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Models of Integration of TB and HIV Services and Factors associated with Perceived Quality of TB-HIV integrated Service Delivery in OR Tambo District, South Africa

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Abstract

Background

Tuberculosis is the leading infectious cause of death among people living with HIV. Reducing morbidity and mortality from HIV-associated TB requires strong collaboration between TB and HIV services at all levels with full-integrated people-centred models of care.

Methods

This is a qualitative study design using principles of ethnography and application of the aggregate complexity theory. A total of 54 individual interviews with health care workers and patients took place in 5 primary healthcare facilities in O.R Tambo district. The participants were purposively selected until data reached saturation point, and all interviews were tape-recorded. Quantitative analysis of qualitative data was used after coding ethnographic data, looking for emerging patterns, and counting the number of times a qualitative code occurred. A Likert scale was used to assess perceived quality of TB/HIV integration. Regression models and canonical discriminant analysis were used to explore the associations between perceived quality of TB and HIV integrated service delivery and independent predictors of interest using SPSS® version 23.0 (Chicago, IL) considering a type I error of 0.05.

Result

Of the 54 participants, 39 (72.2%) reported that TB and HIV services were partially integrated while 15 (27.8%) participants reported that TB/HIV services were fully integrated. Using Likert scale gradient, 23 (42.6%) participants perceived quality of integrated TB/HIV services as poor while 13 (24.1%) and 18 (33.3%) perceived quality of TB/HIV integrated services as moderate and excellent, respectively. Multiple linear regression analysis showed that the access to healthcare services was significantly and independently associated with the perceived quality of integrated TB/HIV services following the equation: $Y = 3.72–0.06X$ (adjusted R^2 = 23%, p-value = 0.001). Canonical discriminant analysis (CDA) showed that in all 5 municipal facilities, long distances to healthcare facilities leading to reduced access to services were significantly more likely to be the most impeding factor which is negatively influencing the perceived quality of integrated TB/HIV services with functions' coefficients ranging from 9.175 in Mhlontlo to 16.514 in KSD (Wilk's Lambda = .750, p = .043).

Conclusion

HIV and TB integration is inadequate with limited accessibility. Full integration (one-stop shop services) is recommended.

Introduction

During the ongoing COVID-19 era, studies by Global Fund have demonstrated that pandemic response measures such as lockdowns had reduced access to key health services like TB diagnosis and treatment. Globally, COVID-19 led to a 29% decline in the TB detection rates in 2020 as current studies noted [1]. During pandemic lockdowns, reduction of sputum sample obtained for TB diagnosis due to people shunning health facilities and health workers prioritising COVID-19 over other conditions [2]. Country level declines for TB notifications ranged from 41% in South Africa to 25% in India, highlighting major disruptions in high TB burden countries [3]. However, prior to COVID-19 already, the African region had 17 countries, which have the highest burden of TB. New TB diagnosis notifications and screening programs declined in part due to a reduction in numbers of health workers, limited access to facilities, and data reporting lapses thus affecting treatment access. The World Health Organisation (WHO) states that in 2020, of the 10 million people who developed TB, only 5.8 million cases were detected globally, leaving 4.2 million undetected and a pool for further transmission in communities [4]. These cases of undetected TB are expected to continue to rise soon. In addition, the number of people dying from TB increased both among HIV negative (from 1.2 million in 2019 to 1.3 million in 2020) and among HIV positive individuals (from 209,000 in 2019 to 214,000 in 2020) [4].

The underlying determinants of TB are poverty, undernutrition and stress and numbers of TB cases will rise further in Africa while untreated TB could kill more than half of those with disease [5]. Additionally, TB/COVID-19 coinfection appears to triple mortality compared with TB mono infection [6, 7]. The impoverished and malnourished are likely to have undiagnosed TB because of health services disruptions and stigma due to COVID-19, this has further led to an increase in TB incidence and mortality which is disproportionately higher among the low-income communities [8]. Larger cross-continental studies are required to define accurately the trends of undiagnosed and new TB cases, MDR-/XDR-TB and impact of TB/COVID-19 co-infections on management outcomes. Associated risk factors for mortality also need to be defined [8]. The disruptions to pharmaceutical supply chains and national TB programs require urgent attention as indicated by Inzaule et al. [9].

Tuberculosis (TB) has been the leading infectious cause of death among people living with HIV (PLWH), causing one third of AIDS-related deaths globally. The End TB strategy launched by the United Nations Political Declaration on Ending AIDS in 2016, aimed at achieving 75% reduction of TB-related AIDS deaths by 2020 [10]. Additionally, the WHO End TB strategy aimed to initiate TB therapy in 90% of all people who require it, including those at higher risk, deprived and achieve at least 90% treatment success by 2030 [10, 11]. While TB incidence has been declining, incidence rates will still be 1000 times greater than the desired elimination threshold if current rates of decline remain unchanged [12]. This slow progress has in part been due to quality gaps in TB and HIV services across the cascade of care, with suboptimal uptake of interventions, especially TB diagnosis in patients with advanced HIV disease, molecular diagnostic platforms such as Xpert MTB/RIF, lack of access to optimal TB prevention and treatment regimens, infrastructure, supply of drugs, diagnostics and BCG vaccines, and information

systems challenges [13]. These gaps become a barrier towards achieving prevention and treatment targets within the TB-HIV care cascades [14, 15].

TB elimination targets may be achievable through robust implementation strategies aimed at improving quality along the continuum of TB care, through use of new technologies in TB prevention, diagnosis, and treatment [16].

As a response to the relentless TB-HIV co-morbidity, the WHO proposed TB-HIV service integration at least at the facility level. Unfortunately, we still don't have any consensus with regards to the model of integration and the levels at which integration should occur. Various models (linkage, collaboration, full integration) have been proposed, but each one bearing several challenges across various settings [17]. For instance, in a linkage model, when a patient is diagnosed with either of the two infections, he/she is referred to another facility or unit to be tested for the other. The collaborated model is concerned with the partial integration of services whereby a person who has been diagnosed through TB services will also be counselled and tested for HIV and then referred if positive. In a fully integrated model of care, all services for TB and HIV are provided in a single facility and by the same service providers. An overwhelming body of evidence, however, suggests that the fully integrated option offers optimum benefits for clients, health systems and workers [18, 19].

The quality of integrated TB/HIV care is characterised by the patient-centred approach, uniform with international standards, efficient and effective, equitable, timely, safe and accessible. The framework of universal health coverage emphasizes components of quality care by including patients' right to care, equitable service delivery and needs based healthcare [17, 18, 19]. Therefore, the quality TB and HIV services include: (i) Screening for HIV and TB with appropriate tests, access to prevention for TB and HIV in those that screen negative, and linkage to appropriate treatment for TB and HIV in those that screen positive; (ii) Effectiveness of care including timely identification of both HIV and TB, linkage to appropriate treatment, continued clinical and laboratory monitoring until favourable outcomes are achieved [19]. Health systems weaknesses and underperformance in healthcare delivery contribute to poor quality TB/HIV care. Health systems failures exist on multiple levels of the health care system, particularly at healthcare worker level, and at management and policy levels. Healthcare workers trainings' needs for provision of quality care are inadequate because lower numbers of trained health care personnel remain a challenge for TB and HIV programs. In South Africa, provision of TB services has historically been delivered by lower-level staff such as enrolled nurses, and community health workers [22]. Professional nurses, and doctors do not routinely offer TB testing, and treatment services. This creates a challenge especially in disease endemic settings, where skilled staff lack adequate confidence, training, and experience in screening, diagnosing and managing TB and HIV [22].

Integration of tuberculosis and HIV services particularly in resource-limited South African provinces such as the Eastern Cape Province has been far from optimal despite the existence of policy frameworks for integration. Achieving widespread integration of TB-HIV care is still unsatisfactory, regardless of a documented intent towards full integration [17, 18, 19, 20, 21, 22]. While this is not the first empirical

discourse on TB-HIV integration in the country, this, to the best of our knowledge, marks the first attempt to investigate operational challenges of TB-HIV integration from the perspectives of service providers and patients at the facility level. We used the “complexity theory” as a theoretical framework able to guide the conduct of this study [23].

Materials And Methods

Description of the study areas

O.R Tambo district (see map in Fig. 1 below) is one of the 7 districts of the Eastern Cape province of South Africa. The seat of O.R Tambo district is in Mthatha. The district has a total area of 12,141 Km^2 with a population estimated to 1,514,306inhabitants at the time of the study. The racial makeup consists of Black-African 90.6%, Coloured 6.7%, Indian/ Asian 1.2%, White 1.0%, of which based on language, Xhosa is the most dominating language spoken by 85% of people, followed by English 8.6% [24]. The district is made up of 4 health sub-districts: King Sabata Dalindyebo (KSD) sub-district, Mhlontlo sub-district, Nyandeni sub-district, and Qaukeni sub-district. While the 4 health sub-districts are deeply rural, KSD sub-district is however considered to be both rural and peri-urban. O.R Tambo district has been reported to bear the following basic indicators: 64.6% of people are living under poverty with an estimated unemployment rate of 65.5% and the literacy rate of 42.2%. The average annual income of a Black resident is R15,762 [24].

Health services are delivered by one central hospital, 1 regional hospital, 12 district hospitals; 11 community health centers, 49 clinics, 52 health posts and 15 mobile health services. Main economic sectors include Community service (55%), trade (18.5%), finance (16.9%), agriculture (3.5%), transport (3.1%), manufacturing (2.8%) and construction (2.7%) [24].

Study Design, Population, And Data Collection Approach

This is a qualitative study design using principles of ethnography and application of the aggregate complexity theory [25]. As shown in the flow chart below (see Fig. 2), one health post per sub-district was selected following a simple randomization process, except for KSD sub-district where 2 health posts were selected of which one from the deep rural setting and another one from the peri urban setting. Data for the study were drawn from a total of 25 health service providers and 27 TB/HIV patients from 5 selected health facilities across OR Tambo district. The participants were purposively selected based on their direct involvement as well as long working experience in the management of TB and or HIV in the selected facilities. Although the 5 health posts were selected by simple randomization, they all have a relatively high burden of TB and HIV in their catchment areas.

Given the focus of the study, a semi-structured interview guide was developed and used for the data collection. The interviews were based on one-on-one interaction with the participants and were all tape-

recorded with their consents. This was done to ensure that we capture reality in the exact words of the individual participants. On average, each interview lasted 45 minutes.

Theoretical Framework: The Complexity Theory

The underlying assumption in the complexity theory is the general agreement that healthcare delivery has become increasingly complex (see Figure 3). This theoretical framework is mainly concerned with functionality and changes within a given healthcare system [25]. The same framework has been applied in other disciplines as well, but each of these disciplines providing a unique understanding of the concept. Manson (25) divided complexity theory into three; algorithmic complexity, deterministic complexity, and aggregate complexity [25]. In this study, we adopted the “aggregate complexity” because it considers the relationships between individual components in a complex adaptive healthcare system (i.e., integrated TB-HIV care operating within a wider health care system). Aggregate complexity is generally regarded as the qualitative component of the complexity theory [25]. Under this framework, it is estimated that all healthcare facilities, particularly those providing care for chronic diseases, are “complex adaptive systems”. The reason being that these healthcare facilities rely on the individual agents, specialized health workers in the field of TB and HIV management, whose actions are interconnected [26] and the interactions among the specialized units are more critical than the discrete actions of individual components [27]. In addition, the complexity theory considers the relationships between entities; internal structures and the surrounding environment; learning and emergent behaviour, and the various ways by which a complex system can transform and improve [28]. During this study for instance, the concern is about the interactions among TB and HIV service providers, TB and HIV/counselling unit, laboratory, X-ray unit, pharmacy/dispensary, and any other units with a direct or indirect relationship with TB and HIV management and the clients. It is estimated that the actions of the related units should aim at ensuring a better outcome for the integrated healthcare services provided. Other factors to consider in this complex system is the environment, particularly the physical infrastructure for the management of TB and HIV in the health facility. The major strength of the aggregate complexity theory lies with its position that complex systems such as healthcare are constantly changing their internal structure and external environment. The complexity theory provides the researcher an opportunity to understand how a complex system like the integration of TB and HIV services can operate, and what are the impeding factors for scaling-up the integration to produce the desired result.

Data Management And Statistical Analysis

At the end of each day of data collection, recorded interviews were transcribed and both old and newly emerging issues or themes through playback of the recorded interviews were noted. This was done to keep track of the issues in the data in order to identify issues that will require further probing in the subsequent interviews. Participants were enrolled until data reached saturation point, meaning that enough “Information Power” was achieved.

Quantitative analysis of qualitative data was used. It “involved turning the data from words or images into numbers. This was done by coding ethnographic or other qualitative data, looking for emerging patterns, and counting the number of times a qualitative code occurs.” [25] Also, when qualitative data was in the form of responses to standardized questionnaire surveys, this data was also quantified. At the end, the generated quantified data from coded qualitative data was used to create a single comprehensive dataset. Simple frequencies and associations between variables were then calculated. A Likert scale was composed of a series of four or more Likert-type items that represent similar questions combined into a single composite score (variable). Likert scale data was analyzed as interval data. For instance, means and standard deviations were used to describe the scale. In addition, the traditional way to report on a Likert scale was used meaning that values of each selected option were summed and a score for each respondent was created. This score was then used to represent a specific trait-satisfied or dissatisfied, for example. Another Scoring System consisted of (0 being poor and 6 being excellent).

Regression models and canonical discriminant analysis (CDA) were used to explore the associations between perceived quality of TB and HIV integrated service delivery and independent predictors of interest. During CDA, Fischer’s linear functions and Eigen values were determined with values of Wilk’s Lambda closer to zero being the evidence for well discriminated patient groups. Data analysis was performed using SPSS®statistical software version 23.0 (Chicago, IL), considering a type I error of 0.05 as acceptable.

Ethical Approval and Consent to Participate

The Research Ethics and Biosafety Committee of the Walter Sisulu University approved the study **(ethical clearance No. 29/2014)** and permission to conduct the study was obtained from the Eastern Cape Department of Health **(EC_2016RP27_242).** The purpose and nature of the study were explained to the study participants and written consent was obtained individually from each participant. Participation was voluntarily, and confidentiality about their names and other identifiers were anonymously kept.

Results

Models of Integration of TB and HIV Services

Of the 54 participants, 39 (72.2%) reported that TB and HIV services were partially integrated while 15 (27.8%) participants reported that TB/HIV services were fully integrated as displayed in the Fig. 4, below.

TB/HIV services were partially integrated when tuberculosis and HIV/AIDS service delivery points are in the same health facility, but some HIV/AIDS services are provided in TB clinic, and some TB services are provided in HIV/AIDS clinic. The co-infected patients must still visit two different clinics served by different staff to access the full range of TB and HIV/AIDS services. However, **TB/HIV services were fully integrated when** TB and HIV/AIDS services are provided in the same delivery point in the health facility by the same staff (“One stop shop”).

Perceived Quality Of Services In Relation To Tb/hiv Integration

Using Likert scale gradient, 23 (42.6%) participants perceived quality of integrated TB/HIV services as poor while 13 (24.1%) and 18 (33.3%) perceived quality of TB/HIV integrated services as moderate and excellent, respectively as display in the Fig. 5, below.

When using the scoring system (ranging from 0 to 6 with 0 being poor and 6 being excellent) to measure the perceived quality of integrated TB/HIV services, the mean score for the 54 participants was found to be 2.02 (± 1.296 SD) with most participants scoring quality of services below 3 ($P < 0.0001$) as displayed in Fig. 6. The relationship between the Likert scale gradient and the scoring system is shown in Fig. 7.

Perceived Quality Of Integrated Tb/hiv Services By Characteristics Of The Study Participants

As shown in Table 1 below, participants perceived equally the integrated TB and HIV services as inadequate whether they were healthcare professionals or patients and whether they were males or females. However, marital status of the participants ($p = < 0.0001$), level of education of the HCWs ($p = < 0.0001$), participants' home language ($p = 0.049$), and the municipality or health sub-district where the study was conducted ($p = 0.003$) have shown significant statistical differences on the participants perceived quality of TB/HIV integrated services.

Table 1
Association between Perceived quality of integrated TB/HIV services and characteristics of the study participants

Variables of interest	Perceived quality of integrated services as inadequate	Perceived quality of integrated services as adequate	p-value
Category of participants	16(64.0%)	9(36.0%)	0.26
• Health professionals	22(75.9%)	7(24.1%)	
• Patients			
Gender	13(68.4%)	6(31.6%)	0.09
• Males	25(71.4%)	10(28.6%)	
• Females			
Living with	29(82.9%)	6(17.1%)	0.29
• alone	9(47.4%)	10(52.6%)	
• spouse			
Marital Status	10(100.0%)	0(0.0%)	**< 0.0001**
• Single	9(47.4%)	10(52.6%)	
• Married	11(64.7%)	6(35.3%)	
• Widowed	8(100.0%)	0(0.0%)	
• Divorced			
Qualification of HCWs	8(66.7%)	4(33.3%)	**<0.0001**
• High School	2(50.0%)	2(50.0%)	
• Bachelor's Degree	3(75.0%)	1(25.0%)	
• Undergraduate Diploma	3(60.0%)	2(40.0%)	
• Postgraduate Diploma			
Population Group	36(69.2%)	16(30.8%)	0.08
• African	2(100.0%)	0(0.0%)	
• White			
Home Language	3(100.0%)	0(0.0%)	**0.049**
• English	34(68.0%)	16(32.0%)	
• Xhosa	1(100.0%)	0(0.0%)	
• Zulu	1(100.0%)	0(0.0%)	

• Other			
Province of upbringing	37(69.8%)	16(30.2%)	0.29
• Eastern Cape Province	1(100.0%)	0(0.0%)	
• KwaZulu Natal Province			
Working	21(80.8%)	5(19.2%)	0.32
• No	17(60.7%)	11(39.3%)	
• Yes			
Municipality	5(83.3%)	1(16.7%)	**0.003**
• KSD peri -urban Informal Mthatha Gateway	5(38.5%)	8(61.5%)	
• Nyandeni small town Libode	9(75.0%)	3(25.0%)	
• Mhlontlo - Mhlakulo small town	8(66.7%)	4(33.3%)	
• Mhlontlo - Qumbu small town	11(100.0%)	0(0.0%)	
• KSD Mbekweni rural areas			

Figure 8 and Table 2 show that participants from the KSD municipality (both rural and peri urban) poorly perceived the quality of TB and HIV integrated services. There was an inverse relationship between age of the study participants and the perceived quality of integrated TB and HIV services. People living under higher poverty conditions perceived better quality of TB/HIV integrated care.

Table 2
Association between Participants' perceptions of quality HIV/TB integrated services and local health municipality, age of participants, accessibility to healthcare facilities and poverty gap

Likert Scale Gradient	Variables of interest	Mean	Std. Deviation	P-value
Low – Weak				**< 0.0001**
	Age years	48.33	15.29	
	Access to services (Km)	29.89	6.25	
	Extent area (Km^2)	2883.52	177.27	
	Poverty gap (%)	55.52	3.60	
Moderate				**.001**
	Age years	44.55	15.17	
	Access to services (Km)	26.27	6.02	
	Extent area (Km^2)	2816.18	192.87	
	Poverty gap (%)	56.23	4.59	
Good to Excellent				**.001**
	Age years	41.25	14.52	
	Access to services (Km)	25.75	3.79	
	Extent area (Km^2)	2661.19	201.45	
	Poverty gap (%)	59.78	5.91	

Multiple linear regression analysis showed that the access to healthcare services was significantly and independently associated with the perceived quality of integrated TB/HIV services following the equation: $Y = 3.72–0.06X$ (adjusted R^2 = 23%, p-value = 0.001).

Canonical discriminant analysis (CDA) (Table 3 and Table 4) showed that in all 5 municipal facilities, long distances to healthcare facilities leading to reduced access to services were significantly more likely to be the most impeding factor which is negatively influencing the perceived quality of integrated TB/HIV services with functions' coefficients ranging from 9.175 in Mhlontlo to 16.514 in KSD (Wilk's Lambda = .750, p = .043).

Table 3

Wilks' Lambda with test of functions and statistical significance from DA From: Wilk's Lambda test and statistical significance in O.R Tambo Municipality

Step		Tolerance	Min. Tolerance	Sig. of F to Enter	Wilks' Lambda
0	Age years	1.000	1.000	.328	.957
	Access to services km	1.000	1.000	.043	.884
	Extent area km2	1.000	1.000	.002	.783
	Poverty Level %	1.000	1.000	.016	.850
1	Age years	.840	.840	.941	.781
	Access to services km	.756	.756	.342	.750
	Poverty Level %	.248	.248	.669	.770

Table 4

Classification of Function Coefficients on Municipality

From: Fisher's linear discriminant functions in O.R Tambo Municipality

	Municipality				
	KSD peri - urban Informal Mthatha Gateway	Nyandeni small town Libode	Mhlontlo - Mhlakulo small town	Mhlontlo - Qumbu small town	KSD Mbekweni rural areas
Age years	.373	.272	.274	.257	.420
Access to services km	14.297	11.468	9.175	13.761	16.514
(Constant)	-234.608	-150.362	-98.863	-212.858	-311.798

Discussion Of Findings

O.R Tambo District Municipality has embarked on integrating TB and HIV services with the expected outcome that patients "have access to a continuum of care and support services for TB and HIV/AIDS diagnosis, in all health care facilities and community-based care services" [29]. This study was conducted to examine the integration of HIV/AIDS, Tuberculosis, and patients' services into the general health care systems. The study revealed that neither health professional staff nor TB/HIV co-infected clients are satisfied with the current model, which presents several constraints to the vision "of a continuum of care and support services."

CURRENT MODELS OF TB AND HIV INTEGRATION IN O.R TAMBO DISTRICT

Our study found that the currently used most common model of care at O.R Tambo district health facilities is the partially integrated, patient centered care and prevention. This model of care is achieved through deliberate efforts by health providers and facilities to ensure that services can be delivered on the same day, within the same facility, but not by the same staff or in the same clinic as our study demonstrated [30, 31]. This model is not usually favorable to patients as they get to visit two or more clinics which is very costly and time consuming for the patients [32, 33]. Integrating HIV and TB services (hereafter written HIV-TB services) is a key strategy in reducing TB-related deaths among people living with HIV. HIV-TB services refers to screening, diagnosis, and treatment services provided for both diseases at the same clinic, by the same clinic team, on the same visit day [34, 35, 36]. Therefore, majority of the study participants has reported that TB/HIV level of integration is sub-optimal. Despite policies in place, strategies and guidelines of TB and HIV integration, the lack of a common understanding on how to operationalize them at the institutional level has been identified as a barrier to integrated TB/HIV service delivery in O.R Tambo District. A sentiment which is shared by other countries like Vietnam where study participants have experienced similar challenges [37, 38, 39]. Shortages in HIV commodities as well as limited staff capacity and infrastructure tend to emerge as important system-level therapeutic challenges of TB/HIV integration treatment in low-income settings [40, 41] and can seriously delay uptake of ART and lead to attrition from ART [35]. This concurs with findings from a previous systematic review which revealed that health system issues such as staffing impair uptake of ART in the prevention of mother-to-child transmission of HIV in sub-Saharan Africa [39, 40, 41, 42]. In a recent large qualitative study in Ghana, infrastructural challenges and lack of staff capacity (notably, understaffing) were highlighted as important challenges in providing treatment commodities in integrated treatment of TB and HIV [43]. These suggest that providing training to adequate number of designated staff, ensuring they have the necessary accompanying treatment resources (through a robust procurement and supply chain) including therapeutic guidelines, developing short and concise enrolment procedures and adequate treatment infrastructure could strengthen the health system, improve service quality, improve outcomes (including those related to drug-related challenges) and consequently contribute in promoting uptake of ART [18, 44, 45]. Designated staff should receive sufficient mentorship and motivation through which they could be encouraged to devote extra time during weekends and emergency circumstances, collaborate in a multidisciplinary team and offer quality services for optimal treatment outcomes. The provision of mentorship to staff engaged in integrated TB/HIV treatment has been previously encouraged as a strategy to improve uptake of ART in co-infected patients in low-income settings and could therefore be included in TB/HIV integrated treatment protocols in order to strengthen staff capacity and enhance initiation of ART [46].

These challenges can, however, be addressed through service delivery in a better integrated approach in TB and HIV [47]. There is evidence to show that full integration of TB-HIV services is considered most appropriate and acceptable among clients, especially co-infected clients, overburdened and deprived [48].

Partial Integration or Stand-alone services: TB and HIV/AIDS service delivery points are located in the same health facility; some HIV/AIDS services are provided in TB clinics, and some TB services are provided in HIV/AIDS clinics [49, 50].

There are some challenges that impact negatively from partial integration model of TB and HIV integration, that have been encountered elsewhere by other studies elsewhere demonstrated [48, 50, 51]:

- In this model, once patients start feeling better on TB treatment they are likely to avoid ART, which leads to their eventual deaths;
- Patients have an extra hurdle to surmount in accessing services in another clinic in that they have to explain the problem afresh to strangers before gaining confidence in the services;
- This model is not patient friendly because patients waste time seeking or queuing repeatedly before getting services;
- Referral to the comprehensive care centers exposes patients to stigma.

Literature has demonstrated that basics for full integration of TB and HIV integration, concurrent administration of ART and IPT has proven a TB risk reduction of 76–89% from both South Africa and Brazil [52] Given the challenges in diagnosing TB in HIV-infected patients, the potential of unintentionally treating active TB with monotherapy and thereby contributing to drug resistance is very real especially in settings with inadequate testing resources for the exclusion of active TB [53]. Our O.R Tambo district has experienced these similar challenges as they are in similar situation of lack of these basic adequate resources as our study findings observed. Significantly, despite the need to exclude active TB prior to the administration of IPT, many people die of TB without having received either IPT or any appropriate treatment for their unrecognized TB [54]. Our study findings suggest that there is a need to develop a sustainable integrated approach to the provision of TB and HIV services at both policy and service-delivery levels in O.R Tambo District, proper implementation and with good monitoring & evaluation systems in place. Fundamentally, the continued scale up of HIV services should include concurrent efforts that support TB and HIV service integration within a broader primary health care context to promote more integrated and sustainable approaches [53, 54]. Simultaneously the knowledge and experiences gained over the last decades must be shared between the historical public health-based approach to TB control and the rights-based approach of HIV programmes [53, 54, 55]. Our study findings at O.R Tambo District Municipality are consistent with the current literature as WHO [17, 18, 19, 20] emphasized that the major weakness of TB/HIV integration models that rely on referral is that patients may be lost if referral fails for example due to cost or transportation. Our study findings have shared similar findings with other studies elsewhere that partial integration of TB and HIV services lead to disconnection, which meant an increase in the cost of care for patients, added inconveniences, since numerous visits are required to access the care [56].

FACTORS ASSOCIATED WITH PERCEIVED QUALITY OF TB AND HIV/AIDS SERVICES

Our study participants perceived quality of TB and HIV/AIDS integrated services as inadequate in O.R Tambo District, however participating municipality have displayed statistical differences (Table 1). In our study findings, there was associations between the age, accessibility to services and poverty gap which had major influence in associated with TB and HIV integration.

Regarding poverty, that is lack of transport fare to travel to treatment centers especially when patients had to be accompanied as reported by UNAIDS [57] and Kadia *et al.* [58]. As concerns younger age, Doward et al. [59] found that patients aged 15–24 years were least likely to initiate ART [60] while Kadia *et al.* (58) reported that age less than 36 years was associated with not initiating ART. Integrated TB/HIV care, in which the same healthcare team provides services to patients with HIV-associated TB, offers potential advantages over standard approaches. Implementing youth-friendly services could improve adolescent knowledge about TB and detection of TB in this age group, an important focus for National TB Programmes. While there is emerging literature and broad support around youth-friendly services for HIV care, there little to scientific literature on youth-friendly approaches in TB care [61]. First, it allows clinicians to better co-manage TB/HIV co-infection and attendant complications, such as drug-drug interactions, side effects, and toxicities [62]. Secondly, integrated care helps counsellors and treatment supporters provide psychosocial support and adherence counselling to co-infected patients in the same location [63]. In trying to understand why age could influence participants' perception about quality of integrated TB/HIV services: participants in the study, who had short distance to the facility, perceived TB and HIV services as integrated (young participants), while the majority of those participants staying far apart from the services or facility, perceived services as not integrated at all (adults' participants) [58]. The participants who are poor perceived TB and HIV integrated as accessible and of quality. Studies observed that distance to the facilities still do not promote equity, inaccessible, unavailable to where people live and stigmatizing especially TB and HIV services and people who are poor perceive, challenges like infrastructure and other health systems still a barrier to quality of integrated care [58, 64]. The district facilities in the low-income countries still struggle to achieve service excellency and greater accessibility of TB and HIV services between people where they live and work [65].

As for poverty/low-income countries especially the overburden districts similar to O.R Tambo, the lack of transport fare to travel to treatment centres especially when patients had to be accompanied considering the high cost of living and transportation is a challenge [38, 54]. As concerns younger age, Enane *et al.* [61], found that patients aged 15–24 years were least likely to initiate ART [62] while Kadia *et al*. [58], reported that age less than 36 years was associated with not initiating ART. Other socioeconomic and individual level barriers such as non-disclosure of HIV status to healthcare providers [66]. In Zambia and Sudan, observational studies of TB patients reported gender, age, education, geographical location, employment, and TB awareness to be associated with TB stigma [63, 64]. While patients know what services they need from the healthcare system their expectations are rarely met, and despite clear evidence that their views influence whether or not they utilize the available services they are rarely consulted in the planning process, these are some of the barriers to accessibility to services [66]. Literature demonstrated that there is positive correlation between poverty and mycobacterium tuberculosis, primarily through 1) its influence on living conditions, such as people living in overcrowded

and poorly ventilated homes, 2) prolonged diagnostic delay and 3) increased vulnerability due to malnutrition and/or HIV infection [52, 66]. Our study observed association between poverty gap of which it is defined as the ratio by which the mean income of the poor falls below the poverty line as the district is characterized by high rate of poverty. O.R Tambo district has been reported to the following challenges unemployment, illiteracy rate, infrastructural, basic water and sanitation which have demonstrated largest contributor of multidimensional poverty in O.R Tambo, indeed highest levels of deprivations in multidimensional poverty. With the current situation where donors are continuously reducing funds for the programmes, government and various health institutions must show more commitment by looking at alternative means of funding activities for TB and HIV control programmes while at the same time addressing the barriers to TB-HIV service integration at poor districts [65].

SERVICE DELIVERY OUTCOMES OF INTEGRATED HIV AND TB SERVICES AT THE CLINICS

The integration of HIV/AIDS & TB services is not taken only at face value, but there is evidence that it may lead to improvements in service delivery outcomes as evident by other study findings elsewhere [66]. Other studies demonstrated that integrated rural clinics can ensured a faster and sustained uptake of HIV-positive clients accessing treatment services and a much lower rate of client drop-out compared with larger specialized HIV/AIDS treatment hospitals. Studies linked this observation to the fact that integrated clinics offered a multiple range of services and HIV/AIDS clinic services being integrated into general consultation [18, 19, 20]. Studies observed similar findings, that patients who visited Integrated HIV Care (IHC) clinics were more likely to achieve viral suppression [67].

These study findings justify why O.R Tambo must adopt full integration of TB and HIV model for control and implementation from this point of partial till full integration of services. Proponents of the integrated HIV clinic model also talk of the potential for improvements in quality of care provided to the patients on integrated clinics [66, 67]. Study elsewhere suggests that quality of care is observably better in integrated clinics when compared to stand-alone facilities (probably because the clinicians were also spending more time interacting with their clients) [67]. Study reported an improvement on the uptake of non-HIV services (testing for syphilis) when ANC was integrated with HIV services [61].

Study by Floyd [52] and Tagaro, Harries and Kool *et al.* [39] documented a significant increase in HIV testing among pregnant women attending ANC when provide-initiated opt-out testing was adopted as part of the routine ANC services. Integration led to similar positive outcomes among TB patients and among diabetics in chronic care. Integration may also have a positive influence on health care workers and hospital operations [58]. Study by Charles et al. [68], in their report of the mid-term evaluation of the integrated management of adolescent and adult illness in Ethiopia, concluded that the integration of services at health facilities has been beneficial to both HIV-positive clients and hospital workers. They observed significant improvements in hospital utilization and increased access of clients to quality HIV services. Hospital workers felt that they were better trained and motivated by what they perceived to be an increase in their credibility as clinical care providers in the eyes of the community [68]. It is possible that

older patients had other comorbidities that contributed to unfavorable outcomes though with full integrated management that can turn to favorable treatment outcomes [60, 61, 62].

Limitations Of The Study

This study could have been done at large scale but due to very limited funding and time we had to choose the five clinics and their patients. The time constraint was also a limitation as these clinics and staff were very busy with their daily activities. The study was a cross-sectional in nature and assessed respondent's perceptions at specific time.

Conclusion and Recommendations

Studies somewhere have demonstrated that large proportion of people with tuberculosis face a catastrophic economic burden related to the direct and indirect costs of illness and health care especially in the low-income countries [10]. Overall, participants are not happy with the current model and type of services rendered by their facilities in O.R Tambo district. They are coming from impoverished communities and not having social protection, majority of them on grant dependent and lack health insurance. They travelled long distances to attend facilities, and even on reaching the facilities they cannot get quality integrated TB/HIV services since the district is still striving to implement full integration model of TB and HIV. The study recommends that O.R Tambo should strive for service excellency to achieve the fully required integrated TB and HIV services. They should be equally accessible, acceptable and equally reach every client in the district, young and old, irrespective of gender, race and ethnicity. In total, they should address all the factors associated and perceived of quality TB/HIV integrated by the population of O.R Tambo District Health Facilities.

Abbreviations

HIV: Human Immunodeficiency Virus

TB: Tuberculosis

O.R Tambo: Oliver Reginald Tambo

ART: Antiretroviral

CDA: Canonical Discriminant Analysis

IPT: Isoniazid Preventive Therapy

UNAIDS: Joint United Nations Programme on HIV/AIDS

KSD: King Sabata Dalindyebo

MDR TB: Multiple Drug Resistance

XDR TB: Extreme Drug Resistance

Declarations

Availability of data and materials

The data generated and/or analysed during this study is available from the corresponding author on reasonable request.

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Contributions

ND: designed the study, collected data from various data sources, contributed in data analysis and interpretation of findings, and drafted the manuscript. BL: revised the study design and analysed data. TA: contributed in data analysis and interpretation of findings, and also edited the final version of the manuscript.

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Ethics declaration

Ethics approval and consent to participate

The Research Ethics and Biosafety Committee of the Walter Sisulu University approved the study **(ethical clearance No. 29/2014)** and permission to conduct the study was obtained from the Eastern Cape Department of Health **(EC_2016RP27_242).** The study was performed in accordance with the Declaration of Helsinki. Information about the purpose and processes of the study were provided to all participants, who provided informed consent before participating in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures

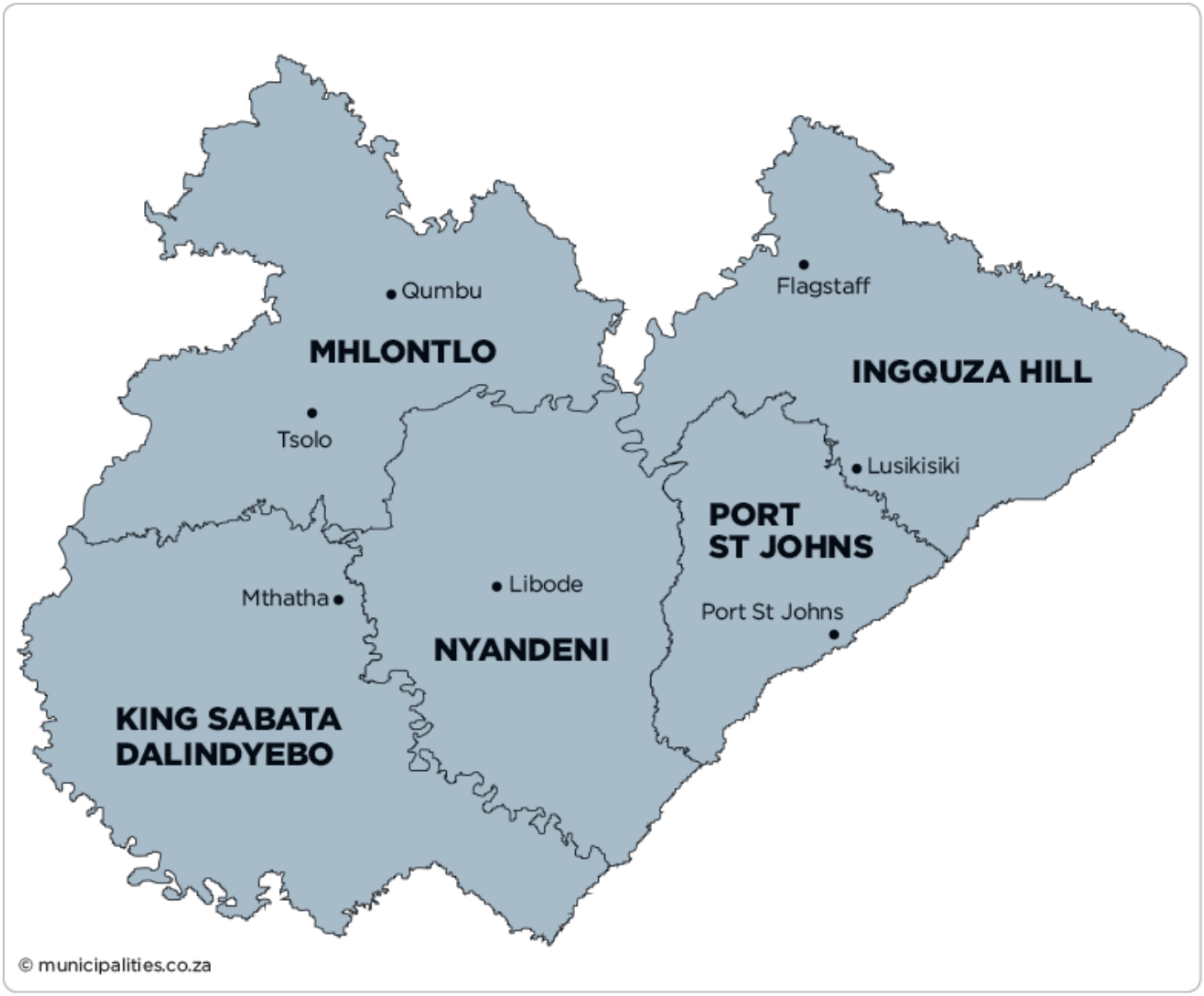


Figure 1

Map of O.R Tambo District Municipality. Source: http://isrdp.dplg.gov.za/documents/IDP/ISRDP/ OR_ Tambo_IDP.pdf. (open access).

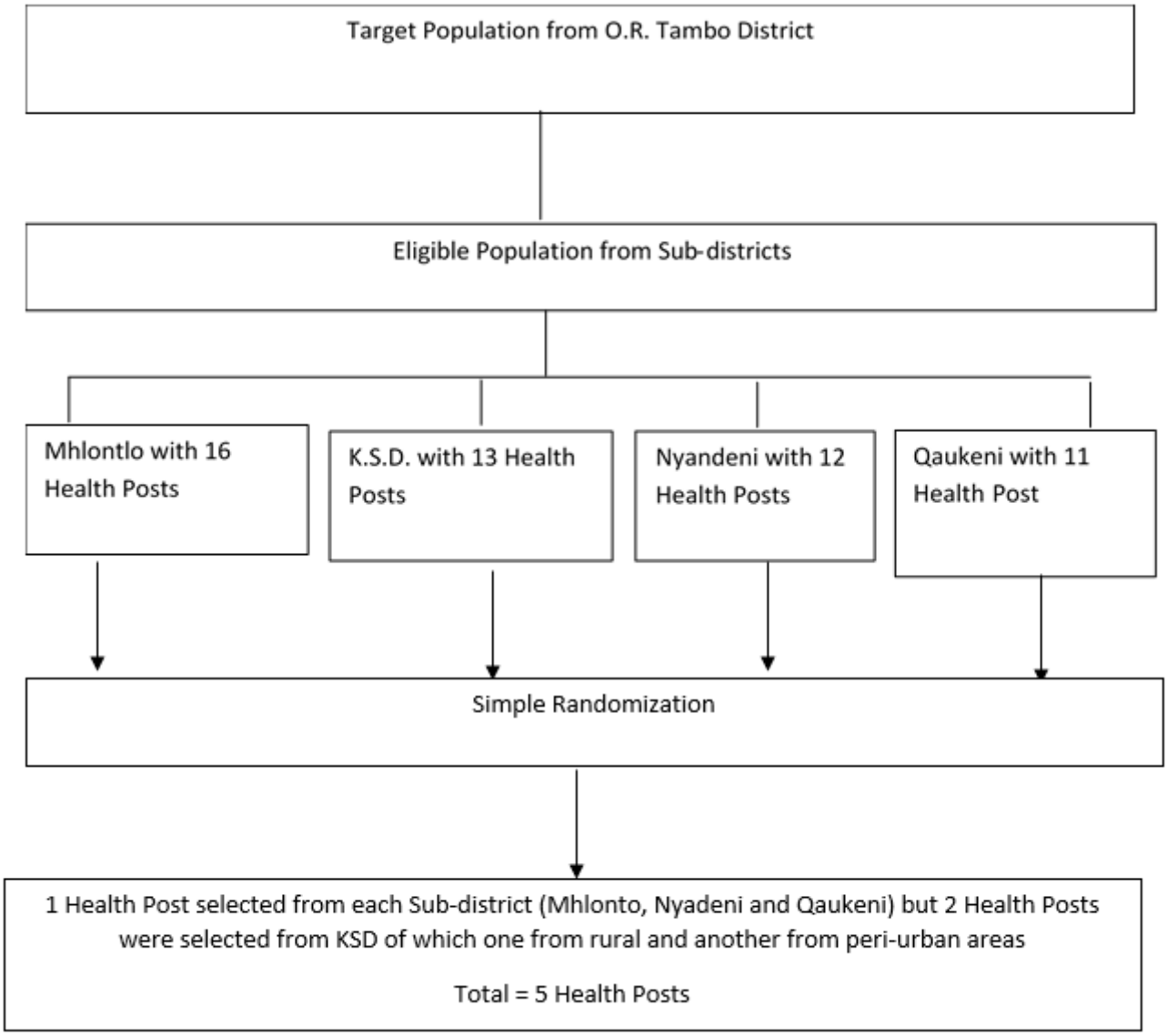


Figure 2

Flow chart representing the selection of study settings

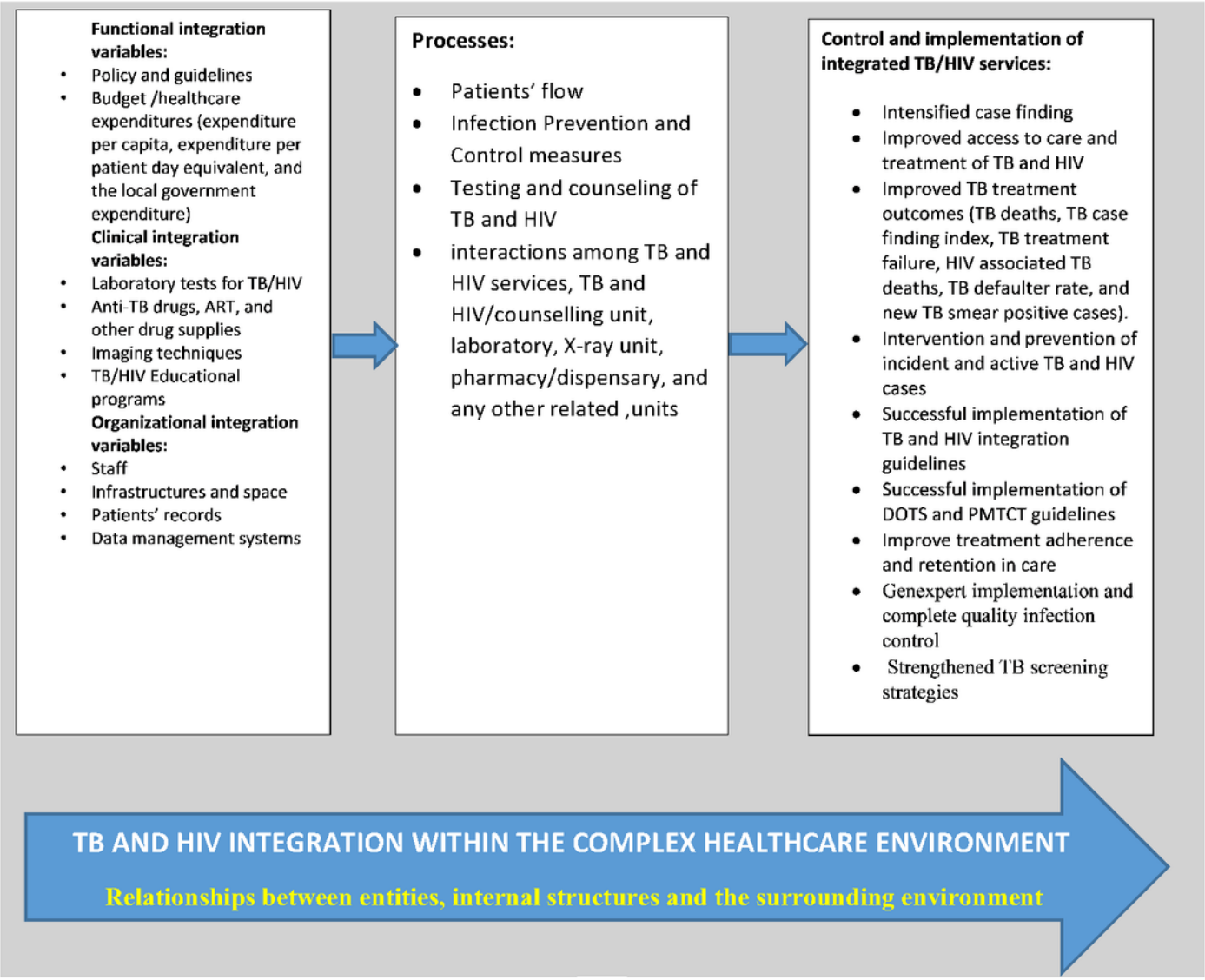


Figure 3

Theoretical framework: The complexity theory (Modified from Naidoo et al, 2017)

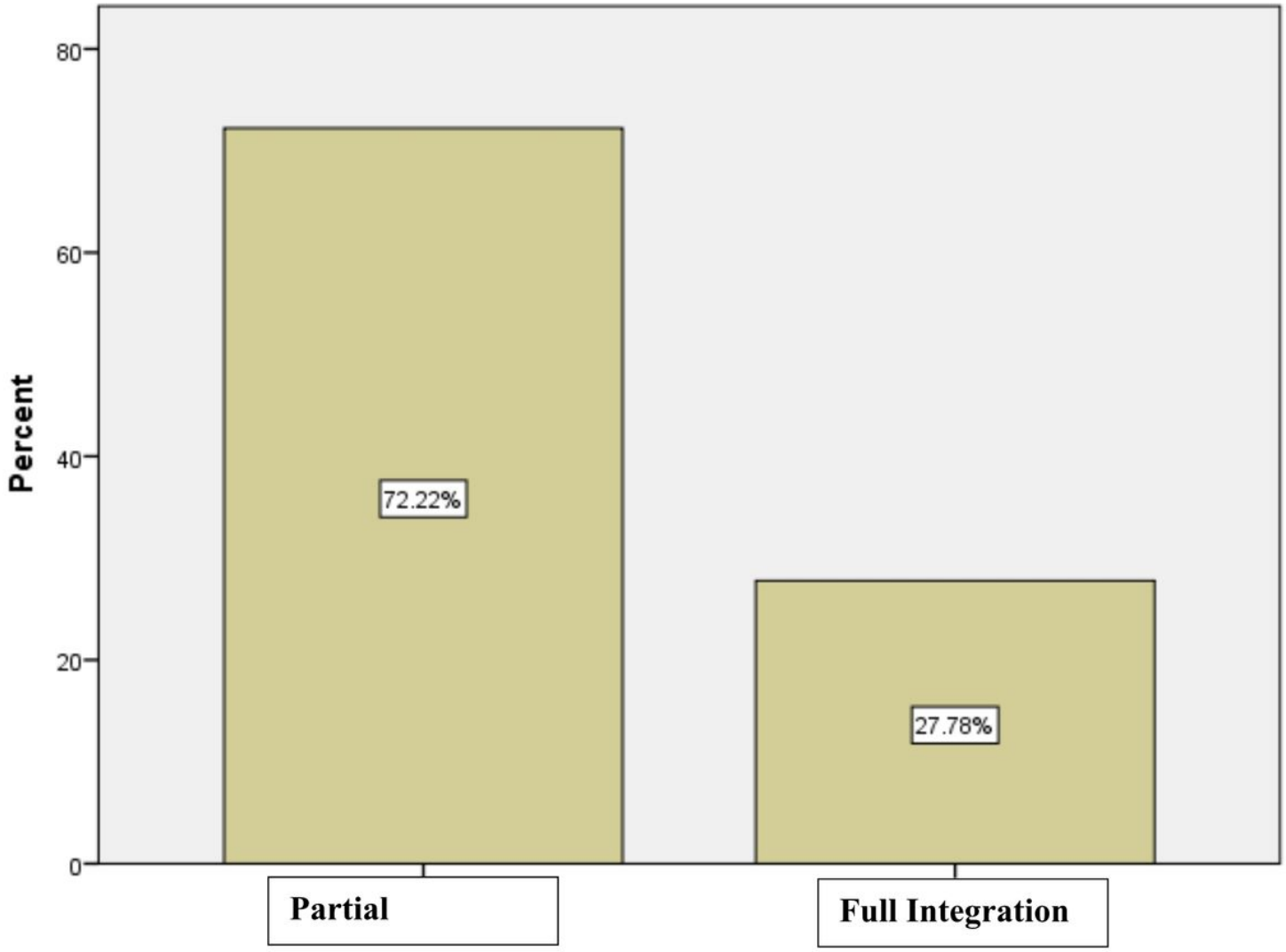


Figure 4

Models of Integration of TB and HIV Services in O.R Tambo district.

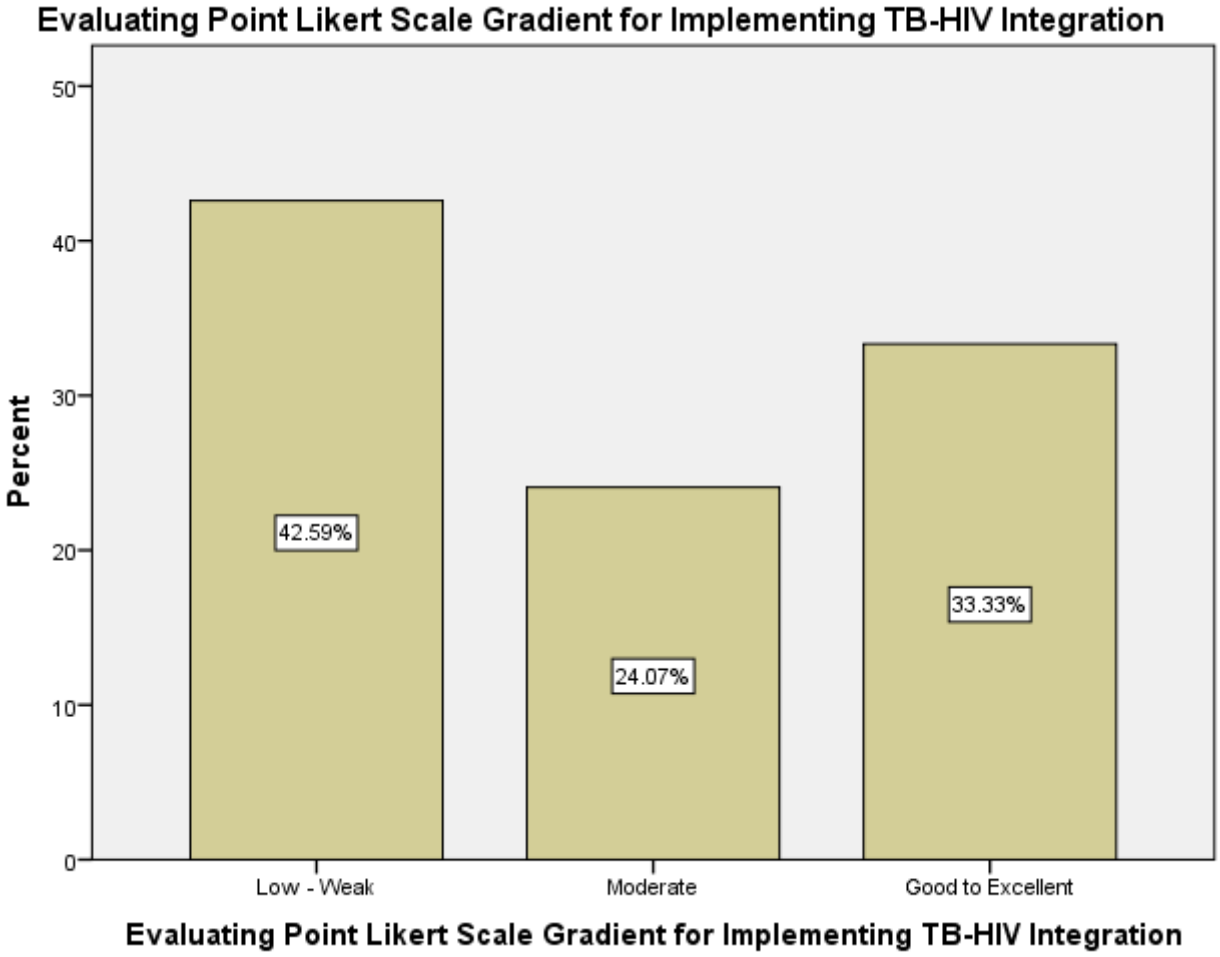


Figure 5

Perceived Quality of TB-HIV integrated Service Delivery in OR Tambo District using Likert scale gradient.

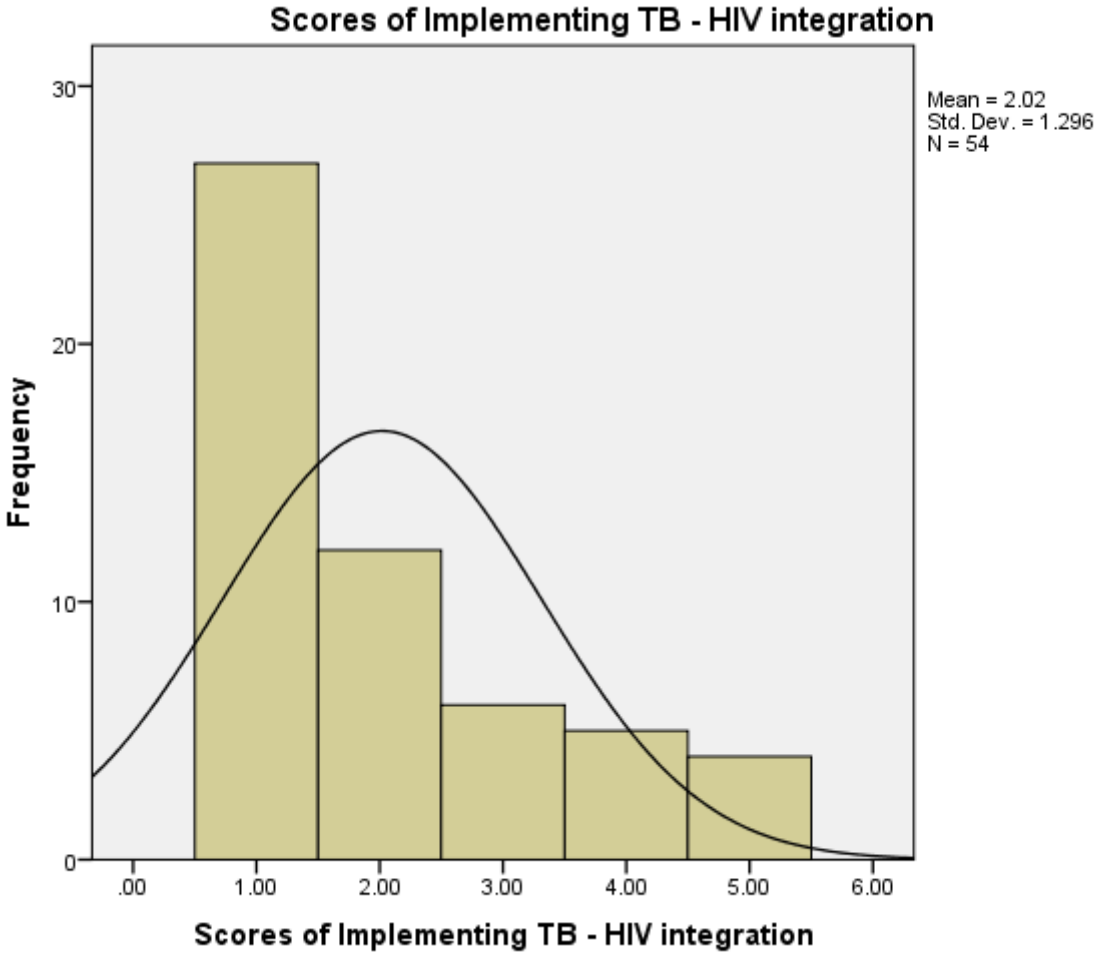


Figure 6

Perceived Quality of TB-HIV integrated Service Delivery in OR Tambo District using the Scoring System (0 being poor and 6 being excellent).

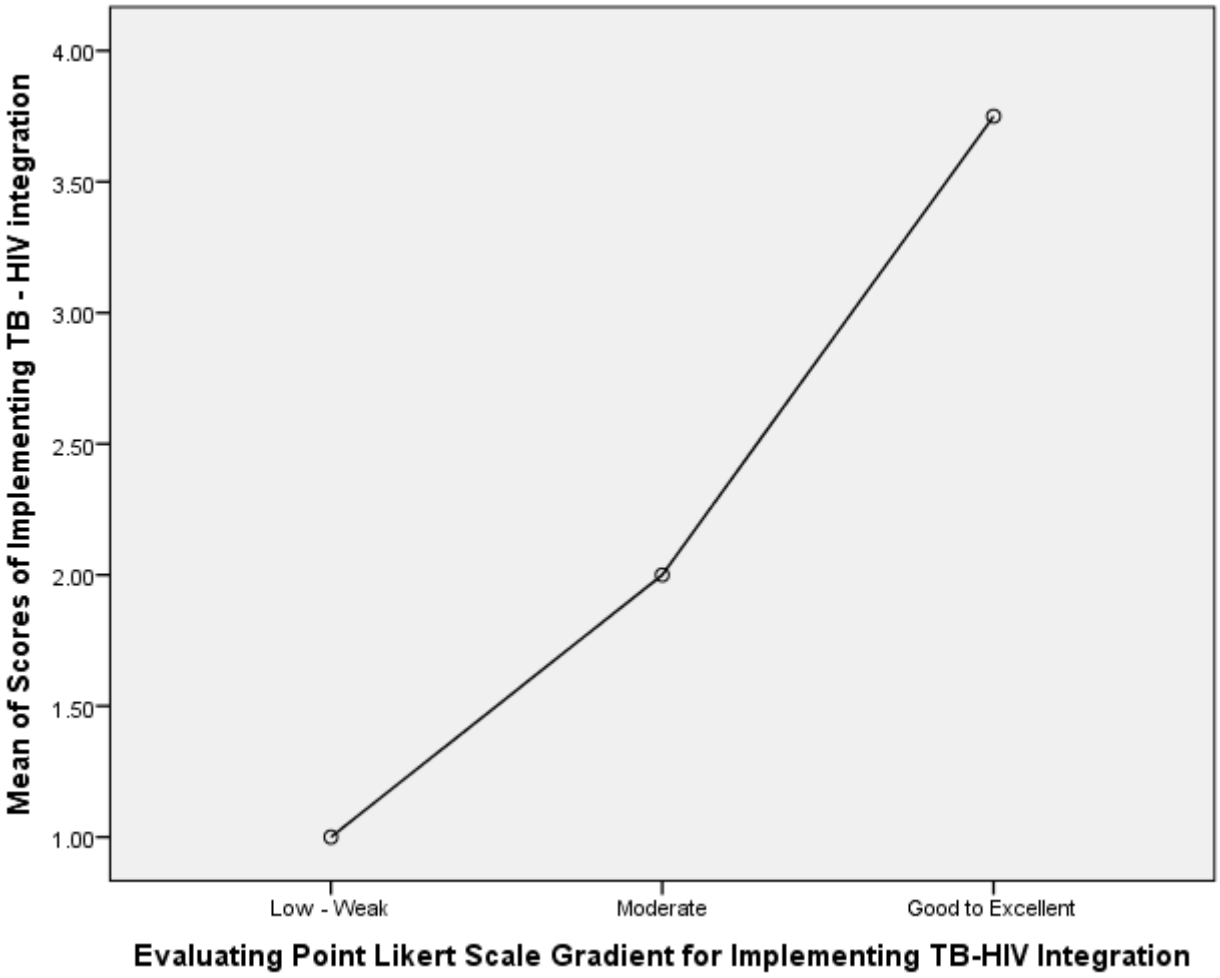


Figure 7

Relationship between Likert scale gradient and scoring system.

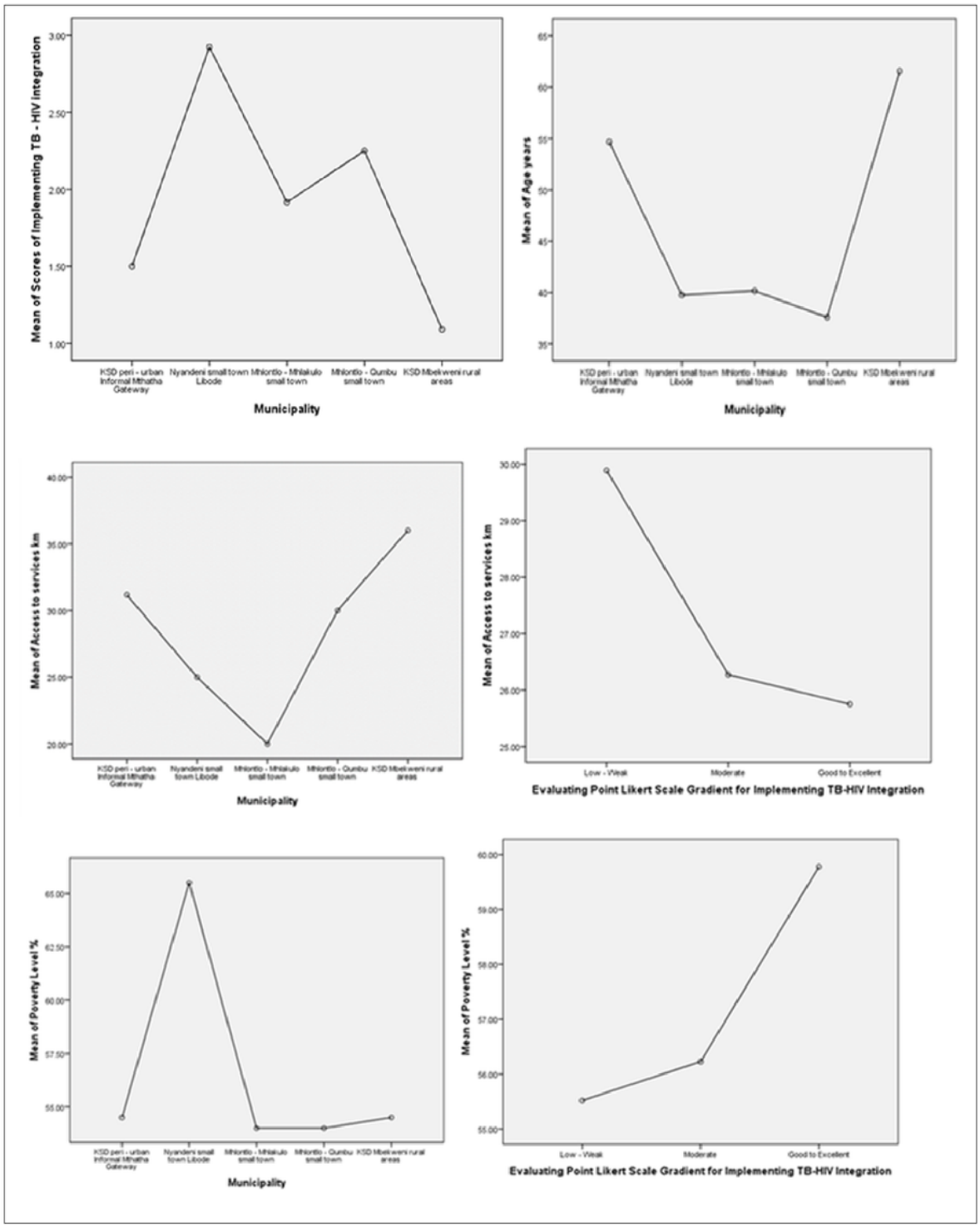


Figure 8

Associations between Perceived quality of integrated TB/HIV services and local health municipality, age of participants, accessibility to healthcare facilities and poverty gap