in which programme managers (technostructure) are the key role players in designing HIV M&E tools and in using HIV data for monitoring, while district managers (middle line) are peripheral role players (188). The health system is highly formalised (rules and procedures are used to control how work gets done and standardisation of outputs is rarely used for coordination). Finally, the locus of decision-making on HIV operations lies at national and provincial levels, such that district managers are excluded from decision-making on issues that directly affect implementation of HIV M&E tools at district level. Table 15 summarises the findings (188). Other findings emerge from the qualitative analysis. The first is that, through their behaviours and actions (or inactions), provincial and national leaders promote programme actors as the key role players in the monitoring of HIV interventions, and perpetuate the exclusion of district managers from assuming this role (188). Further, organisational practices (preferential funding for programmes and allocating the more senior managers to programmes and not to districts) has meant programme structures have grown in size and stature, while the same has not happened for district management structures. An issue that emerged (not included in Mintzberg's framework) is that the leadership style fails to use cultural coordination mechanisms to foster HIV M&E-related communication and joint working amongst programme and districts actors. Paper 4 argues that, while stated policy intends for district managers to assume authority over programme operations, an organisational culture has emerged in which district managers

defer decisions regarding programme interventions to programme actors (largely located at higher levels), and rarely exercise agency. There seems to be a sense of powerlessness and acceptance at all levels that this is how things are meant to be. The ways in which the prevailing organisational structure and culture may affect administrative integration are briefly outlined in Table 15 and discussed in greater detail in the appended Paper 4 (188).

Table 15: Influence of organisational structure and culture on integration

Parameter	Observed features	Influence on integration?
Key part of the organisation	**Programme managers are the key role players** (in relation to HIV M&E work): • Programme managers collate and present data on HIV services, are held accountable for using HIV data for monitoring (district managers are not). • National leaders capacitate programme managers to use HIV data for developing HIV-specific plans; do not capacitate district managers to integrate HIV plans in district health plans. • District and programme actors' respective M&E roles not clarified in documents which define overlapping roles (for non-ART data) or no role at all for district managers (for ART data).	Potentially undermines administrative integration because administrative authority over programme operations within districts would continue to rest with programme managers, especially since written documents and actions of leaders seemingly reinforce a message that that district managers have no role.
Coordination mechanisms	**Standardisation of work processes:** a rules-based approach to managing • Great focus on how data should be verified and by when it should be reported up the hierarchy, little emphasis on outputs (data quality and use of data) • Emphasis on how district performance review meetings should be conducted (standard agenda and format), little emphasis on performance outputs (standardisation of outputs).	Potentially stifles district managers' agency. Emphasis on rules rather than outputs means managers may focus on performing HIV M&E tasks for the sake of compliance rather than for example on ensuring optimal data use for quality improvement.
Type of decentralisation	**Limited vertical decentralisation:** locus of operational decisions lies at higher levels • District managers have little say in decisions regarding HIV M&E tools and processes; are excluded from decision-making processes • Lower level managers feel stifled by authoritative top-down approach; are barred (by higher level) from adapting M&E tools to their local realities.	May undermine district managers' exercise of agency over services (including HIV service monitoring) as they have no input into the design of HIV M&E tools, authority to adapt them to local context stifled. Centralisation favours programme managers having more control because of their location at a higher level.

CHAPTER 4 DISCUSSION AND CONCLUSION

The discourse on integration has for a long time been dominated by 'vertical' versus 'horizontal' debates (18) that have not enhanced understanding of the complex ways in which programmes interact with health systems (74). Measuring the nature and extent of interactions – as done in this research – contributes to understanding the complexity and identifying areas where interventions for maximising synergies can be targeted. This PhD applies innovative measurement approaches to quantify the extent of programme integration within the health system at sub-national level. It provides new knowledge regarding the complex and varied ways in which programme and district actors interact, as well as data on how organisational structure and culture affect integration. The appended papers discuss the research findings in greater detail.

This chapter synthesises and discusses the main cross-cutting themes that emerge from the research findings across the four studies. Four cross-cutting issues are identified, which are outlined in Table 16 and discussed in more detail later (sections 4.1 to 4.4). The themes include: a) implications of the findings for integration policy and practice; b) implications of the findings for district health system strengthening; c) proposed actions for maximising synergies that are realistically feasible for South Africa's health system context; and d) the methodological innovation of this PhD. Discussion on the last theme includes some personal reflections on the experience of adapting and applying the various measurement methods and tools. The last part of this chapter includes discussion of the key limitations of the research, and ends with the conclusion.

Table 16: Themes that emerge across the four studies

Themes	Study 1 **Measuring the nature and extent of operational integration of the HIV M&E system**	Study 2 **Adapting decision-space analysis to measure the extent of administrative integration of HIV M&E**	Study 3 **Using social network analysis to measure the extent of programme and district manager interactions regarding HIV M&E**	Study 4 **Assessing whether and the ways in which organisational structure and culture may affect administrative integration – using HIV M&E case study**
Implications of findings for integration policy and practice	Parallel programme-specific M&E systems that bypass the district limits availability of HIV data. This may undermine integrated use of data for comprehensive district health service monitoring. Fragmentation between pre-ART and ART M&E ("silos within a silo") reinforces verticality.	Horizontal production and vertical use of HIV data and programme managers using HIV data in silos undermines the extent to which programme data can be integrated within district-wide health service planning and monitoring. Programme and district managers perform overlapping tasks, and work in silos. Limits opportunities for joint working	Cohesive communication amongst district managers and district-based programme actors potentially enhances integration. Poor communication between provincial programme and district managers limits opportunities to share knowledge and work jointly.	Investing in strengthening programme structures (in size, capacity, and status) and actors to play a key part in management of HIV interventions while ignoring district managers may undermine: a) administrative integration; and b) cohesive and respectful working relationships amongst district and programme actors.
Implications of findings for district health system strengthening	Investing in parallel programme-specific M&E systems is a missed opportunity to strengthen district health system-wide M&E capacity (institutional and individual).	Horizontal production and vertical use of HIV data perpetuates the notion that district managers are merely producers and not users of data for decision-making at their level. Duplication of effort reflects inefficient and unsustainable use of human resources in a resource-constrained setting.	Vertical patterns of communication and dual lines of reporting may undermine district managers' formal authority to oversee all staff (including programme staff) located within districts. Homophilic communication amongst provincial programme managers limits extent to which specialist technical expertise is made available to districts.	Rules-based management style and centralised decision-making may limit district managers' ability to exercise agency over health activities within their jurisdictions. Strengthening programme structures at the expense of districts: a) undermines the vision of the district as the foundational building block of the health system; b) entrenches programmes as the "de facto building block"; and c) may impede the building of a capacitated district health system management workforce.

Table 16~~7~~ (cont'd) Themes that emerge across the four studies

Themes	Study 1	Study 2	Study 3	Study 4
Promoting integration requires actions to maximise synergies that are realistically feasible for South Africa	Enhance operational integration of ART M&E, while taking action to minimise the burden of programme data elements. Tackle health system-related drivers of vertical HIV M&E (funding models, DHIS and district manager capacity).	Strengthen technical capacity of district managers to use programme data and hold them accountable for data use. Strengthen district management capacity. Progressive approach: incremental transfer of programme authority to district managers as district manager and district management capacities are strengthened. And / or deploy trained staff to districts on a rotating basis.	Create more cohesive actor networks (use of a range of liaison devices). Inculcate collaborative management committees that span levels of hierarchy and horizontal / vertical divisions. Deploy / relocate trained programme specialists to districts.	Organisational change to transform bureaucracy culture to one that is more suited to the task of administrative integration – such as a divisionalised form with use of cultural coordination mechanisms in order to engender a culture in which unity of purpose amongst actors is valued as the new norm. Manage the tensions to achieve appropriate balance (suited to SA context) in: programme vs. district actor roles; formalised (rules-based) versus flexible (agency-based) coordination mechanisms.
Methodological innovation: contribution of methods for measuring and understanding integration **(triangulating data from different methods results in the same conclusion).**	Provides the first ever data on the nature and extent of interactions between programme-specific M&E and system-wide M&E function at sub-national level in South Africa. Extends existing methods of measuring operational integration which focus on the meso-level, by providing integration metrics that measure the degree of integration at micro-level.	Makes an original contribution by providing metrics for quantifying: a) the extent of administrative integration, and b) the degree of overlapping tasks between programme and district managers (an entry point for interventions to address duplication).	Applies social network analysis in a new way and for the first time in a LMIC provides measures that quantify the extent of interactions amongst programme and district managers. The metrics provided in this study extend the measurement and understanding of some of the complexities of integration.	Applies an organisational lens to analyse the health system and generate data on the complex ways in which tensions in the organisational configuration may influence administrative integration.

4.1 Implications of the research findings for integration policy and practice

This research reveals that HIV M&E is integrated within the district health system M&E to varied extents – ranging from no integration (dedicated HIV M&E staff, parallel processes for collecting, collating, analysing ART data), through partial (HIV data collation tasks shared between programme and district managers), to full integration (non-ART data are produced through the district M&E system) (129, 182). The existence of both horizontal and vertical elements reinforces the idea that programmes rarely fit neatly into theorised notions of 'vertical' or 'horizontal'(21, 28). The observed positive operational synergies – shared staff and processes for non-ART data and linkages between ART M&E and DHIS technology – bode well for a coordinated approach to M&E. (182). Positive administrative synergies (district managers exercise high degrees of authority over HIV data collation) (129) and existence of moderately cohesive communication between district and district-based programme managers (183) also bode well for an integrated approach to managing services within districts. However some observed interactions may undermine a more coordinated approach. These include: running a parallel ART M&E system that bypasses the district with few or no linkages to the DHIS (182); responsibility for using HIV data for monitoring services in districts lies with programme managers who use these data in silos; district and programme managers have overlapping HIV data collation tasks (both in allocation and execution) (129, 188); and poor communication between provincial programme and district managers (129).

The research findings also suggest that broader factors related to the health system organisational structure and culture may influence the extent to which administrative integration can happen. While the formalisation observed in this research (e.g. rules about operational activities such as reporting deadlines and the data verification process) may be

necessary to ensure some standardisation in practice across districts, it is problematic that less emphasis is placed on outputs and performance of tasks such as the use of data. Further, a top-down and rules-based style of managing that prevails in the health system has seemingly created compliant district managers rather than competent individuals who can problem-solve and exercise authority over HIV programme monitoring. Further, years of investing in programmes while failing to develop district manager capacity means district managers are neither empowered to exercise authority nor valued as the lead players in HIV monitoring (188). This culture is at odds with South Africa's policy context which makes district managers the lead actors in the management of all health services in districts (31). Thus, according to hierarchy, it is district managers who have been delegated formal authority (122) over HIV monitoring in districts. However, in the prevailing organisational culture it is programme managers who are enabled to retain control over HIV monitoring (188), and accrue power from residing at a higher level of the health system and having higher statuses and salaries than district managers (145, 210).

A lesson for policy is that particular attention is needed to address gaps in administrative integration and communication amongst programme and district managers. The findings also provide insights on areas that need to be targeted in order to create an organisational structure and culture that is more supportive of integration reforms. A significant lesson is that an enabling policy context exists, but it is the practice of integration that needs attention. Though this research focuses only on an HIV M&E case study, this insight is consistent with work focussing on other programmes in South Africa which also highlights that integration policy remains unrealised. For example, though HIV and TB programmes are both largely operationally integrated within the health system service delivery function (34, 83, 89, 134), intents to integrate the strategic oversight of TB, HIV and PMTCT programmes at national level (PMTCT falls under the MCH programme at national level), remain unrealised (34).

Further, the TB programme runs an M&E system that is managed outside the DHIS (34), and, despite intents to integrate them, TB and HIV M&E systems are managed by disparate units at national level which also run parallel to the DHIS (34). Regarding administrative integration, work done 15 years ago showed that both national and provincial programme managers failed to relinquish responsibility for programme operations to district managers and seldom performed their technical advisory tasks (45). More recent data from 2014 show that the situation had not changed much (34).

4.2 Implications of the research for district health system strengthening

District health system strengthening has been a stated policy objective for almost two decades in South Africa (31). The notion of health systems strengthening includes improving health system capacity in order to achieve sustained improvements across health services (211). Some argue that one of the reasons districts remain weak and perform poorly is the "preponderance of vertical programmes" (212). Whether programmes negatively affect health systems is an issue that is central to the integration discourse in LMICs (7, 22, 30, 172). The evidence is mixed. For example, some show that measles immunisation programmes can benefit routine general health services (generate additional financial resources, transfer of skills to generalist personnel) (213-214), and that the scale-up of HIV interventions does not negatively affect uptake of non-HIV services (215). Other research depicts how programmes undermines the ability of district health system managers to coordinate across health services (108), disrupt delivery of existing routine general health services (214, 216), and hamper coherence in the planning, coordination and monitoring of national health systems (108). Effects are often context-specific (7, 214).

This research does not measure health system effects of HIV M&E, but argues that some of the observed programme-system interactions may undermine district health system strengthening. First, running an ART M&E system that bypasses the district limits availability of programme data at district level and thus may limit district managers' potential to use programme data to comprehensively plan and monitor activities across all health services in districts (182). Running a parallel M&E to fast-track data reporting to national level also symbolises that the primary purpose of M&E is to submit data 'upwards' rather than use it to support service delivery in districts. Second, that district managers exercise authority over HIV data collation while programme managers retain control of using HIV for monitoring – "*horizontal production and vertical use of HIV data*" (129) symbolises that district managers are merely producers and not users of programme data and may undermine the extent to which they would use programme data for managing services.

Third, dual lines of accountability and duplication of effort observed in this PhD research may undermine district health system functioning by increasing fragmentation in the monitoring of health services. Dual accountability was observed when district-based personnel formally account to district managers but also informally account to provincial programme managers for their HIV M&E activities (182-183). Observed examples of duplication include: setting up a parallel M&E system; programme managers undertaking the same HIV data collation tasks as district managers but focussing only on their own HIV data); and managers using HIV data for monitoring in silos. In Paper 1, respondents cite the perceived inability of the district health information system to fast-track reporting of ART data as justification for a parallel ART M&E system (182), while in Paper 4, respondents cite poor district managers' capacity as justifiable reason to limit the amount of authority that district managers can have over programme operations (188). Finally, findings from Paper 4 highlight that the prevailing machine bureaucracy culture potentially undermines district

health system strengthening because centralised decision-making and high levels of formalisation limit the extent to which district managers are involved in operational decisions and can problem-solve at local level to improve services. That paper also argues that a culture of investing in programmes while ignoring district strengthening undermines stated policy aims (31-32) of developing the district health system as the foundational building block of the health system.

These research findings are consistent with other work documenting: how poor dialogue between district and reproductive health (93) or HIV programme managers (55) undermines comprehensive planning and management of health services within districts; and how the health system culture stifles lower level agency (217-219). Other work shows how the health systems fails to strengthen districts and instead vests power in programmes (210) which have become the "*de facto building block*" of the health system (145). Research in South Africa also shows that dual lines of accountability and duplication of effort (due to poor clarification of programme and district manager roles) causes tension and undermines district managers' authority over district-based personnel (93). Further work in South Africa shows that district-based HIV and maternal and child health managers perform the same supervisory tasks but separately (each focussing on their specific programme operations), thus leading to "*unnecessary duplication of efforts and increased transaction costs for facility managers*" (34). Duplication of effort should not be happening in South Africa where the limited availability of human resources is an important health system constraint (12, 220). Creating duplicative M&E mechanisms that by-pass the district in order to satisfy HIV data needs at national level mimics how some donors and Global Health Initiatives establish parallel M&E systems in recipient countries in order to exercise control over the monitoring of their funded programme activities (221). Arguing that district managers should not have authority over HIV monitoring because they lack capacity is circular, reinforces their incapacity, and

discourages them from exercising agency. Importantly, it is a missed opportunity to address existing weaknesses. Building a capacitated district health system management workforce would not only advance administrative integration aims but also be in accordance with stated district health system strengthening objectives.

4.3 Proposed actions to maximise synergies

Maximising positive synergies between programmes and health systems is about finding practical ways for programme and health system functions to positively interact for mutual benefit (25). Based on lessons from this thesis, actions that health managers and policy makers could take in order to maximise positive synergies are proposed, while considering what would be realistically feasible for South Africa's context. It is anticipated that lessons from this HIV M&E case study will have broader relevance for other programmes in South Africa, and other health system functions besides M&E.

A phased incremental process

When considering how to go about implementing initiatives to achieve greater degrees of integration, it is important to think about the realities of the South African health system context regarding district health system capacity constraints (118). This thesis finds that there are real capacity constraints at district level in that district managers possess low levels of HIV M&E knowledge, and certainly lower than programme managers (129). Further, district health information system weaknesses are documented in the literature (222-224). A phased incremental process is thus recommended aiming to progressively achieve greater degrees of integration to avoid undermining absorptive capacity within districts (2, 8). Some verticality may thus be necessary in some programme aspects while capacities are strengthened. Scale-

up should be guided by operational research and periodic evaluation to assess health system effects (both positive and negative) (225). A bottom-up inclusive process is advisable, as including all relevant players in defining how integration should happen is important to engender ownership and acceptance of the new ways of working (226) which can also foster a change in organisational culture.

Actions to achieve greater degrees of integration

I propose that the approach to integration should include actions to achieve greater operational and administrative synergies in HIV M&E as well as foster more collaborative communication between programme and district actors. Making integration happen in practice however requires more than policy statements. Good leadership is also needed to create an organisational culture in which integration can actually happen. Focussing interventions at operational, administrative (managerial) and broader organisational levels is important because M&E systems are not only about operational or technical elements (171, 227). Experiences in Uganda shows that developing and sustaining a well-performing M&E system is hampered by focussing on technical changes and ignoring organisational reform as strengthening management and creating a culture in which information-led decision-making is valued and institutionalised as the norm (227).

Actions to achieve greater degrees of operational integration

Operational integration of HIV M&E can minimise fragmentation in the production of health information. Greater integration could be achieved by merging (or greater linkages where merger is not possible) all HIV data collection and collation forms, data analysis software and other technologies, as well as information dissemination mechanisms with those of the overall district health information system. As this thesis was undertaken at a time of rapid

change in the HIV programme, including in the HIV M&E system, over the course of the research, some actions were taken by the National Department of Health (NDOH) to alleviate some of the observed fragmentation reported in Paper 1. Notably, the NDOH decided that all ART indicators were to be channelled through the DHIS (summary ART data could now be exported from TIER.Net to the DHIS – as was observed in Site B of this research). This decision reflects policy intent towards achieving greater operational integration of the HIV M&E system. These linkages between TIER.Net and the DHMIS however need to be fully implemented in all districts. Observations in both study sites indicate that actions are however needed to achieve greater operational integration at the micro-level. HIV M&E personnel (clerks, information officers, managers) should be integrated within the system-wide information system in order to minimise duplication of effort, and generalist staff should be trained to collect HIV data and maintain HIV records. This was achieved with success in Zambia where generalist registry clerks valued the new knowledge they had acquired through being trained on ART record-keeping (111).

Further, simplifying M&E system can improve the availability and quality of data (228-229). The M&E system could thus be simplified in order to ensure the quality of HIV data once they are integrated within the DHIS. A simpler system could be achieved by reducing the number of HIV data elements and M&E forms, reducing the number of reporting channels, and collecting only those data that are essential for management decisions. A recent review shows that scaling up the ART M&E system outside the DHIS has meant general data managers do not understand the ART M&E systems and so cannot provide support to improve the quality of ART data (34). A higher degree of operational integration – coupled with training on HIV M&E – could therefore potentially enhance the quality of HIV data that are produced through the DHIS. It is notable that during the course of this PhD research, some actions had been taken by the National Department of Health to simplify the HIV M&E

system – such as reducing the number of ART elements that are collected and indicators that are reported, as well as minimising the number of HIV data recording tools.

Actions to achieve greater degrees of administrative integration

In light of HIV M&E capacity constraints, authority for using HIV data should be progressively transferred to district managers as their HIV M&E capacity is developed. This thesis shows that actions are particularly needed at a broader organisational level in order to make administrative integration happen. Organisational change that supports administrative integration might mean transforming the rules-based and technostructure-led machine bureaucracy by institutionalising behaviours and practices that shift the balance of power in favour of district managers being the key players. Essentially, it's about adjusting and better managing organisational parameters (differentiation and coordination mechanism) to ensure they support integration (230). Managing coordination might mean adopting a less formalised approach that is output-based (standardisation of outputs) (40) and encourages district managers to exercise agency in the monitoring of programmes. Standardisation of outputs could be coupled with cultural coordination mechanisms wherein managers at all levels should adopt a collaborative approach and encourage their personnel to also do so.

Managing differentiation might mean clearly documenting (in written guidelines or operating procedures) and distinguishing district and programme managers' roles so that that these actors may execute tasks according to their expected respective M&E oversight and support roles (231). For example, programme managers' specialist support roles can be defined as: training district management teams in HIV M&E and conducting field supervision visits to provide expert on-the-spot coaching to health providers and managers (56). Ensuring district and programme managers perform their respective expected roles (with no overlap) is a more

efficient use of scarce human workforce. Managing differentiation also means managers and leaders changing their practices and holding district and not programme managers accountable for oversight of HIV data collation and for using HIV data to monitor progress with uptake of interventions. It also means making the specialised HIV M&E expertise that currently resides at provincial level available within districts where it is needed. This might be achieved by deploying programme managers to work in districts on a rotating basis, or permanently relocating some to districts where they would also be better positioned to interact closely with district managers.

When scaling up administrative integration it is important to carefully consider district managers' absorptive capacity (43). While, continuing to work in programme silos may not be ideal, overwhelming district managers with programme oversight responsibilities that they are ill-equipped to execute is not advisable. This research highlights the need to build district managers' technical competency to interpret and optimally use HIV data for monitoring. Equipping district managers with this skill may encourage them to exert the authority that they already have and desist from deferring to programme managers. For the role re-allocation to work, programme managers may require re-orientation to their technical M&E support role. Based on experiences in South Africa and elsewhere, programme managers may resist relinquishing programme oversight roles for fear of losing resources or their privileged statuses (75, 88). This resistance should be anticipated and managed as part of the integration process.

Actions to achieve more cohesive communication

Actions are also needed to bridge communication gaps between provincial programme and district managers. More cohesive communication is important if these actors are to work

interdependently in an integrated model, as it would potentially allow the exchange of ideas and transfer of expert knowledge from programme specialists to district managers (29) and facilitate joint use of data for monitoring of services (232). Various liaison devices could be explored in order to foster more cohesive communication networks. Liaison devices – mechanisms to encourage informal communication and joint working between different components of an organisation – are ideally suited for more organic organisations such as adhocracies, milder devices (structures such as standing committees or liaison persons) can be used to increase flexibility in other organisation types (40). Liaison devices may be apt for South Africa's differentiated health system where programme work is quite specialised and highly interdependent, thus necessitating informal communication across both levels of hierarchy and programme/district divisions (129). Standing committees are useful to encourage regular contact between actors from different parts of the organisation to discuss matters of common interest (40). Others document that standing committee meetings are commonly used for coordinating HIV programme activities in South Africa, but seldom foster coordinated efforts (132). Further, while standing committees facilitate information-sharing (132, 145, 233) they can fail to institutionalise unity of purpose when actors view them as ends in themselves rather than as means to improve coordination (132) and when they are ad hoc and not sustained (233).

This PhD reveals that several standing committees already exist where matters relating to HIV data are discussed; but that these do not effectively foster discussion and joint HIV monitoring between district and programme managers (183). These existing standing committees could be transformed such that they better support collaborative relations by making them more inclusive and constructive. For example the multiple standing committees convened at provincial level that focus only on HIV (each focussing on HCT, PMTCT, or ART) could be merged and instead convened within districts where district managers would

chair the meetings while provincial programme specialists attend as advisors to provide on the spot expert guidance. Liaison persons can also be used to institutionalise collaboration. For example, liaison positions could be appointed – persons specifically tasked to channel communication between actors over whom they have no formal authority (40). This thesis reveals that, by virtue of their network position, district-based HIV programme managers are best-placed to serve in liaison positions, but they would need to be appointed at a senior enough level in the hierarchy to play this role (183). Alternatively, integrating managers can be used if liaison positions are unable to foster sufficient communication. Integrating managers do not exist in South Africa's provincial health system context. Such a position could be created and filled with a senior manager (to whom both provincial programme and district managers account for cross-cutting decisions) who would use powers of persuasion to influence actor behaviours and ensure collaboration is accepted as the new norm (233). Essentially, the liaison manager requires "*the ability to stand between conflicting groups and gain the acceptance of both without being absorbed into either*" (40) (pg. 84).

Addressing health system factors that drive greater degrees of verticality

Besides the organisational structure, other health system characteristic can influence the rate and extent to which programmes can integrate within the health system. These include financing mechanisms, resource availability, and individual and institutional capacity (14, 74). These factors need to be understood and considered when deciding to scale up integration. This thesis does not assess the influence of these kinds of characteristics on the extent of integration. However it emerged from the research that real and perceived district health system capacity constraints (individual and institutional capacity), as well as the HIV programme funding model may be key drivers of a vertical M&E approach. It is therefore

proposed that integration scale up should be coupled with actions to address these drivers. The suggested actions are described below.

Addressing capacity constraints within the district health system

Integrating programme functions within the health system M&E function cannot be sustained without the system as a whole being better resourced (14). Lessons from experiences of integrating reproductive health programmes in LMICs are that little progress can be made in the absence of health systems strengthening (increasing human workforce numbers and capacity, improving supervision of services, strengthening management support systems, and ensuring sustainable funding) (49). Further, experiences elsewhere show that poor managerial capacity can limit the extent to which district managers can exercise authority in managing their newly allocated programme management role (43).

This PhD reveals that district managers possess limited HIV M&E technical knowledge, which limits the extent to which they use HIV data for monitoring (129). Other research in South Africa similarly shows that district managers largely lack the knowledge needed to use data for monitoring maternal health services (145). This highlights the need to develop district managers' technical skills. Further, though not shown in this thesis, others work in South Africa documents gaps in district managers' managerial capacity, highlighting the need to build district managers' managerial skills (149, 170). As a review of integration experiences in LMICs shows, investing in building the knowledge and skills of district managers and providing them the resources and tools that they need to oversee programme operations, is an essential aspect of scaling up administrative integration (49). Statements of intent are not sufficient. During the last two decades, intents to strengthen district health system and district managers' capacity have been expressed (31-32) but not adequately translated into action (234); while those training initiatives that have been implemented do

not adequately address district managers' capacity development needs (170, 217). A proper needs assessment is required, as well as new ways of developing capacity, such as approaches tested and found to be effective in South Africa that focus on continuous mentoring and supportive supervision of district and sub-district managers rather than once-off workshops (217). District health information system capacity constraints are also documented in the literature, including: incomplete reporting, delayed availability of information, poor or obsolete HIS infrastructure, and poorly skilled health information personnel (222-224). Achieving greater degrees of operational integration will thus also require district health information system strengthening. Simply merging HIV data and processes within DHIS mechanisms is not sufficient. A government-commissioned review of HIV-related programmes in South Africa shows that integrating programme data within the DHIS without building the capacity of the information systems and DHIS personnel can compromise data quality (34). This point is underscored by research in South Africa depicting the poor accuracy and completeness of PMTCT data that are integrated within the DHIS (235).

Considering the effects of the silo HIV programme funding model

The literature documents how external donor demands on national governments drive vertical M&E systems in LMICs (56, 221). Creating vertical donor-funded machinery often places a heavy data reporting burden on health personnel and systems in recipient countries and contradicts Paris Declaration principles of harmonised in-country coordination (22, 24). This thesis reveals a less well documented situation in which the national government (which funds the HIV conditional grant) places data reporting demands on its own largely domestically-funded provincial HIV programmes (recipients of the HIV funding), thus seemingly driving parallel and duplicate M&E mechanisms. In this thesis, senior provincial managers cite how strict ART data reporting requirements – part of the conditions of

receiving the HIV funding from national level – forces them to maintain a parallel ART M&E system (182), develop HIV business plans in silos (188), and use dedicated accountability mechanisms (129, 182). While the HIV conditional grant provides a legal mechanism for national government to ensure provinces spend on national priorities (155), the attached conditions cause an undue burden and facilitate fragmentation.

In light of these observations, policy-makers should consider other mechanisms and funding models that are less disruptive. For example, as seen in the urban site for this PhD research, it is possible to export summary ART data from the ART M&E system to the DHIS. In a less fragmented approach, national managers should be compelled to extract the HIV data that they need from the DHIS platform rather than requiring district and provincial HIV programme or HIV information managers to submit these to them through parallel processes. The decision by the National Department of Health to report ART data through the DHIS, thus requiring provincial and national actors to extract ART data from the DHIS, indicates that this action has already been taken. This is a step in the right direction that has the potential to minimise fragmentation. Also, while district capacity is progressively developed, HIV funding could instead be allocated to district managers who would then be held accountable for spending it on HIV activities. A 'diagonal' approach could be applied whereby HIV funding could be leveraged to provide resources for health system development while also addressing HIV programme goals. For example, HIV funds could be used to build the capacity of the DHIS to produce more timely and reliable programme as well as general data. The funding could be used to pay salaries of HIV M&E personnel who are absorbed within the DHIS on account of operational integration, train generalist health workers on HIV data collection processes, and improve DHIS infrastructure. Lessons can be learned from Nigeria where ear-marked HIV funding was leveraged to train all laboratory personnel and

rehabilitate general laboratory infrastructure, leading to improvements in the quality of laboratory performance, thus addressing both programme and health system needs (236).

The need for an enabling leadership that can advance organisational change

The findings of this research suggest that making integration happen will require bold and decisive leaders who are prepared to be catalysts for organisational cultural change. As Tsai argues, organisational culture – which reflects behaviours that are socially learned and perpetuated by organisational members – is positively correlated with leadership behaviour (237). As such, health system leaders (policy-makers and managers at all levels) should modify their behaviours in order to facilitate cultural change. Aligning organisational culture to integration could mean leaders at all levels adopting behaviours and practices that are consistent with the vision of integrated services, such as: sharing the vision with subordinates and allowing dialogue; rewarding those who choose to communicate and work jointly; holding district rather than programme managers accountable for programme monitoring in districts; supporting and enabling district managers to exercise agency in executing this role without always having to await approval from 'the top'; and breaking away from entrenched patterns of communication that do not support an integrated approach. Changing entrenched behaviours, attitudes and ways of working is however challenging (88, 94). This was seen in Tanzania when programme managers at higher levels of the health system felt threatened when their responsibilities were shifted to decision-makers at district level (88). Other research on integration of the health information system in Tanzania shows that those who lose power may try to re-assert their positions by undermining the process of integration (226). This underscores the need for leaders to anticipate, and find ways of effectively managing, resistance to change. Translating administrative integration policy into practice will require leaders who are willing and able to take on the challenges; the kind of leadership

that understands what the health system seeks to achieve rather than just continuing to do what has always been done.

4.4 Contribution to understanding and measuring integration

One of the aims of this research is to contribute new methods for measuring integration. This thesis contributes methodological innovations for measuring integration and thus contributes new knowledge that enhances understanding of the dynamics and extent of programme integration at sub-national level. This is an important contribution, in light of the dearth of health systems research analysing the extent of programme integration at district health system level. This thesis provides the first ever data on the nature and extent of interactions between programme-specific M&E and system-wide M&E function at sub-national level in South Africa. Because there has never been a study to define a model of programme integration at district level, evidence has been lacking on how programmes interact with the district health system in South Africa. This research contributes by conceptualizing a model of integration. Insights gained from testing this model could be used to inform policy and further research.

Methodological innovations

A key innovation of this research is that it adapts and applies existing methods from different disciplines in new ways to health systems research to provide quantifiable measures of the extent of programme integration within a district health system. Crucially, triangulating results from the different methods results in similar conclusions. The key methodological innovations are as follows.

- Adapting Atun's existing analytical framework to measure the extent to which HIV M&E operations are integrated within the district health system M&E function.

- Adapting the existing decision-space framework to develop a new approach and measurement scales for measuring the extent to which administrative authority over programmes is transferred from programme to district managers. Application of this novel approach describe the extent of administrative integration and reveals the specific programme and district manager M&E tasks that overlap and the extent to which they overlap – thus identifying exist an entry point for interventions to address duplication.

- Applying social network analysis (SNA) – a method extensively used in the social sciences – for the first time in a LMIC to analyse the nature and extent of communication interactions between programme and district managers, with a view to enhancing understanding of some of the complex relationships between programmes and district health systems. This study provides measures that quantify the extent (cohesiveness) of communication interactions – and thus provides quantifiable measures that can be tracked over time and compared across districts as integration is progressively scaled up.

- Applying an organisational lens to describe the health system organisational structure and culture. This research applies Mintzberg's configurations framework (a tool largely applied in organisation science research) to the South African health system for the first time to generate data on the complex ways in which tensions in the structure and culture may influence the success of administrative integration. The research also generates data to inform the kind of adjustments needed to structure and culture in order to create an organization supportive of integration reform.

Box 4 outlines some personal reflections on challenges and successful applying the methodological innovations and tools in this thesis.

Box 4: Personal reflection on my experience of applying the methods and tools

Conceptualising the methods and tools was itself a significant challenge because the concepts that I measure in this thesis are quite complex. In this thesis, I found that developing tools for measuring administrative integration was the biggest challenge as this concept had not ever been measured. Further, the approach that I adopted to collect data on administrative integration was challenging. Because there were no previous studies measuring administrative integration to inform my approach, I opted to collect data through semi-structured interviews and then use these data to develop a numerical HIV M&E scale and sub-scales. The semi-structured interviews worked well because they allowed me to apply a conversational style of interviewing to obtain detailed information about the specific tasks that each respondent performed regarding HIV M&E. I suspect a structured data collection tool may have missed some nuances because some managers felt uncomfortable describing what they do / don't do and responded only to prompt questions. However, the interviews were long – none was less than one hour – and so this may not be a practical data collection approach for large studies aiming to measure administrative integration. I would recommend to anyone intending to apply my methods and tools in larger studies to rather use a structured data collection tool with questions based on the sub-scale items that I developed for measuring the extent to which district actors perform programme-related tasks.

Though there have not been any previous SNA studies analysing communication between district and programme actors, there is a vast amount of literature describing the application of SNA methods and providing guidance on how SNA questions can be framed. In this research, I administered the SNA questionnaire (25-30 minutes) immediately after the key informant interview, which meant I did not then need to make a second appointment with each respondent just for the SNA survey. Participants responded positively to the SNA questions about who they talked to about their HIV M&E tasks. However, many found it difficult to recall how frequently they talked to other actors, and so I was not able to analyse the intensity of their communication. In my view, the SNA questionnaire that I applied in this thesis can be easily applied as a self-administered questionnaire; I would recommend this approach for large studies.

This research does not measure the health system effects of the extent of programme integration. However, quantifying the extent of integration provides the basis upon which

further research can be done to analyse the effects of different degrees of integration on the districts health system. This research provides a model, tools and integration metrics that could be applied in such research. For example, data and methods from this thesis can be used to inform future research that seeks to evaluate associations between different degrees of integration and health system outcomes (e.g. performance, health outcomes).

4.5 Limitations and the challenge of analysing integration

This research has a number of limitations and challenges that are elaborated in greater detail in the papers. This section focuses on two key questions regarding limitations of the overall research approach: a) whether the research is representative of the South African health system and programme context, including whether the hypothesised model is appropriate; and b) whether HIV M&E is an appropriate exemplar for this analysis.

Is this representative of the South African context?

This research is conducted in one district per province in only two of South Africa's nine provinces – representing two out of 53 districts in the country. The limited number of sites may limit generalisability of the findings to other districts. However, the two districts are not selected to be representative of the country but rather to be used as case studies for providing data on integration experiences. It is anticipated that these experiences are likely to be relevant for other districts, especially those in provinces that operate an HIV M&E system. Further, the findings of this research are consistent with other documented experiences of programme integration in South Africa and with research describing the health system organisational culture. This suggests that the experiences observed here may reflect practices in other provinces. Further, based on the experiences documented in other studies, it would

seem the situation regarding programme integration may in reality be even more complex than that depicted in this research which focuses only HIV M&E.

Integration is a complex concept that is not consistently defined in the literature. It is for this reason that a significant part of this thesis is dedicated to providing conceptual clarity regarding what integration means in the South African context. The hypothesised integration model proposed for this research seeks to capture the essential programme aspects that could be integrated within district health system functions. A limitation is that the face validity of this model was not tested with key informants working within the South African health system. However, the model is informed by the literature and an understanding of the South Africa's health system and programme context based on published research and documents, and the researcher's own experience. The model provides a basis for further testing in the South African context.

Is HIV M&E an appropriate and representative exemplar?

This research uses the HIV programme (as an example of a 'vertical' approach), which may not be representative of other programmes in South Africa. HIV has traditionally been more 'vertical' in approach than other programmes; with earmarked funding and a significant amount of political attention. Therefore, HIV M&E experiences may represent a more extreme example of a programme approach. Further the HIV programme evolves quite rapidly, so the nature, types and complexity of interventions currently in place may vary somewhat from what prevailed at the time of data collection. For example, the HIV M&E system rapidly evolved during the course of this research. During the first phase of data collection, it processed more than 100 ART data elements, but this number reduced significantly to 27 (in the urban site) by the time phase three was completed.

Another question is whether it is appropriate to use the M&E function as an exemplar. M&E is a particularly difficult health system function because health managers in South Africa do not routinely perform M&E tasks (particularly data use for decisions). M&E tasks is not consistently recognised and accepted as part of a manager's job role, whereas tasks related to the service delivery function are (34, 224). Thus, the M&E lens may be too narrow to provide understanding of broader issues regarding programme integration. Further, though this research focuses only on M&E (the information building block (1)), it is appreciated that a "systems thinking" approach to health systems analysis should ideally include three or more building blocks (238). This would allow some assessment of inter-relations amongst the building blocks and provide data on the ways in which a programme intervention can affect multiple health system building blocks (238). Examining interactions in this way generates evidence that can better inform health system strengthening strategies. However, as this research is explanatory in nature and does not seek to analyse health system effects of programmes, it was decided to focus on one programme and only one building block in order to allow an in-depth analysis which would not have been feasible had more building blocks been included. It is anticipated that the specific experiences based on this HIV M&E case study (and using the hypothesised integration model) provide useful insights that can be further tested with other programmes in more settings.

4.6 Conclusion

This research applies existing methodological approaches in innovative ways and triangulates data from the different methods to provide a nuanced understanding of the complex ways in which the HIV programme interacts with the district health system M&E function. By assessing the extent of operational and administrative integration and collaborative actor relations, the research reveals both positive and negative synergies and highlights that these

may affect the integration and district health system strengthening reform agendas in South Africa. The research findings suggest that achieving higher degrees of HIV M&E integration is not only about merging of personnel, technology, and management structures. It will require broader actions such as creating a supportive organisational culture, addressing districts health system capacity constraints, and revising programme funding models such that they do not exacerbate negative synergies. Lessons from this HIV M&E case study can inform these actions. The bottom line is that translating integration policy into action will require a bold and decisive leadership that understands the need to invest in health system strengthening for sustained long-term gains rather than continuing to strengthen single-purpose programme machinery in the pursuit of short-term gains.

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APPENDICES

Appendices A to C: **Published papers 1 -3**

Appendix D: **Paper 4: manuscript (submitted, under review)**

Appendix E: **Ethics clearance certificate**

Appendix F: **Data collection tool: semi-structured interview and SNA questionnaire survey with actors at sub-national level**

Appendix G: **Data capture tool for the social network analysis survey**

Appendix H: **Data collection tool: interview with actors at national level**