

# The Comorbidity of HIV, Hypertension and Diabetes: A Qualitative Study Exploring the Challenges Faced by Healthcare Providers and Patients in Selected Urban and Rural Health Facilities where the ICDM Model is Implemented in South Africa

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## Research Article

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# Abstract

## Background

People living with HIV (PLWH) are living longer as a result of advancement and adherence to antiretroviral therapy. As the life expectancy of PLWH increases, they are at increased risk of hypertension.

## Methods

We conducted 24 in-depth interviews to understand the challenges faced by healthcare providers and PLWH with chronic comorbidities under the Integrated Chronic Disease Management (ICDM) model implemented in health facilities in South Africa. Thematic content analysis was conducted.

## Results

The challenges experienced included lack of staff capacity, unclear guidelines on the delivery of integrated care for patients with HIV chronic comorbidities, pill burden, non-disclosure, financial burden, poor knowledge of treatments, relocation of patients and access to treatment. Lack of support and integrated chronic programmes including minimal information regarding the management of HIV chronic comorbidities were another concern.

## Conclusion

Standardised guidelines and training, increasing staff capacity and addressing socio-economic barriers is critical to achieving the outcomes of the ICDM.

## 1. Background

Advancement in antiretroviral therapy (ART) has improved the health outcomes and prolonged the lives of people infected with HIV (1). As the life expectancy of people living with HIV (PLWH) increases, they are prone to developing additional chronic diseases (2,3). In 2018, the global prevalence of hypertension in PLWH was estimated at about 9% and at least 59% of these were living in sub-Saharan Africa (4). A hospital-based study in Ethiopia found that over 50% of its HIV positive sample reported an additional chronic condition from hypertension, diabetes, cardiovascular disease, COPD and cancer (10). In Zimbabwe, chronic comorbidities among PLHIV are projected to increase by 26% by the year 2035 (11). Similarly, almost 30% of people living with HIV (PLHIV) in South Africa have at least one other comorbidity (12). Further research in South Africa shows that about one fifth of PLWH were hypertensive at ART initiation and almost 15% were diagnosed with hypertension at follow up (5).

The deterioration in levels of physical activity and weakness in metabolic system are some of the factors that increase the vulnerability of developing chronic conditions as people grow older (6). A national population based survey in South Africa found that more than 50% of people were not physically active (7). However beyond individual physical activity, a study in Swaziland confirms that hypertension in

PLHIV is triggered by various mechanisms such as changes in BMI, characteristics of the HI virus and some ART regimens (8).

Studies in high and low income countries are in agreement that PLHIV are faced with an increased risk of developing hypertension and diabetes (2,8;5,9). However, the chronic conditions reported by PLHIV may be pre-existing, HIV-related or even due to ageing. For instance, the HI-virus and antiretroviral drugs at times interact with chronic disease risk factors to lead to the development of chronic diseases (14).

Like many countries, South Africa has adopted an Integrated Chronic Diseases Management (ICDM) model which it first introduced in 2011 to address the double burden of HIV/AIDS and non-communicable diseases (15). Some of the key outcomes of the model is to provide: Improved Operational efficiency and quality of care; Individual responsibility and establish an activated and informed population (Fig. 1) that can support individuals with living with chronic conditions such HIV/AIDS as well as other non-communicable diseases such as hypertension and diabetes (15).

To achieve these outcomes, the model proposes reorganizing the facility to better manage bookings and patient flow; expanding clinical management support by providing training and guidance on delivery of the ICDM model; providing assisted self-management through empowering; providing support at the facility and community level and prioritizing health promotion and population screening (16). Barriers to delivering the ICDM model include overburdened health systems, staff shortages and lack of guidance on the adequate delivery of the model (17).

Persons diagnosed with the comorbidity of HIV and hypertension or diabetes have unique healthcare needs as compared to persons living with only one of these conditions as they require multiple medicine prescriptions as well as regular monitoring to avoid medicine toxicities and to ensure adherence (18). For some ART compliant patients, treatment fatigue is common and entails coping with side effects; the burden and intensity of treatment as well as taking complicated regimens (19). In addition, structural and institutional barriers to accessing chronic care treatment continue to persist and include poverty, stigma and poor social support (20). The treatment and management of co-morbidities is difficult for both patients and health providers as they need costly prolonged treatment and care (21). For health providers, the comorbidity of diseases may be too complicated for simple treatment (22). For example, patients with CCMs often require multiple treatment regimens that need to be prescribed and administered carefully to reduce the risk of drug interactions (Nobili et al., 2011).

The increasing prevalence of chronic conditions among PLWH and the unique healthcare needs of this population group requires a well-integrated ICDM model. However, the implementation of the model remains suboptimal in many facilities where it is implemented as a result of, among others, health system inefficiencies (23).

After establishing existing barriers to providing comorbid care, some research has called for further studies to understand the experiences of comorbid patients under the integrated and chronic disease model being implemented in South African public healthcare facilities (17). This study is two-fold in that

it investigated the challenges faced by health care providers in delivering the outcomes of the ICDM model, particularly, to patients living with the comorbidity of HIV and hypertension or diabetes as well as provide perspectives from persons living with these HIV chronic comorbidities under the care of healthcare facilities where the model is implemented. We focused on providing an understanding of challenges in terms of the three outcomes of the ICDM model (improved operational efficiency and quality care; achieving individual responsibility and an activated and informed population).

## 2. Methods

### 2.1 Study Setting

We conducted 12 key informant interviews with healthcare providers and 12 in-depth interviews with participants living with HIV and an additional chronic condition from March to May 2020. At the time of data collection, the Covid-19 pandemic had surged the world and several lockdown restrictions including limitations on movement and face-to-face contact were enforced in South Africa to limit the spread of the virus. Given these circumstances, 17/24 interviews were conducted telephonically. We conducted the remaining 6 interviews prior to the implementation of the lockdown regulations. The study was conducted among participants attending primary health care (PHC) facilities and hospitals in Gauteng and the Eastern Cape (EC) provinces of South Africa (*as shown in* Table 1). The selection of these two provinces was because spatial analysis has shown the EC to be among the provinces with the highest prevalence of chronic co-morbidity in South Africa (25). In this province, the adult HIV prevalence is 25.2%, which is higher than the national average (24). Gauteng was selected because it comprises the largest (14.7 million) share of South African population and has the highest (24.0%) percentage of the elderly population, aged 60 years and older, residing in the province (26). About 17.6% of the adult population in Gauteng are living with HIV (24).

### 2.2. Study Design

We developed semi-structured research tools guided by the three principle outcomes of the ICDM model. For the KIs with healthcare workers, we focused on understanding the practices to achieving improved Operational efficiency and providing quality of care. The interview included questions pertaining to challenges with providing treatment and care to PLWH and another chronic condition, health system challenges as well as availability of systems and programmes to support health facilities to provide comprehensive care for patients with HIV chronic comorbidities. The semi-structured interview guide used for PLWH and hypertension or diabetes was premised around understanding challenges with prevention, treatment and management of these comorbidities as well as gaining an understanding of the difficulties with disclosure and social interactions after participants come to the knowledge of the dual diagnosis of HIV and hypertension or diabetes. We adopted a qualitative phenomenological approach to understand the experiences shared by both healthcare providers and adults living with HIV comorbidities in this study.

### 2.3 Study Population

Purposive sampling was used to select 7 Primary Health Care (PHC) facilities and 3 hospitals where the ICDM model is implemented in Eastern Cape (EC) and Gauteng. A combination of HCPs from clinics and hospitals was used because patients with HIV chronic comorbidities often receive their medical treatment at primary health care facilities such as clinics. However, in cases where patient's conditions are uncontrolled, patient care can be escalated to the hospital level. To be eligible for the study, healthcare providers were required to have at least 2 years' experience with providing treatment and care to PLWH and another chronic condition. Eligibility for patient participants were aged 18 years or above, living with an HIV chronic comorbidity, on ART and receiving treatment at the selected health facilities. Both male and female healthcare providers and patient participants were invited to participate in the study. Recruitment of participants with HIV chronic comorbidities occurred until the point of data saturation.

## **2.4 Data collection Procedures**

The study initially sampled HCPs from hospitals and clinics in both Gauteng and the Eastern Cape. However, some of HCPs in the hospitals and clinics could not participate in the study and mentioned that their health facilities were under a lot of pressure given the rise of the Covid-19 pandemic and that many of their staff were, in addition to providing health services, preoccupied with Covid-19 training and capacity building. Given this, the study relied on snowballing to recruit HCPs. The HCPs that were successfully interviewed, provided contact details of other HCPs who were not necessarily from the same health facility.

The sample of adults living with HIV and either hypertension or diabetes was recruited from the facility's patient records provided by the healthcare providers with permission from the facility managers. Prior to each interview, the researcher contacted the facility manager to inform him/her about the study. The managers assisted with facilitating the introduction to the professional nurses or doctors as according to the study's inclusion criteria.

## **2.5 Interview Process**

The objective of the study was explained to all study participants that met the study criteria. For face-to-face interviews, participants provided written consent. For telephonic interviews, the study information sheets were sent via Email and WhatsApp (*as per participant's preference*) and consent was obtained verbally and audio recorded. Using their clinic/hospital records, the HCPs were asked to provide details of adults living with HIV Chronic comorbidities in their health facilities. The researcher then made telephonic contact with these patients to assess eligibility and obtain participant consent. The interviews were conducted in English and isiXhosa, *a local language in the Eastern Cape Province*.

## **2.6 Data Analysis**

Where a local language was used, the data was transcribed back to English by an isiXhosa speaking translator and checked for accuracy and completeness. All transcripts were imported into Atlas.ti version 12. The healthcare provider and patient participant interviews were first analysed separately. We began with analysing the healthcare worker interviews, followed by the patient participants. For each study

population, we reviewed the findings reported by the participants and developed a set of preliminary codes. We began by using deductive analysis following the Integrated Chronic Disease Framework (Fig. 1). We focused on the three outcomes of the care continuum (1) Improved operational efficiency and quality of care (2) Individual responsibility and (3) Activated and informed population. To provide more depth to the analysis, inductive analysis was conducted to contextualize the research findings. To do this, we analysed the text to identify expressions that shared the same concepts. The respective codes for healthcare providers and patient participants were analysed and those sharing similarities were merged. We used the final set of codes to develop broader themes. The findings in this paper are reported using thematic headings and illustrative quotes.

## **3. Results**

### **3.1 Health Care Provider characteristics**

A total of 24 interviews were conducted; 12 Healthcare providers and 12 adult participants. The sample of healthcare providers included 1 registered nurse, 9 professional nurses and 2 doctors across three hospitals and seven clinics. With regards to gender, the HCPs comprised of eleven females and one male as shown in Fig. 2.

All HCPs had spent at least two years in their profession and in providing treatment and care to PLWH and/or chronic conditions. We asked the providers to detail the types of chronic conditions that they commonly attended to among PLWH. All HCPs cited hypertension and/or diabetes as the most prevalent chronic condition to affect adults diagnosed with HIV. Of the twelve HCPs interviewed, all mentioned that most of their HIV positive adult patients had hypertension while only 6 mentioned that both hypertension and diabetes were prevalent among adults living with HIV. The distribution of the interviews conducted with healthcare providers is as shown Fig. 2.

### **3.2 Characteristics of patient participants**

Of the 12 HIV positive participants, 10 were diagnosed with hypertension and two with diabetes. All were on ART.

Table 1  
 Characteristics of adults living with HIV Comorbidity  
 (Hypertension & Diabetes)

<b>AGE</b>	<b>Frequency (N)</b>	<b>Percentage (%)</b>
30–35	2	16.66
36–40	2	16.66
41–45	1	8.33
46–50	4	33.33
51–55	2	16.66
56–60	1	8.33
<b>SEX</b>		
Female	11	91.66
Male	1	8.33
<b>MARITAL STATUS</b>		
Single	7	58.33
Married	3	25
Divorced/Separated	2	16.66
<b>LEVEL OF EDUCATION</b>		
Primary	3	25
Secondary	8	66.6
Matric	1	8.33
<b>EMPLOYMENT STATUS</b>		
Employed	6	50
Unemployed	6	50

The majority (33%) of the participants were aged between 46–50, mostly female (92%) and almost 60% reported that they were single. In terms of socio-economic status, more than two-thirds had received secondary education. There was an equal balance between the number of participants that were employed and those that were not employed.

### **3.3. Improved operational efficiency and quality of care**

Overall, the healthcare providers cited three main challenges pertaining to providing efficient and quality care to patients living with the comorbidity of HIV and hypertension or diabetes under the ICDM model.

## Under-resourced facilities

Most healthcare providers reported that their health facilities were under-resourced in terms of staff capacity. The nurses cited being frequently overwhelmed with the patient flow. Some said that they sometimes do not take their lunch breaks or reduce them to 15 minutes. Others reported that they took their lunch while consulting with patients. The fatigue resulting from missing lunch breaks and/or the workload placed on providers to attend to as many patients seems costly for holistic patient care. One nurse shared the following experience:

*“Sometimes the facility itself would be packed, so meaning that you don’t really have enough time to spend with one patient, you have to rush the queue...another thing sometimes we have problems with shortage of drugs especially chronic medication like for hypertension and diabetes”, professional nurse, EC.*

The patient participants echoed that the lack of staffing in healthcare facilities was responsible for the many notable inefficiencies such as the slow delivery of services. One patient said: *“To us it seems as though they are just slow, but they are not slow it’s just that they are short staffed”, P2 GP.*

In the nurse’s shared experience, concern was raised over the lack of on time delivery of chronic medications, particularly in the rural areas. This hinders efforts to achieving improved operational efficiency because it means patients may need to return on a different date to receive their medication; which could be one of the reasons health facilities and healthcare providers become overworked on specific days. The issue of delayed delivery of medication further risks patients defaulting from treatment.

## Lack of training and guidance on chronic care delivery

Two major concerns were raised by healthcare providers with regards to receiving adequate training on delivery the ICDM model. Firstly, and because of the previous point of under resourced facilities, some healthcare providers reported that they are too overworked to find time to attend training and when they do attend, they are not as focused during lessons because they are exhausted. For example, one healthcare provider said:

*“To be honest with you nurses don’t always have the time for refresher courses because most of the time hospitals and clinics are short-staffed”, professional nurse, EC*

In the second account, healthcare providers who had moved between facilities or different departments reported that they had some experience with providing treatment and care for HIV, hypertension and diabetes, respectively. However, they did not receive training on dealing with HIV chronic comorbidities. One nurse summarized her experience as follows:

*“Let me be honest with you, when I was working at XXX clinic I had just come from working in a hospital, so at the hospital I was working at medical and didn’t know much about what is going on in the primary health care and I did not get training like specific to co-morbidities...I was just thrown in the deep end”, professional/triage nurse, EC.*

## **Unclear guideline on chronic care integration**

The lack of training was reflected in the accounts of several other healthcare providers. There seemed to be different interpretations and methods of implementation of the ICDM model. Some nurses reported that they provided holistic treatment for all chronic conditions including HIV, hypertension and/or diabetes. For example, a patient with HIV and hypertension has one file, one appointment card and can receive their chronic medication from the same nurse or during the same clinic visit. However, there were reports of patients having different clinic dates for HIV and hypertension or diabetes. A doctor in one of the hospitals said:

*“Somehow chronic care is not yet too much integrated in the government sector because I remember asking another patient why she had another date for another treatment...you find one condition is handled by the other and one also handled by the other”, Dr, EC.*

Interestingly, when the adult participants were asked about their experiences of receiving integrated chronic care and the quality of the care provided. We found that patients were happy with the attitude of healthcare workers in providing treatment and care. *“Every time when I come here, they don’t just give me my medication and say here is your medication go, they will ask me this and that; how are the pills treating you, how does your body feel and so on”, P4 GP.* However, we found that routine testing for high blood pressure was provided but not for diabetes. With the exception of one patient (who was pregnant at the time of interview), most reported receiving their HIV and chronic care treatment from one nurse within the same facility. However, some patients raised concerns about the separation of queues for patients receiving HIV treatment and those receiving care for other conditions and the slow delivery of services. *“I had a problem with the way the queues are formed. People with HIV had their own line and other people who came to the clinic for different issues had their own lines...that puzzled me a lot”, P10 EC.*

### **3.3. Individual Responsibility**

We explored providers and patients perspectives of the role of patients to adhere to treatment and ensure adequate management of their conditions. HCPs mentioned that the self-management of diseases was difficult for patients and evident in the rate of default from HIV treatment and, subsequently, from other chronic medication as well. The HCPs elaborated on a number of reasons and experiences that cause patients to discontinue treatment, which we have organised under sub-themes. These themes include: non-disclosure; polypharmacy, poor knowledge of treatments; constant movement of patients and lastly, socio-economic issues.

## Non-disclosure

Most HCPs mentioned that most of their patients defaulted because of non-disclosure of their HIV status to either their partners, family, peers and/or employers. All agreed that HIV was the most difficult to disclose compared to other chronic conditions such as hypertension or diabetes. However, even after disclosure of HIV status, some HCPs were to the view that most of their patients found it difficult disclosing that their other chronic conditions because it was too many illnesses for anyone to understand. One of nurses said:

*“People don’t want to disclose, I think it is because of the stigma or whatever...they will even tell you that even the family haven’t accepted that they are HIV positive and now there is hypertension or diabetes so sometimes it’s difficult...they are even too scared to disclose the status to their partners, parents and when not disclosing their status obviously adherence is going to fall”, registered nurse, GP.*

There were different accounts from the patient participants. Some agreed with the healthcare providers that it was much easier to inform people that you are hypertensive or diabetic as opposed to telling them about your HIV status. Others related their non-disclosure as a fear of discrimination, stigma or judgement. Two of the participants shared their experiences as follows: *“... you know I was once employed as a house helper and my employer found me taking my pills and she fired me from work just for that... and I have worked for them for many years but I was fired for that...Now it is many of us at work who are taking medications and we all know each other’s clinic appointment dates but our employers are not aware of that. So when one goes for their clinic appointment you just tell them about the high blood condition but not the HIV one”, P5 GP.*

*“Well yes people do gossip about me because I lost weight, my body was not like this... many are not aware of my high blood pressure condition but they are aware of the HIV one because I am losing weight... the discrimination that I am receiving is mainly because of the HIV but not the high blood”, P4 GP.*

## Polypharmacy

Polypharmacy refers to the use of multiple medications, which is common for persons living with comorbidities. The healthcare providers mentioned that another leading cause for treatment default was because PLWH and additional chronic conditions were subjected to taking different medications, sometimes taking a number of pills at a single or different times. They reported that this often lead to treatment fatigue or patients weighing which of the treatments; between HIV or hypertension; they thought was more important or had the least side effects.

*“I think pill burden is a problem for patients...for hypertension it depends how your high blood is elevated, for example I can start you on one drug or two or three drugs...so the fact that you have three drugs on*

*top of the ARV drug...now taking four tablets in a day it's a lot for them. So you find that some of them take the HIV drug only and say no the hypertension one I will see", professional nurse, GP.*

Indeed, some patients reported treatment fatigue. One of the patients cited the following: *"They are five...I take two for HIV and three for high blood...hey it is very hard...they are a lot and stressful to take...worse when I hear or see other people that taking 1 pill for HIV and probably less for chronic...it worries me a lot, I just wonder what is so unique about my illnesses", P8 EC.*

## Poor knowledge of treatments

We found that participants had poor knowledge of their HIV and chronic medication, with most being unable to name the medications that they using aside from saying it is for HIV and hypertension/diabetes. In the healthcare worker's account: *"Most of the time patients don't even know the names of the tablets that they are taking", professional nurse, EC.* This corroborated the experiences of the patient participant with one saying: *"I don't know their name, I just drink pills", P9 EC.*

## Relocation of patients

Healthcare providers raised concern over the constant movement of patients from one geographical area to the next. Reasons for the relocation can be alluded to fear of stigma in the area where they receive their medication and pull factors that lead them to seek better economic opportunities. The problem however arises where patients that intend to relocate do not request their local clinic to provide them with transfer letters in order to allow the next clinic to know the client's medical history.

*Our clients are moving a lot, today they will be here the next day they are in KZN...we tell clients that when they leave they should come and we give them a transfer letter but some do not follow that...usually what they do is that when they come to an institution they will say that it is my first time because client knows that she is supposed to be bringing a transfer letter", professional nurse, EC. .*

## Socio-economic issues

Individual responsibility is difficult to achieve, especially, for patients with a low socio-economic status. In most of the PHC included in this study, the patients were unemployed and experienced several financial challenges that affected access to health facilities, food security and their ability to take treatment accordingly. One healthcare provider reported that:

*"Some patients will tell you that I don't have food at home and don't even have money to go fetch that treatment at the hospital so mostly its social factors", Dr, EC.*

Similarly, the patient participant agreed that unemployment was one of the factors that made the self-management of chronic conditions difficult. One participant went on to say:

*"I am unemployed so the problem is that I am not working. For someone to be living with these conditions and on the other hand not working it is a problem obviously... because even those pills you cannot just drink them when you have not yet eaten, you must eat before you can be able to drink pills...you must eat fruits and other things; all those things require money because even with this condition, we hear from doctors or nurse's advices that it is very important that we always eat lots of fruits and that is money", P4 GP.*

### **3.4. Activated and Informed population**

HCPs were asked about their role in ensuring patients with HIV comorbidities were informed and supported about the prevention and management of chronic comorbidities. Providers reported that support and information was provided through different structures. These include community healthcare workers and social workers who provide health talks and support through platforms such as WhatsApp and adherence clubs. They mentioned that these support initiatives were implemented by organisations not affiliated to the clinics; often non-governmental organisations under donor funding.

However, we found a different perspective from the patient participants. Most reported an unavailability of social workers or support groups that provide information and/or support to patients living with HIV Chronic comorbidities. Others reported having not received sufficient information about managing their conditions from healthcare providers as well. For example, two of the participants mentioned the following:

*"We just get our medication and go home...we do not have support programmes that help us to cope with mental and stress of having these conditions", P9 EC.*

*"I did not get much information about HIV and ways of preventing vulnerability from other chronic diseases, the information I got was very vague...they only said when you diagnosed with HIV it's easy to get other diseases but that time didn't have diabetes or know it existed", P7 EC.*

## **4. Discussion**

Several challenges continue to exist with delivering the three outcomes of the ICDM model. These include under-resourced facilities; unclear guidelines on the delivery of the model. On the part of the patients, concerns over non-disclosure, polypharmacy, socio-economic challenges and the lack of support programmes for managing HIV chronic comorbidities affect the success of achieving an integrated care system for PLWH and other chronic diseases in South Africa.

## **Improved operational efficiency and quality of care**

As according to the ICDM, providing quality of care in health care facilities is dependent on improvement in operational efficiency (15). In this study, HCPs mentioned a number of operational inefficiencies that can potentially have an impact on the treatment and care provided to patients with HIV chronic comorbidities. These problems included limited staff capacity coupled with overburdened health facilities, lack of guidance and training on integrated chronic care delivery for HIV comorbid patients and we observed an inconsistency in the chronic care integration guidelines across the different health facilities; with some still treating HIV separate from other chronic conditions.

The experiences of adults living with HIV chronic comorbidities in this study corroborate these operational deficiencies in the health system. Reports of slow service delivery and the divide in queues for HIV treatment vs treatment for other chronic conditions remains concerning. Health system inefficiencies such as lack of staff and unclear guidelines for the care of patients with multi-morbidities threaten the successful implementation of the Integrated Chronic Disease Model (17). Research suggests that current budgeted costs for implementing the ICDM model are sufficient however minimal additional costs are required for improving patient flow, managing bookings and the training of staff (27).

One of the objectives of the model was to use the HIV programme to scale up services for chronic conditions (15). In this study, we found that routine testing for chronic conditions was done only for hypertension. The improvement in routine testing for hypertension was unexpected given reports of malfunctioning blood pressure equipment and medicine stock-outs for hypertension (23,28).

Some empirical evidence has suggested that operational inefficiency negatively influences patient satisfaction (29). However, results in this study showed that adult patients with the comorbidity of HIV and hypertension or diabetes were satisfied with the attitude of healthcare workers in providing treatment and care. We found that most adults reported that healthcare providers were supportive and remained professional even despite the healthcare deficiencies.

## **Individual Responsibility**

Health care providers reflected on the difficulty of patients to take responsibility of managing their conditions noting that this was evident in their experience with patients that default from HIV treatment and, subsequently, from other chronic medications. According to providers, the management of disease is a challenge to patients because of issues of non-disclosure; polypharmacy, poor knowledge of treatments; constant movement of patients and socio-economic issues. The management of diseases is expected to be difficult when patients are not informed or supported at the facility and community level (15). However, according to providers, healthcare workers and social workers provide support through health talks at the facility, social media platforms and adherence clubs.

Indeed, patients diagnosed with HIV Comorbidities in this study found the self-management of comorbidities difficult. For example, diabetes requires self-management outside of the health facility whereby patients continuously monitor their glucose levels and maintain a healthy diet (17). Further

challenges include stigma against persons living with HIV comorbidities, pill burden, financial difficulties, challenges with maintaining a healthy lifestyle and access to treatment. Access to healthcare in South Africa remains a challenge particularly in the rural areas because of the distance between the patients' home and health facility which often involves travel costs (30). Our study supports these findings as we found that health facilities in the rural areas were not within close proximities resulting in patients have to walk long distances and some patients being unable to fetch their treatments because of the travel costs.

There seems to be a discordant account of the existence of support given by healthcare providers and patients. Contrary to the report given by healthcare providers, the adult participants in this study mentioned that support from the facility and community was minimal. They report receiving minimal information about managing HIV chronic comorbidities and the absence of support groups. We acknowledge that implementing achieving the outcome of individual responsibility through providing assisted self-management is among the costliest components of the ICDM model (27). However, it is important for health systems to be transparent about the difficulties in delivering this component. The scale up of this component can improve adherence and provide relief to overcrowded health facilities (27).

## Activated and informed population

The ICDM model lists population screening and health promotion at the population level as essential to achieving an activated and informed population (15). In addition to patients being unsatisfied with the information they receive regarding the prevention and management of HIV chronic comorbidities, patients reported the existence of stigma at a community level which gave them fear to disclose their HIV status in particular. Similar to other studies, the HIV stigma reported came in the form of gossiping, judgment and lack of support (31). Reports of existing stigma and discrimination at the community level suggest an uninformed population

A recent audit of the quality of care for diabetes patients in primary health care facilities in South Africa showed that the ability to provide comprehensive care to diabetic patients was compromised by the lack of resources (32). In this study we found that, aside from hypertension, patients were not screened for diabetes or other chronic conditions at the primary healthcare level.

## 5. Conclusion

The three outcomes of the ICDM model (*improved operational efficiency and quality of care, individual responsibility and achieving and activated and informed population*) need to be strengthened in order to meet the unique health needs and challenges of people living with HIV and other chronic conditions. Strengthening these outcomes to meet the needs of HIV chronic comorbid patients entails scaling up ICDM components such facility reorganization to provide better management of patients flows, redistributing some of the ICDM implementation costs towards providing assisted self-management in order to improve individual responsibility of chronic disease management, providing capacity building

and training on the delivery of chronic care treatment under the ICDM model, ensuring that guidelines on the integration of chronic diseases such as HIV, hypertension and diabetes are standardized across all health facilities where the model is implemented and lastly, scaling up health promotion at the population, community and individual level.

## **6. Limitations**

This study has important limitations. Firstly, we did not evaluate how long the ICDM model had been implemented in each of the health facilities that were sampled in this study. As a result, it is possible that the suboptimal outcomes of the ICDM model mentioned in this study reflect facilities that had recently adopted the model. Lastly, the findings in this study are representative of patients and healthcare workers in the selected provinces in South Africa. Nonetheless, the results presented in this study are essential for policies that aim to improve the adherence and the quality of care received by patients living with HIV and the comorbidity of hypertension or diabetes.

## **Declarations**

### **Ethics approval and consent to participate**

Ethical clearance (M190683) was obtained from the Human Research Ethics Committee (Medical) at the University of the Witwatersrand. All ethical standards of obtaining consent and maintaining confidentiality were adhered to. For face-to-face interviews, a private room was used at the health facility to conduct the interviews. For telephonic interviews, participants were asked to propose a suitable time where they would be at most comfort to be interviewed by the researcher. Informed consent was obtained from all study participants. Participants for the in-person interviews were required to sign an informed consent form while all telephonic consents were audio-recorded. All methods were performed in accordance with the relevant guidelines and regulations as outlined by the ethics committee.

### **Consent for publication**

All participants were informed and provided consent to have the study findings published. However, individual identities have been kept anonymous.

### **Availability of data and materials**

The data that support the findings of this study are available from Motlatso Godongwana but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Motlatso Godongwana.

# Competing interests

The authors have no competing interests to declare.

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# Authors' contributions

MG designed the study, collected and analyzed the data, wrote the manuscript and did the submission. The authors reviewed and approved the final manuscript.

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# Authors' information (optional)

N/A

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## Figures

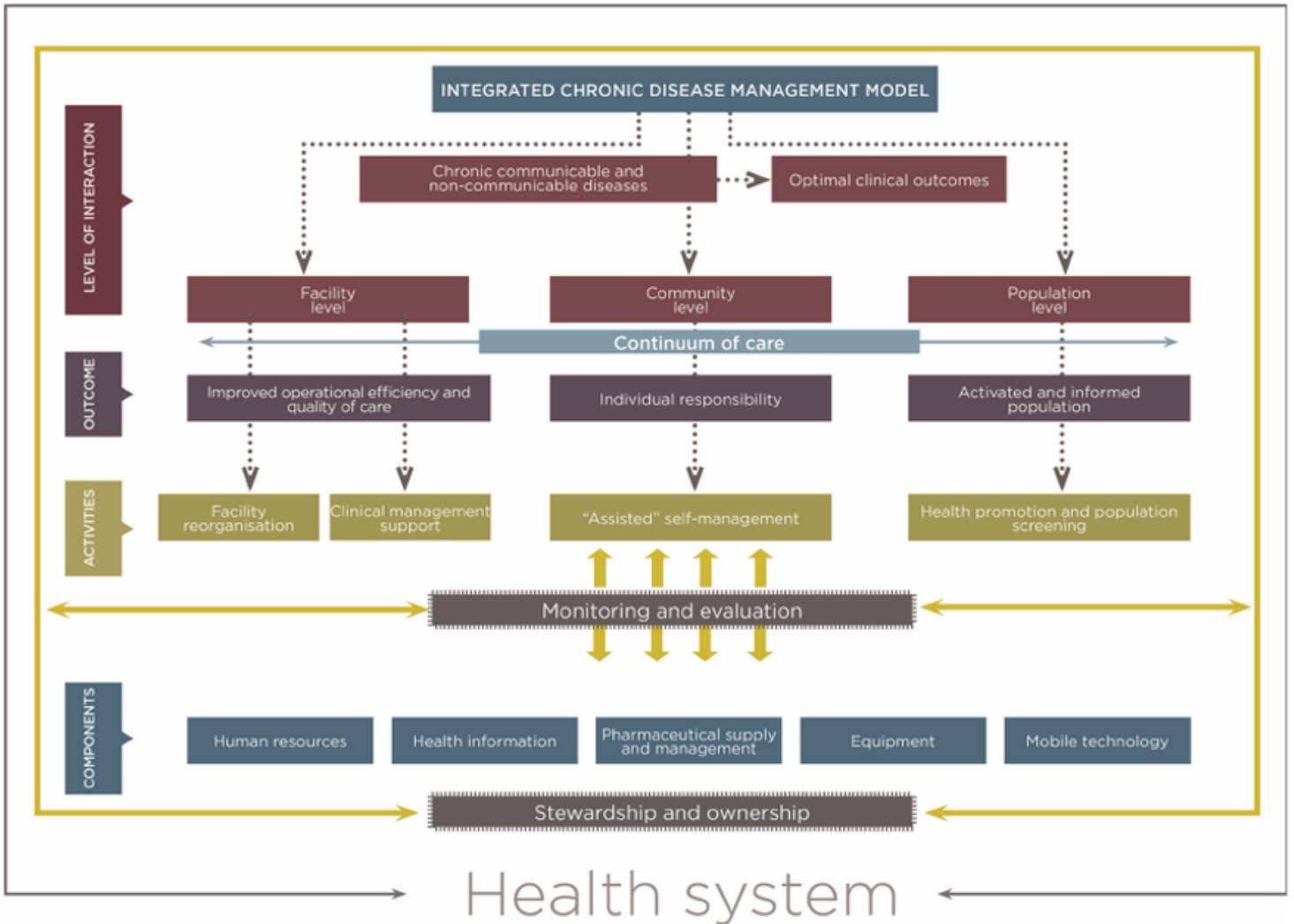
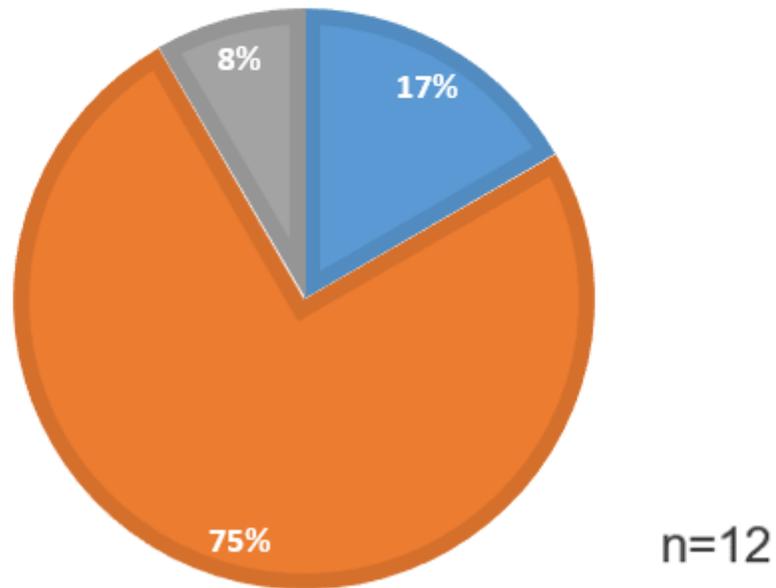


Figure 1

Integrated Chronic Disease Model implemented in South Africa

## TYPE OF HEALTH CARE PROVIDER

■ Doctors   ■ Professional nurses   ■ Registered nurse



**Figure 2**

Percentage distribution of the types of healthcare workers sampled