Original Research Article

Health system barriers and facilitators influencing TB/HIV integration in Ghana

Abstract

Introduction

A quarter of all TB cases in Ghana were HIV-positive at the end of 2012.The integration of TB and HIV services is anticipated to improve patient access to comprehensive care. Key health system components for successful integration are leadership and governance, health information systems, health financing, human resources for health, essential medical products and technologies, and service delivery This paper explores the health system barriers and facilitators influencing TB/HIV integration in Ghana.

Study design

A qualitative approach was employed, with the use of one-on-one interviews

Place and Duration

The study was conducted in the Eastern Region of Ghana between May and July 2009.

Methodology

Three hospitals were purposively selected as study sites. The sites included the referral site, partially integrated site, and the one-stop shop with increasing levels of integration. One-on-one in-depth interviews were conducted with purposively sampled TB/HIV patients, providers and managers. The audio recorded interviews were transcribed and thematically analysed using emergent codes.

Results

Twenty nine participants made up of 18 HIV-positive TB patients, eight providers and three managers were identified. Barriers included inadequate capacity, poorly motivated staff, different financial and information systems, irregular and misapplied funds and differences in access. Facilitators included political will, direct supervision, regular supply of drugs, and privacy and confidentiality.

Conclusion

The impact of facilitators needs to be enhanced to address related barriers. Standardisation of norms and values, as well as new staff training methods should be used to achieve staff behavioural changes towards integration.

Abbreviations

AIDS	Acquired immune deficiency syndrome
ART	Antiretroviral therapy
ARV	Antiretrovirals
CI	Confidence interval
CPT	Co-trimoxazole preventive therapy
DOTs	Directly observed therapy, shortcourse
GHS	Ghana Health Services
HIV	Human immunodeficiency virus
HTC	HIV testing and counseling
IQR	Inter quartile range
NGO	Non-governmental organisation
NHIS	National Health Insurance Scheme
OSS	One-stop shop
PIS	Partially integrated site
PLHIV	Person living with HIV
RS	Referral site
SD	Standard deviation
TB	Tuberculosis
UK	United Kingdom
VCT	Voluntary counselling and testing

1.0 Introduction

Ghana launched a TB/HIV policy in 2007 which sought to strengthen the health system to respond to the dual epidemic, decrease the burden of TB in persons living with HIV (PLHIVs), and decrease the burden of HIV among TB patients [1]. At the end of 2012, 24% of TB cases were HIV positive in Ghana [2]. The integration of tuberculosis (TB) and HIV services has become relevant due to the synergistic interaction of the two epidemics which led to a resurgence of TB and the escalation of HIV-related morbidity and mortality in sub-Saharan Africa [2-4]. Integration of health services is the organisation and management of health services to provide timely needed care that achieves results [5]: to reduce fragmentation and provide a comprehensive approach to service delivery [5-7]. The successful implementation of integration, however, requires a well-functioning health system to achieve the anticipated impact. Key components of a robust health system are leadership and governance, health information systems, health financing, human resources for health, essential medical products and technologies, and service delivery [8].

TB and HIV programmes in Ghana have differences [9] that have limited interaction in the past. Focus was on implementing individual core activities, but the changing determinants and distribution of both diseases resulting from their interaction, demands a broader approach. Integration is therefore seen as a mechanism to rise above the differences between the two programmes to facilitate the changes needed to address current TB/HIV challenges. The purpose of Ghana's TB/HIV policy was not to create a new national programme, but to strengthen collaboration between the existing TB and HIV control programmes. As part of the programme, TB patients are to be screened for HIV, and positive cases provided with co-trimoxazole preventive therapy (CPT) and antiretroviral therapy (ART) where

indicated. HIV patients are also to be regularly screened for TB and managed appropriately. Introduction of TB/HIV activities was done in initial pilot sites to be scaled up nationwide [1]. This paper was part of a PhD programme that used a mixed methods approach to evaluate the TB/HIV services in Ghana.

Health systems are highly differentiated units that require integration to be effective [10]. Differentiation leads to structural, cultural and political differences which foster fear of loss of territory, influence and resources in the face of integration [11]. Mechanisms for facilitating integration include direct supervision, standardisation and mutual adjustment [10, 12]. Others are funding, administrative, organisational, service delivery and clinical strategies [13], as well as thorough preparation and planning, strong leadership, teamwork and a shared vision [14].

Few studies on barriers of integration exist, and current literature suggests the need for more research on effective means of addressing health system-related factors [6,15-17]. We previously also published a paper that suggests that health system limitations may be a major barrier to effective implementation and evaluation of TB/HIV integration in Ghana (Ansa et al 2014) [18]. This paper explores the health system barriers and facilitators influencing the integration of TB and HIV services in Ghana.

2.0 Methodology

An ethnographic qualitative approach was used to explore patient and provider perspectives in their 'real' and natural settings.

Three urban district hospitals with three different service delivery models with increasing levels of integration were purposively selected as study sites (Tables 1-3).

Table 1: Relationship between the level of integration and different service delivery models [19]

Level of integration	Service delivery models	WHO descriptions

Linkage	Referral site (RS)	Entry via TB service and referral for HIV testing and care Entry via HIV service and referral for screening, diagnosis and treatment of TB
Collaboration	Partially integrated site (PIS)	Entry via TB service and referral for HIV care after HIV testing Entry via HIV service and referral after TB screening
Full integration	One-stop shop (OSS)	TB and HIV services provided at a single facility

The sampling frame included all TB/HIV patients registered at the three sites during data collection from May to July 2009, service providers working during that period, and national managers.

Table 2: **Characteristics of TB cases at the study sites[20]**

	Level of integration (%)			
	OSS	**PIS**	**RS**	**All sites**
Gender	**N = 207**	**N=132**	**N = 251**	**N = 590**
Female	43.0	48.5	33.1	40.0
Male	57.0	51.5	66.9	60.0
Age	**N = 207**	**N = 132**	**N = 250**	**N = 589**
Mean (S.D)	41.8 (18.8)	41.4 (17.4)	41.6 (18.4)	41.6 (18.3)
Median (IQR)	39.0 (24)	39.0 (22)	40.0 (25)	40.0 (24)
Range	2 - 105	3 - 86	1 - 97	1 - 105
Patient type	**N = 207**	**N =132**	**N = 251**	**N = 590**
New	91.3	89.4	90.0	90.3
Defaulter	0.5	2.3	1.6	1.4
Failure	3.4	0	5.6	3.6
Relapse	4.3	7.6	2.4	4.2
Month 0 Sputum	**N = 188**	**N = 113**	**N = 208**	**N = 509**
Number screened	99.5	98.2	98.1	98.6
Number positive	57.2	46.8	54.4	53.8
Outcomes	**N = 199**	**N = 121**	**N = 247**	**N = 567**
Cured	22.6	30.6	28.7	27.0
Completed	30.2	45.5	49.8	42.0
Died	18.1	21.5	15.0	17.5
Defaulted	3.0	0	0.8	1.4
Failed	1.0	0.8	4.0	2.3
Transferred	24.1	0.8	0.8	9.0

Key: S.D – Standard Deviation IQR – Interquartile range

Table 3: TB/HIV activities across study sites [26]

TB/HIV indicator	**Level of integration**		
	OSS (95% CI)	**PIS (95% CI)**	**RS (95% CI)**

TB cases screened for HIV	98.6 (97.6-99.5)	91.7 (90.3-93.0)	72.5 (71.9-73.1)
TB cases screened and are HIV positive	47.0 (46.6-47.5)	65.3 (64.2-66.3)	35.7 (35.3-36.1)
HIV-positive TB cases on CPT	82.3 (80.6-84.0)	74.7 (72.8-76.5)	93.8 (91.0-96.7)
HIV-positive TB cases on ART	0	59.5 (58.0-61.0)	10.8 (10.4-11.1)

ART: Antiretroviral therapy; CI: Confidence interval; CPT: Co-trimoxazole preventive therapy; HIV: human immunodeficiency virus**;** OSS: one-stop shop; PIS: partially integrated site; RS: referral site; TB: Tuberculosis

Purposive sampling was used to identify eligible participants based on the inclusion criteria to ensure diversity of opinion and inclusion of key informants (Table 4).

Sample size was informed by sampling sufficiency by adequate representation of key informants (Table 4).

Table 4: **Inclusion and exclusion criteria for participants and study sites**

	Inclusion criteria	**Exclusion Criteria**
Participants		
Service providers	Facility TB/HIV co-ordinator DOTS centre treatment room nurse HIV centre nurse/physician Trained in TB treatment or HIV clinical care Training on TB/HIV co-infection	Not currently active in clinics
Patients	TB patients who are: - HIV positive - Male or Female - Completed at least a month of the intensive phase or in the continuation phase	Critically ill patients
National Managers	Programme Manager or representative TB/HIV Coordinator	None
Study sites		
	District Hospital TB diagnostic and treatment centre Use of new national TB Register for facilities ART centre Staff trained in TB/HIV co-infection & management Use of national TB/HIV management guidelines Urban location	

Eligible patient participants identified from the TB registers who were due for review during the study period, or could be contacted by telephone, were initially approached by their provider to inform them about the study and seek their participation. Following an initial verbal consent, an interview date was scheduled. Face-to-face in-depth interviews were used for data collection to generate rich and relevant data from key informants. Before the interviews, the study was explained to each participant and written consent obtained. Particular attention was given to voluntary participation, use of the information collected, and measures to preserve the privacy and confidentiality. Interviews were held in English and interpreted into two local languages by teachers of the local languages who had been trained on the study as well as the questionnaire where relevant. Interview guides were used to explore participant experiences and perspectives on the implementation of TB/HIV integration.

Being an exploratory study, sampling sufficiency was the objective as opposed to saturation. For patients, the interviews explored living with TB/HIV, accessing care, and experiences and perspectives relating to TB/HIV. The service provider interviews focused on delivering TB/HIV services while implementation, monitoring and evaluation of the policy were topics discussed with the managers. All interviews were audio-recorded. The interviews were transcribed verbatim (after translation and back translation where relevant), and a thematic approach used to analyse data in Microsoft Excel using a-priori emergent themes. Ethical approval was obtained from the University of Leeds as well as the Ghana Health Service. The issues of reflexivity addressed relate to methodological and theoretical openness, awareness of the social context of the research, and the wider social and political contexts [21].

Table 5: Sample size and study population

Sample size (29)	Study Population
National Managers (3)	TB Programme Manager HIV Programme Manager Representative TB/HIV Co-ordinator
Facility Providers (8)	2 HIV nurse prescribers 1 TB/HIV nurse prescriber 4 TB nurses District TB Co-ordinator
TB/HIV Patients (18)	5 in Intensive Phase of TB treatment 13 in Continuation Phase of TB treatment

3.0 Results

Twenty nine participants were interviewed (Table 5). The provider participants included seven females and four males and their level of experience of working in TB or HIV ranged from one to 14 years. Among the 18 patient participants, 10 were males and 8 females, and they had been living with HIV for 2 months to 15 years. The youngest patient participant was 18 years. All but one of the patient participants had been working prior to the illness (Table 6).

Table 6: Occupations of patient participants before illness

Activity	Number of participants
Selling cooked food/foodstuffs	6
Farming	4
Construction site workers	2
Students	2
Small scale mining	1
Barber	1
Shop attendant	1
Unemployed	1

Patient and provider interviews were held in the hospitals and lasted between 15 and 60 minutes, averaging 30 minutes. Interviews with managers occurred in their offices and lasted a minimum of 60 minutes, with the longest lasting 75 minutes.

There were six sub-themes identified: working in TB/HIV, living with TB/HIV, managing TB/HIV, paying for care, TB/HIV perspectives, and barriers and facilitators. Codes from patient and provider findings were initially identified and then integrated by combining them to obtain the six sub-themes. The results presented here relate to health system barriers and facilitators of integration.

Health system barriers

Financing

The different financial systems of the two programmes serve as a barrier because although both programmes are funded through the Global fund, this is vertical and comes for specific activities. One manager reported that TB and HIV staff get pre-occupied with satisfying funding agencies and forget to plan and merge activities, to the detriment of integration.

Four out of the eight facility providers stated that the enablers' fund, which is part of the Global fund support and used to support needy patients was irregular at the facility level, making it difficult to plan with effectively. Another manager also responded that due to delays in the payment of government funds, some district managers use the enablers' fund to support other health system functions.

'the District Director of Health Services does not use (the money) for only enablers... they are saying that it is the 'enablers' that is running the medical system, because monies are not coming in the way it should' (Manager 1).

Workforce

Of the 11 health personnel, 5 reported that the lack of adequate numbers of staff especially at the district level and below was a major barrier due to attrition or transfer of trained staff, and unwillingness of trained staff to work as TB/HIV staff. Some staff felt it was voluntary, while others attended training for the allowance.

"...the workload is heavy and we need a doctor. They come and work briefly, and then they go on leave. Next, you are told that they have gone abroad; they are going to do another course or travelled somewhere" (TB Nurse/HIV Prescriber at PIS)

Four out of eight respondents at the district and facility levels reported that poor staff morale was a barrier due to the heavy workload, increasing patient numbers and lack of resources.

"even with the room here… it looks like nobody cares about the place... personally, I'm not happy about the things…Look at our chairs. Look at the chairs TB patients come to sit on… no cupboard...to pack these things to make the place look neat" (TB Nurse at PIS)

Statistics and information

Participants felt documentation, data collection and feedback was poor. The two programmes have separate and parallel recording and reporting systems with different indicators from the facilities, requiring constant exchange of information at all levels. TB/HIV indicators were regularly reported on from the TB programme but not from the HIV programme, leading to gaps.

Governance

Two out of three managers were of the opinion that collaboration at the national level was not satisfactory:

‘ joint monitoring and evaluation ... at the national level is weak. We do independent monitoring, but we expect that twice in a year staff on the two programmes get together’ (Manager 1)

Service delivery

One nurse at the RS and one manager suggested that at the regional and district levels there were professional jealousies among some providers who feared the loss of influence and power that comes with integration, thus resisting the change. Their actions to protect their functional territories undermined integration:

‘...when they give people money they tend to form kingdoms...forgetting that at the end of the day we are looking at one patient...’ (Manager 3)

‘people who ... are used to working in a certain way (are) asked to immediately reconcile (their) activities with another... People feel threatened by it’ (Manager 1)

Differences in access to TB and HIV services serve as barriers. At the time of this study comprehensive HIV/AIDS services were available only in Teaching Hospitals, Regional hospitals and some District and Mission Hospitals [22]. There were 422 HIV counselling and testing sites as opposed to 1600 TB treatment sites [23].

’... initially, HIV was doctor-led. So, if you were not a doctor, you can’t give ART...Doctors can’t be everywhere’ (Manager 1).

‘ART treatment should be rapidly decentralised’ (Manager 3)

Programme workers focus on achieving the goals of their units with staff unable to move away from these established ways of doing things. Some TB physicians therefore failed to look for any other illness apart from TB, neglecting other co-morbidities that may influence outcome. Some monitoring teams visiting service

delivery points look out for only TB or HIV activities instead of doing both to facilitate integration.

> 'Sometimes everybody is busily doing their activities; and we forget that we have to merge some of our activities and plan them together. So I plan,, to visit my TB sites. But I forget to add on that in the same TB clinic, I could be looking at the HIV clinic and finding out the challenges they have... Some of us do; some of us don't do'. (Manager 3)

An impact of the heavy workload and inadequate staff numbers is the long patient waiting times and long working hours for staff during the HIV care clinics which are held once or twice a week. Three nurses and four patients in the RS and PIS complained of long waiting times for patients:

> "when they come and then they think they are keeping long, they become angry. They can say all sorts of things" (VCT nurse/HIV prescriber at RS)

Health system facilitators

Financing

Providers and patients were of the opinion that the National Health Insurance Scheme (NHIS) should be extended to cover the antiretroviral drugs (ARVs), and the enablers' package made more regular as these facilitate integration. And the provision for patients to be given their ARVs on credit was a good strategy,

> "...even if you don't have money, you come. We shall credit it (drugs) for you" (VCT nurse/HIV prescriber at PIS).

Workforce

Different people had been trained in different skills so that each one knows what is expected of them as well as what is expected from others: nurses have been trained

as adherence counsellors and prescribers, and there were also data management staff specifically responsible for record keeping and reporting. There were also plans to train doctors in the management of TB co-morbidities and complications to strengthen capacity at the district level.

Medicines and Health Products

Respondents at the district and facility levels attested to the fact that there was regular supply of programme-related logistics, drugs and reagents:

> 'the only thing that makes it easier is that you have the things available. So, when the patient comes, you don't have to be running about' (TB Nurse at PIS)

> "the drug for the disease itself I always get there" (Female patient at RS)

Other interventions like the community-based care, patient health education, and the use of fixed dose combination drugs with the elimination of injections for treatment of new TB cases were identified as facilitators.

> "there has been no default because there are no injections…"

Statistics and information

The TB/HIV policy identifies a number of outputs whose indicators are used to monitor the integration [8]. These standardised outputs facilitate integration. At all the three sites all the indicators were reported on except the number of TB cases identified through the HIV clinics.

Governance

There is strong leadership and political will at the national level for TB/HIV in Ghana. Leadership demonstrated responsiveness by regularly reviewing guidelines and protocols in order to achieve set objectives of TB/HIV integration. The TB screening tool was introduced to facilitate TB screening of PLHIV,

"if you did a thorough analysis of the (HIV patient) booklet…it's gone through a lot of phases. And it's been revised about twice". (Manager)

All three managers stated that the leadership role of the Regional Deputy Directors of Health, who are also responsible for Public Health, had been instrumental in ensuring coordination at the district level. This direct supervision of work provides leadership and ensures that the teams collaborate and do monitoring together. In districts where there was one person as the coordinator for both TB and HIV, integration worked better.

The availability of a national policy and treatment guidelines which were used to train staff ensured that common procedures and tasks are clearly specified. Coordination therefore occurs through the standardised design of TB/HIV-related activities nationwide.

Service delivery

The existence of TB/HIV teams in hospitals, districts and regions is a further strength of integration, as this encourages both formal and informal communication at all levels with mutual adjustment to achieve common objectives. Managers have been particularly interested in team building as a means of promoting integration at all levels through flexible communication between the integrating units. Providers also described situations where nurse prescribers identified and managed routine HIV cases so the doctors handled those who were ill or had complications. This helped to reduce the waiting time. There were instances where the different teams at the site coordinated to supply both TB and HIV drugs on the same day, especially for patients who travelled long distances.

All providers attested to the fact that private one-on-one counselling services were provided for HIV testing and counselling services met patient need for privacy

and confidentiality, and facilitated uptake of TB/HIV activities. In addition, providers ensured secure storage and restricted access to patient folders. Only TB/HIV staff had access to these folders. Patients determined who to disclose their status to.

> 'I do not disclose someone's status to another person. If someone else will do it, I cannot tell' (TB Nurse/HIV Prescriber).

> 'They have their privacy, because during counselling it's only the patient who will be with you in the room' (TB Nurse/HIV Prescriber).

4.0 Discussion

This study explored the health system-related barriers to and facilitators of TB/HIV integration in Ghana.

Barriers to integration

Findings from this study suggest that inadequate human resources and existing financial management practices were key barriers to integration. This corroborates the findings of Gyapong et al [14]. Human resource barriers included overburdened and poorly motivated staff, and a high rate of staff attrition [15-17, 24, 25]. This results in long waiting times [17], and missed opportunities to offer TB/HIV services [26]. Although staff are well trained in the TB/HIV guidelines, this knowledge has yet to be translated into appropriate attitudes and behaviours to overcome fear of loss of territory, influence or resources to support integration. This contributes to poor implementation of joint TB/HIV activities and poor quality of services [15].

The financial challenges were not due to lack of resources but how available resources were managed. Stringent demands by different funding agencies were limitations to collaboration between the two units as noted by Uwimana et al. [15],

318 while other administrative decisions and procedures led to delays in release of
319 monies to the districts for health system functions.
320 National level collaboration was weak, re-echoing observations of Uwimana et
321 al. [15]. The study identified poor documentation and data collection, and lack of
322 feedback as barriers, as did Okot-Chono et al [17], and resulting in poor monitoring
323 and evaluation. Improving data quality should therefore be prioritised. Fraser et al.
324 [26] suggest that electronic information systems can be used to support
325 overwhelmed staff to track and follow-up patients, provide access to extensive data
326 for providers and address challenges of referrals, feedback, and duplication.
327 The HIV programme's doctor-led approach to patient management restricted
328 access to care as TB services are highly decentralised and managed mostly by
329 nurses, while HIV services are facility-based. This corroborates the observations of
330 other studies [15,16] that treatment of TB and HIV by different health professionals
331 limits service integration, and delays ART initiation. Rapid decentralisation of HIV
332 care and ART initiation using nurse-led service delivery models is necessary for
333 expansion of access to ART.
334 Separation of services with patient referral to other facilities for TB or HIV
335 services was a barrier. Some studies propose co-location of services as a preferred
336 TB/HIV mode of service delivery as they provide easier access to comprehensive
337 care [6,16, 27, 28]. However in a previously published study we suggested that the
338 real impact of the degree of integration of TB and HIV on service delivery may be
339 masked by health system barriers [18].
340 The development of local focus is a manifestation of lack of flexibility and
341 external orientation in the work processes of TB and HIV teams. This results in
342 continuing duplication and inefficient use of resources as identified by Uwimana et al.

[15], and contributes to poor implementation due to poor prioritisation of resources [17].

Standardisation of norms can be used to create new values and cultures so that stakeholders in TB/HIV integration can do things differently and create new lived experiences [29]. More research is therefore recommended to identify strategies, interventions and training needed to initiate appropriate changes in the functioning of the health system.

Facilitators of integration

Leadership and political will were identified as facilitators by all participants, corroborating the findings of Gyapong et al. [14] and Harris et al. [25]. These attributes however have to be strengthened at all levels to address policy and implementation barriers.

Strategies to improve financial access to care including NHIS coverage of ARVs, the enablers' fund, ARV credit facility, and NGO support were also identified as facilitators as found by Gandhi et al. [30] and Dong et al. [31]. These improve availability and utilisation of services. Other facilitators were identified as standardisation of work, skills and knowledge, and outputs. Others were direct supervision and mutual adjustment [10,12]. Dong et al observed that rigid application of guidelines without the ability to adapt to patient challenges contributes to programme failure [31].

Privacy and confidentiality becomes an essential determinant of utilisation of services as identified by Heunis et al. [24], particularly in the presence of stigma. Availability of drugs was also reported as a facilitator, in contrast to the findings of Okot-Chono et al. in Uganda [17]. This was probably due to the fact that apart from the national management making drugs and logistics available, there were also well

368 defined pathways for accessing these supplies. Other facilitators that improved
369 access to care were the use of fixed dose combinations and elimination of injections
370 for new cases. Uptake of services is improved with these interventions [24].
371 ***Temporal Influence***
372 Although the data was gathered in 2009, the findings still remain relevant. Key
373 achievements of the TB/HIV policy implementation in Ghana have been the
374 increased awareness among health workers and the dramatic improvement in
375 access. Through both public and private health facilities, DOTs and HTC centres
376 have increased from 1600 and 422 sites to 3000 and 1656 sites respectively. ART
377 sites have also increased from less than 50 sites in 2007 to 165 sites at the end of
378 2013 [32]. Coordination has improved, with the two programmes currently planning
379 joint efforts for resource mobilisation. However significant gaps and challenges
380 identified suggest that the findings of the study still remain relevant [32].
381 ***Limitations***
382 The use of purposive sampling limits the representiveness of this data.
383 Selection bias may have occurred from the recruitment process as patients who
384 could not be contacted on telephone or were not due for review during the data
385 collection period were excluded from the study. Another limitation was the use of
386 nurses for recruitment, which may have compelled some to participate. This impact
387 was mitigated by emphasising voluntary participation prior to interviews. There was
388 also some loss of meaning in translation, which was minimised by back translation.
389 Selection and access of study sites, data production and analysis have been
390 explicitly outlined. Interactions between the researcher, a medical doctor, and the
391 providers were influenced by existing social context: the managers were medical
392 doctors and related at par in terms of power relations while other providers (nurses)

related as subordinates. The researcher's previous experience in TB control facilitated the use of technical language. The use of service providers in recruiting patients may have influenced patient participation. This impact was mitigated by emphasising voluntary participation, and assurance of confidentiality and privacy. Participants were also assured that non-participation would not influence their care. Strategies used to ensure rigour in this study included methodological coherence and transparency, sampling sufficiency, reflexivity, and relevance.

5.0 Conclusion

Health system barriers to integration were staff shortages, lack of resources, existing financial management practices, and provider resistance to change due, differences in TB and HIV programmatic approaches, and separation of services, especially at the referral site. Facilitators included political will, direct supervision, improved access to services, privacy and confidentiality, as well as standardisation of work, skills and knowledge, and outputs. Standardisation of norms and values, as well as new staff training strategies should be used to achieve staff behavioural changes towards integration. Further studies are also needed to explore patient-related barriers to and facilitators of TB/HIV integration.

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References

1. GHS (2007) Implementation of TB/HIV collaborative activities in Ghana: technical policy and guidelines Accra; Ghana Health Service. Accessed 1 March 2015. Available:http://www.ghanahealthservice.org/documents/Main%20Text_Technical%20_%20Policy%20Guidelines%20TB%20HIV%2031%20Jan%2007.pdf .

2. WHO (2013) Global Tuberculosis Control. Geneva: World Health Organization; 2013. Accessed 4 March 2015. Available: https://extranet.who.int/sree/Reports?op=Replet&name=%2FWHO_HQ_Reports%2FG2%2FPROD%2FEXT%2FTBCountryProfile&ISO2=GH&LAN=EN&outtype=pdf

3. Getahun H, Harrington M, O'brien R, Nunn P. (2007) Diagnosis of smear-negative pulmonary tuberculosis in people with HIV infection or AIDS in resource-constrained settings: informing urgent policy changes. *Lancet* 369 (9578) :2042–9. DOI: http://dx.doi.org/10.1016/S0140-6736(07)60284-0

4. Corbett EL, Marston B, Churchyard GJ, De Cock KM. (2006) Tuberculosis in sub-Saharan Africa: opportunities challenges and change in the era of antiretroviral treatment. *Lancet* 367 (9514) :926–37. Doi:10.1016/S0140-6736(06)68383-9

5. WHO (2008) Integrated Health Services – What and Why? Making Health Systems Work. Geneva: World Health Organization. Accessed 5 March 2015. Available: http://www.who.int/healthsystems/technical_brief_final.pdf

6. Uyei J, Coetzee D, Macinko J, Guttmacher S. (2011) Integrated delivery of HIV and tuberculosis services in sub-Saharan Africa: a systematic review. *Lancet Infect Dis* 11 (11) :855–67. DOI: http://dx.doi.org/10.1016/S1473-3099(11)70145-1

7. Kodner D & Spreeuwenberg C (2002) Integrated care: meaning, logic, applications, and implications – a discussion paper. *Int J of Integr Care* 2:e12.

443 Accessed 4 March 2015. Available:
444 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1480401/
445 8 WHO 2010 Key components of a well functioning health systems. Geneva, World
446 Health Organisation. Accessed 11 April 2015. Available:
447 www.who.int/healthsystems/EN_HSSkeycomponents.pdf
448 9. Anderson S & Maher D (2001) An analysis of interaction between TB and
449 HIV/AIDS Programmes in sub-Saharan Africa. WHO. Accessed 2 March 2015.
450 Available: http://whqlibdoc.who.int/hq/2001/WHO_CDS_TB_2001.294.pdf .
451 10. Glouberman S & Mintzberg H. (2001a) Managing the Care of Health and the
452 Cure of Disease--Part II: Integration. *Health Care Manag R,* 26, 70.
453 11. Barki, H & Pinsonneault, A (2005). A model of organizational integration,
454 implementation effort, and performance. *Organ Sci* 16 (2): 165
455 http://dx.doi.org/10.1287/orsc.1050.0118
456 12. Sobczak A (2002) Opportunities for and constraints to integration of health
457 services in Poland. *Int J Integr Care* Apr-Jun 2: e23. Accessed 28 February 2015.
458 Available: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1480383/ .
459 13. Kodner DL (2009) All together now: a conceptual exploration of integrated care.
460 *Healthcare Quarterly* 13 Spec No: 6-15. Accessed 27 February 2015. Available:
461 http://europepmc.org/abstract/MED/20057243 .
462 14. Gyapong JO, Gyapong M, Yellu N, Anakwah K, Amofah G, Bockarie M et al.
463 (2010). Integration of control of neglected tropical diseases into health-care
464 systems: challenges and opportunities. *Lancet* 375 (9709): 160-5. DOI:
465 http://dx.doi.org/10.1016/S0140-6736(09)61249-6
466 15. Uwimana J, Jackson D, Hausler H, Zarowsky C. (2012) Health system barriers to
467 implementation of collaborative TB and HIV activities including prevention of mother

468 to child transmission in South Africa. *Trop Med Int Health* 17 (5):658–65.
469 DOI: 10.1111/j.1365-3156.2012.02956.x
470 16. Loveday M & Zweigenthal V (2011) TB and HIV integration: obstacles and
471 possible solutions to implementation in South Africa. *Trop Med Int Health* 16 (4):
472 431- 8. DOI: 10.1111/j.1365-3156.2010.02721.x
473 17. Okot-Chono R, Mugisha F, Adatu F, Madraa E, Dlodlo R, Fujiwara P. (2009)
474 Health system barriers affecting the implementation of collaborative TB–HIV services
475 in Uganda. *Int J Tuberc Lung Dis* 13 (8) :955–61.
476 18. Ansa GA, Walley JD, Siddiqi K, Wei X. (2014) Delivering TB/HIV services in
477 Ghana: a comparative study of service delivery models. *Trans R Soc Trop Med Hyg*
478 108 (9): 560-7. DOI:10.1093/trstmh/tru110
479 19. Ansa GA, Walley JD, Siddiqi K, Wei, X. (2012) Assessing the impact of TB/HIV
480 services integration on TB treatment outcomes and their relevance in TB/HIV
481 monitoring in Ghana. *Infect Dis Poverty* 1:13. Accessed 1 March 2015. Available:
482 http://www.idpjournal.com/content/1/1/13. doi: 10.1186/2049-9957-1-13.
483 20. Ansa GA. Integration of Tuberculosis (TB) and HIV services in Ghana. Leeds;
484 University of Leeds; 2011. Accessed 10 April 2015. Available:
485 http://etheses.whiterose.ac.uk/2419/1/Gloria_Ansa_Thesis.pdf
486 21. Green J & Thorogood N. (2009) Qualitative Methods for Health Research,
487 London, SAGE Publications.
488 22. NACP (2009) 2008 Annual Report. Accra, Ghana Health Service.
489 23. NTP (2009) The National Tuberculosis Health Sector Strategic Plan for Ghana:
490 2009–2013. Accra; Ministry of Health.
491 24. Heunis JC, Wouters E, Norton WE, Engelbrecht MC, Kigozi NG, Sharma A et al.
492 (2011) Patient- and delivery-level factors related to acceptance of HIV counseling

493 and testing services among tuberculosis patients in South Africa: a qualitative study
494 with community health workers and program managers. *Implemen Sci* 6:27.
495 doi:10.1186/1748-5908-6-27
496 25. Harris JB, Hatwiinda SM, Randels KM, Chi BH, Kancheya NG, Jham MA et al.
497 (2008) Early lessons from the integration of tuberculosis and HIV services in primary
498 care centres in Lusaka, Zambia. *Int J Tuberc Lung Dis* 12 (7): 773-9.
499 26. Fraser HSF, Allen C, Bailey C, Douglas G, Shin S, Blaya J. (2007) Information
500 systems for patient follow-up and chronic management of HIV and tuberculosis: A
501 life-saving technology in resource-poor areas. *J Med Internet Res* 9 (4) e29.
502 doi:10.2196/jmir.9.4.e29.
503 27. WHO (2012) WHO policy on collaborative TB/HIV activities: guidelines for
504 national programmes and other stakeholders. Accessed 1 March 2015.
505 Available:
506 www.who.int/tb/publications/2012/tb_hiv_policy_9789241503006/en/index.h
507 ml
508 28. Kachiza C, Msiska T, Kaonga E, Moodie C, Wandwalo E, Kellerman S et al.
509 (2010) What is the best model of TB/HIV service delivery? Experience from Malawi. :
510 AIDS 2010 – XVIII International AIDS Conference: Abstract no. MOPE0858
511 Accessed 2 March 2015. Available: www.iasociety.org/Abstracts/A200740018.aspx .
512 29. Anderson-Wallace M & Blantern C (2005) Working with culture. In Peck, E. (Ed.)
513 *Organisational Development in Healthcare: approaches, innovations, achievements.*
514 First ed. Oxford, Radcliffe Publishing.
515 30. Gandhi NR, Moll AP, Lalloo U, Pawinski R, Zeller K, Moodley P et al. (2009)
516 Successful Integration of Tuberculosis and HIV Treatment in Rural South Africa: The

517 Sizonq'oba Study. *J Acquir Immune Defic Syndr,* 50 (1), 37-43. doi:
518 10.1097/QAI.0b013e31818ce6c4.
519 31. Dong K, Thabethe Z, Hurtado R, Sibaya T, Diwati H, Walker S et al. (2007)
520 Challenges to the success of HIV and tuberculosis care and treatment in the public
521 health sector in South Africa. *J Infect Dis* 196 (Suppl 3): S491-6. DOI:
522 10.1086/521111
523 32. GHS (2014) Implementation of TB/HIV collaborative activities in Ghana: Joint
524 programme planning policy and guidelines, Accra, Ghana Health Service.