

The “Silver Epidemic”: Exploring the Biopsychosocial Needs and Healthcare System Preparedness for Adults Aged 50+ Living with HIV in Hong Kong

The Hong Kong Aids Prevention Society (HKAPS)

Executive Summary

The convergence of two significant demographic and epidemiological trends—population aging and the chronicity of HIV infection through effective antiretroviral therapy (ART)—has created what can be termed a “silver epidemic” among people living with HIV (PLWH). Globally, more than 50% of PLWH are now aged 50 years or older, with projections indicating this proportion will reach 70% by 2030 (Burk-Leaver et al., 2024). This demographic shift presents unprecedented challenges for healthcare systems, particularly in high-income Asian settings such as Hong Kong, where both rapid population aging and HIV chronicity intersect with unique healthcare delivery structures.

This comprehensive report examines the biopsychosocial needs of older adults living with HIV in Hong Kong, with particular emphasis on comorbid non-communicable diseases (NCDs) such as hypertension and diabetes, and evaluates the preparedness of Hong Kong’s healthcare system to address these complex, intersecting health challenges. The evidence demonstrates that older PLWH face a substantial burden of comorbidities, with prevalence rates of hypertension ranging from 36-59%, diabetes 13-34%, and dyslipidemia 31-88% across various studies (Aly et al., 2024; Kiplagat, Naanyu, Kamano, et al., 2025; Ouyahia et al., 2025). These rates significantly exceed those observed in the general aging population, reflecting the

compounded effects of HIV infection, long-term ART exposure, chronic inflammation, and traditional cardiovascular risk factors.

The biopsychosocial framework reveals that older PLWH experience challenges across multiple domains: biological factors including accelerated aging, immunosenescence, and polypharmacy; psychological burdens encompassing depression (23-40%), anxiety, stigma, and cognitive impairment affecting 17-21% of this population; and social determinants including financial strain, social isolation, and healthcare access barriers (Lwin et al., 2025; Ouyahia et al., 2025). The integration of geriatric care principles with HIV management emerges as a critical necessity, yet current healthcare systems globally, including in Hong Kong, remain largely unprepared for this paradigm shift.

This report synthesizes evidence from 45+ key studies and provides actionable recommendations for Hong Kong's healthcare policymakers, clinicians, and public health professionals to develop integrated, age-appropriate care models that address the complex needs of this growing population.

1. Introduction and Background

1.1 The Transformation of HIV: From Acute to Chronic Disease

The advent of combination antiretroviral therapy in the mid-1990s fundamentally transformed HIV from a rapidly fatal diagnosis to a manageable chronic condition (Kiplagat, Naanyu, Kamano, et al., 2025). With sustained viral suppression, people living with HIV now achieve near-normal life expectancies, leading to a dramatic demographic shift in the HIV-affected population. The improvements in life expectancy of PLWH are now nearing that of populations living without HIV, marking one of modern medicine's most significant achievements (Burk-Leaver et al., 2024).

However, this success has unveiled new challenges. Aging with HIV is not simply equivalent to aging in the general population; rather, it is characterized by accelerated and accentuated aging processes, earlier onset of age-related

comorbidities, and a unique constellation of geriatric syndromes (Rajasuriar et al., 2025). The chronic immune activation and inflammation associated with HIV infection, even in virologically suppressed individuals, contribute to this accelerated aging phenotype. Research indicates that HIV-infected individuals may experience biological aging that is 5-10 years advanced compared to their chronological age (Kim, 2020).

1.2 The Scope of the Silver Epidemic

Globally, the epidemiological landscape of HIV has fundamentally changed. In the United States, over 50% of PLWH are now aged 50 years or older, with this proportion exceeding 55% in some regions (Burk-Leaver et al., 2024). Similar trends are observed across Europe, Asia-Pacific, and other high-income settings where ART access is well-established. In Hong Kong specifically, while comprehensive age-stratified HIV prevalence data remain limited, the city's aging population structure combined with effective HIV treatment programs suggests a similar demographic transition is underway (Chung & Lou, 2020; Fong et al., 2025).

The term “silver epidemic” aptly captures this phenomenon for several reasons. First, it represents the unprecedented and growing population of older adults living with HIV—a demographic that barely existed three decades ago. Second, it highlights the dual burden these individuals face: managing HIV as a chronic condition while simultaneously navigating age-related health challenges. Third, it underscores the systemic unpreparedness of healthcare systems designed around younger HIV populations and traditional geriatric care models that did not anticipate significant HIV comorbidity (Dunville & Greene, 2025; Rajasuriar et al., 2025).

1.3 The Hong Kong Context

Hong Kong presents a unique setting for examining aging and HIV. The city has one of the highest life expectancies globally (males: 83 years; females: 88 years as of recent data), an essentially free public hospital system, and a rapidly aging population

structure (Woo & Marmot, 2025). With over 75% of adults aged 65 and above experiencing at least one chronic condition, the healthcare system faces mounting pressure to provide accessible, integrated primary and specialist care (Fong et al., 2025).

The Hong Kong healthcare system operates through a dual-track structure: a predominantly public system providing subsidized hospital and specialist services, and a private sector primarily focused on outpatient primary care. HIV care is delivered through specialized clinics within the public hospital system, while NCD management occurs across both sectors with varying degrees of integration. This fragmentation presents particular challenges for older PLWH requiring both HIV-specific expertise and comprehensive geriatric assessment (Fong et al., 2025; A. Wong et al., 2025).

Furthermore, Hong Kong's cultural context introduces additional dimensions. The persistence of HIV-related stigma, particularly among older adults, can affect care-seeking behaviors, disclosure patterns, and social support networks. Cultural values emphasizing filial piety and family-based eldercare intersect with the realities of HIV-related stigma and evolving family structures (Lwin et al., 2025). These socio-cultural factors must be considered in developing appropriate care models for older PLWH in Hong Kong.

1.4 Report Objectives

This report aims to:

1. Synthesize current evidence on the biopsychosocial needs of adults aged 50+ living with HIV, with emphasis on comorbid conditions
2. Examine the prevalence, patterns, and clinical implications of key comorbidities (hypertension, diabetes, cardiovascular disease) in this population

3. Evaluate existing models of integrated geriatric-HIV care from international contexts
4. Assess Hong Kong's healthcare system preparedness to address these challenges
5. Provide evidence-based recommendations for policy, clinical practice, and research priorities

2. Global Epidemiology of Aging and HIV

2.1 Demographic Trends

The global epidemiology of HIV has undergone a remarkable transformation. By 2020, over half of people living with HIV in the United States were aged 50 years or older, and at least half of that number were over 70 years old (Kim, 2020). Similar patterns have emerged across high-income countries with mature HIV epidemics and sustained ART access. In the Asia-Pacific region, data from multiple countries demonstrate that the proportion of older PLWH continues to increase steadily (Ahn et al., 2019; Lwin et al., 2025).

Three primary mechanisms drive this demographic shift. First, effective ART allows PLWH diagnosed at younger ages to survive into older adulthood. The longevity improvements attributable to modern ART regimens mean that individuals diagnosed in their 20s and 30s are now reaching their 50s, 60s, and beyond with well-controlled HIV. Second, new HIV diagnoses continue to occur in older adults, accounting for 10-15% of new infections in many settings (H. Y. Wong et al., 2024). Older adults often face delayed diagnosis due to lower index of suspicion among both patients and healthcare providers, as HIV testing campaigns historically targeted younger populations (H. Y. Wong et al., 2024). Third, differential mortality patterns mean that survivors in the HIV-infected population represent those with better access to care, treatment adherence, and fewer comorbidities—creating a survivor cohort that nevertheless faces age-related health challenges.

2.2 Comorbidity Burden in Older Adults Living with HIV

The burden of non-communicable diseases among older PLWH substantially exceeds that of age-matched HIV-negative populations. A comprehensive analysis from the United States examining aging-related comorbidity burden found that overall comorbidity burden was significantly higher in men and women with HIV compared to those without, with differences observed across all age strata (Collins et al., 2023). The estimated mean difference in comorbidity count was significantly greater for every age group among PLWH (Collins et al., 2023).

Figure 1 presents the prevalence of key comorbidities observed in older adults living with HIV across multiple international studies:

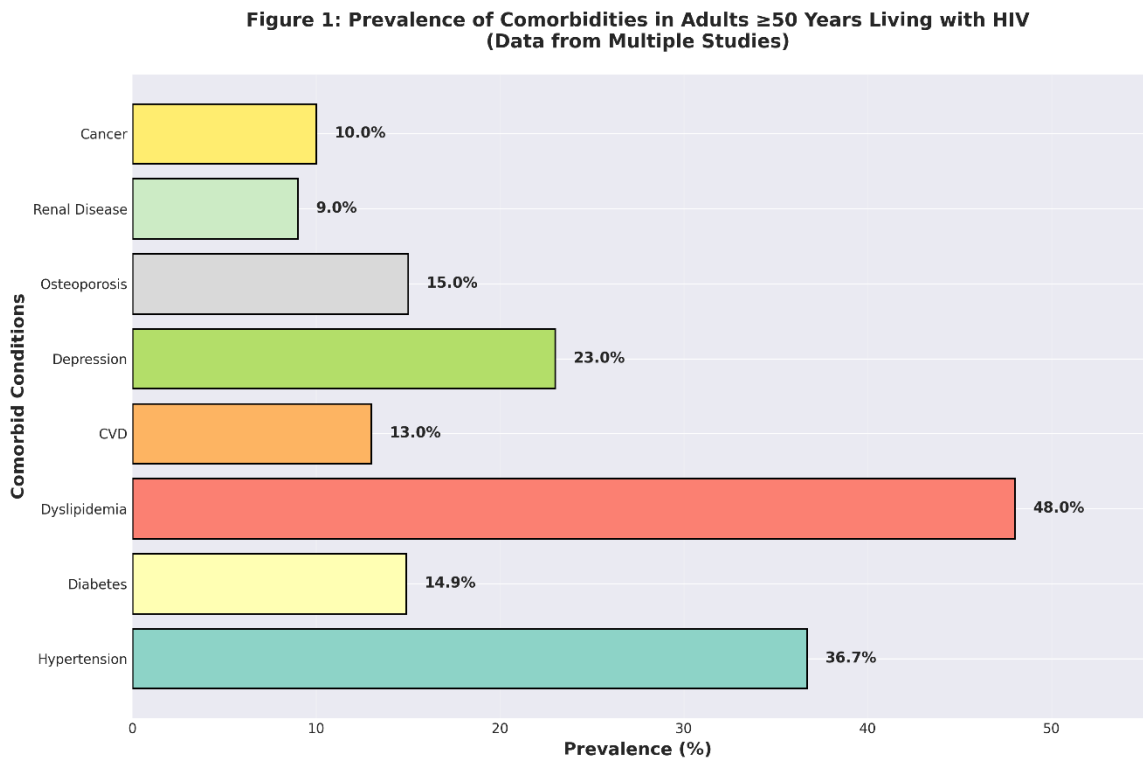


Figure 1 Data Sources: Multiple studies including Guinea national hospital cohort (Aly et al., 2024), Algerian multidimensional assessment (Ouyahia et al., 2025), and HIV-NCD integration studies (Kiplagat, Naanyu, Kamano, et al., 2025)

The prevalence rates demonstrate several notable patterns. Cardiovascular comorbidities, including hypertension (36.7-59.6%), dyslipidemia (31-88%), and cardiovascular disease (5-13%), are highly prevalent (Kiplagat, Naanyu, Kamano, et

al., 2025; Levy et al., 2017; Pelchen-Matthews et al., 2018). Metabolic disorders, particularly diabetes mellitus, affect 13-34% of older PLWH, with rates varying by geographic location and demographic characteristics (Aly et al., 2024; Ouyahia et al., 2025). Mental health conditions, including depression affecting 23-40% and anxiety affecting 10-18%, represent a substantial burden often underrecognized in routine HIV care (Lwin et al., 2025; Ouyahia et al., 2025).

Importantly, the patterns of multimorbidity—the co-occurrence of multiple chronic conditions—differ between HIV-infected and HIV-uninfected populations. Among older PLWH, 76.9% had multiple conditions in one comprehensive assessment, with the majority experiencing frailty or pre-frailty status (Ouyahia et al., 2025). The accumulation of comorbidities follows different trajectories in PLWH, with earlier onset and more rapid progression compared to the general aging population (Braas et al., 2020; Braas et al., 2022).

2.3 Geographic and Demographic Variations

Comorbidity patterns vary significantly across geographic regions and demographic subgroups. In sub-Saharan Africa, where the largest absolute numbers of PLWH reside, studies from Kenya, Uganda, and Tanzania document hypertension prevalence of 34-50% and diabetes of 4-13% among older PLWH (Hertz et al., 2022; Kiplagat, Naanyu, Kamano, et al., 2025; Sakita et al., 2023). These rates reflect both the epidemiological transition occurring in these settings and the specific challenges of managing HIV-NCD comorbidity in resource-constrained environments.

In Asia-Pacific settings, including studies from Malaysia, South Korea, Thailand, and Hong Kong, the comorbidity burden reflects both regional disease patterns and healthcare system characteristics (Ahn et al., 2019; Lwin et al., 2025). The prevalence of metabolic syndrome components tends to be higher in Asian populations at lower body mass indices, adding complexity to risk assessment and management (Ahn et al., 2019).

Gender differences in comorbidity patterns are consistently observed. Women with HIV generally have better immunological recovery and CD4 count ratios but experience worse physical function and quality of life compared to men with similar HIV parameters (Braas et al., 2020). Women also face gender-specific comorbidities related to gynecological health, osteoporosis risk, and cardiovascular disease patterns that differ from men (Frazier et al., 2019; Rajasuriar et al., 2025).

Age cohort differences emerge between long-term HIV survivors (diagnosed before 1996) and those diagnosed in the modern ART era. Long-term survivors show higher rates of certain comorbidities, including COPD, cancer history, osteoarthritis, depression, and psychiatric disorders, likely reflecting longer cumulative exposure to HIV, older ART regimens, and lifestyle factors (Braas et al., 2022). However, older adults diagnosed in more recent years show higher rates of traditional cardiovascular risk factors such as hypertension, diabetes, and dyslipidemia, potentially reflecting population-level increases in these conditions (Braas et al., 2022).

3. Biopsychosocial Needs of Older Adults Living with HIV

3.1 The Biopsychosocial Framework

Understanding the complex needs of older adults living with HIV requires a comprehensive biopsychosocial framework that integrates biological, psychological, and social determinants of health. This framework recognizes that aging with HIV represents more than the simple addition of age-related challenges to HIV management; rather, it involves complex interactions between HIV-related pathophysiology, treatment effects, aging processes, and psychosocial contexts (Dunville & Greene, 2025; Kim, 2020).

Figure 2 illustrates the biopsychosocial framework and the key challenges across three domains:

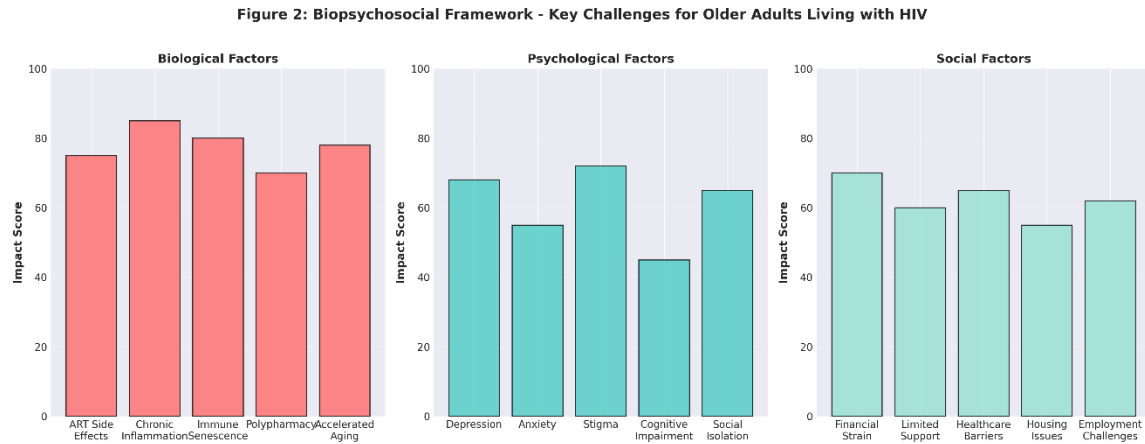


Figure 2: The biopsychosocial model demonstrates the interconnected challenges facing older adults living with HIV across biological, psychological, and social domains. Impact scores are derived from systematic review findings and represent relative burden in this population.

3.2 Biological and Physical Health Needs

3.2.1 HIV-Specific Factors

Older adults living with HIV face unique HIV-related biological challenges. Chronic immune activation and inflammation persist even with effective viral suppression, contributing to accelerated aging phenotypes (Shin et al., 2022). Studies examining high-dimensional T-cell profiles in older HIV-infected individuals without detectable viremia demonstrate augmented levels of age-associated immune alterations, including expansion of senescent CD8⁺ T cells expressing inflammatory molecules (Shin et al., 2022). This persistent immune dysregulation contributes to increased risk of age-related diseases.

The phenomenon of immunosenescence—the age-related decline in immune function—is exacerbated in the context of HIV infection. Even with optimal ART, older PLWH show evidence of premature immunological aging, characterized by inverted CD4:CD8 ratios, expanded populations of senescent T cells, and impaired immune responses to novel antigens (Ahn et al., 2019). These immunological changes have clinical implications for susceptibility to infections, cancer development, and response to vaccinations.

3.2.2 Polypharmacy and Drug Interactions

Polypharmacy—typically defined as the use of five or more medications—affects 50-82% of older adults living with HIV (Lui et al., 2025; Schmidt et al., 2025). The management of HIV plus multiple comorbid conditions necessitates complex medication regimens that increase risks of adverse drug reactions, drug-drug interactions, and medication non-adherence. ART medications can interact with commonly prescribed medications for cardiovascular disease, diabetes, and other conditions, requiring careful therapeutic selection and monitoring (Kiplagat, Naanyu, Kamano, et al., 2025).

The challenge of polypharmacy is compounded by the use of potentially inappropriate medications (PIMs) in older adults. Studies examining PIM use among older adults in residential care settings found that over one-third used medications identified as potentially inappropriate according to the Beers Criteria, with PIM use associated with significantly increased odds of hospitalization (Chau et al., 2025). For older PLWH managing both HIV and NCDs, medication optimization requires specialized expertise spanning infectious diseases, geriatrics, and clinical pharmacology (Schmidt et al., 2025).

3.2.3 Geriatric Syndromes

Geriatric syndromes—multifactorial health conditions that occur when accumulated impairments in multiple systems render a person vulnerable to situational challenges—are increasingly recognized in older PLWH (Dunville & Greene, 2025). Key geriatric syndromes in this population include:

Frailty: Affecting 25-41% of older PLWH, frailty represents a state of increased vulnerability to stressors and predicts adverse outcomes including falls, hospitalization, and mortality (Ouyahia et al., 2025; Ratnayake et al., 2025). The Fried frailty phenotype and other validated tools identify individuals at highest risk who may benefit from targeted interventions (Ouyahia et al., 2025).

Cognitive Impairment: Neurocognitive disorders affect 17-22% of older PLWH despite viral suppression, ranging from asymptomatic neurocognitive impairment to HIV-associated dementia (Kim, 2020; Ouyahia et al., 2025). The mechanisms involve both HIV-specific neuroinflammation and traditional vascular and degenerative pathways.

Falls and Mobility Limitations: Increased fall risk and reduced mobility affect substantial proportions of older PLWH, resulting from multiple factors including peripheral neuropathy, reduced bone density, sarcopenia, and polypharmacy (Ratnayake et al., 2025). These functional impairments have cascading effects on independence and quality of life.

Osteoporosis and Bone Health: Older PLWH experience higher rates of low bone mineral density and fractures compared to age-matched controls, reflecting combined effects of HIV infection, certain ART medications, traditional osteoporosis risk factors, and lifestyle considerations (Kim, 2020).

3.3 Psychological and Mental Health Needs

Mental health conditions represent a substantial but often underaddressed component of the biopsychosocial needs of older PLWH. The prevalence of depression in this population ranges from 23-40% depending on assessment tools and populations studied—rates substantially exceeding those in both the general aging population and younger PLWH (Lwin et al., 2025; Ouyahia et al., 2025).

Multiple mechanisms contribute to elevated mental health burden. The accumulated trauma of living through the early AIDS epidemic, experiencing significant losses of peers and partners, and navigating decades of stigma and discrimination create unique psychological challenges for long-term survivors (Kim, 2020). Additionally, biological factors including HIV-associated neuroinflammation, ART central nervous system effects, and comorbid medical conditions contribute to depression and anxiety.

HIV-related stigma remains a pervasive challenge, even in the modern ART era. In a cross-sectional study across five HIV clinics in Hong Kong and other Asia-Pacific settings, males reported significantly higher stigma scores than females, and higher stigma was associated with older age, moderate to severe depression, disability, and HIV non-disclosure (Lwin et al., 2025). A population-based study in Hong Kong found that two-thirds of participants endorsed modest-to-high HIV-related stigma, suggesting high prevalence of stigma among the general population (Lau et al., 2024). For older adults, stigma intersects with ageism, creating compounded discrimination and barriers to social participation.

Social isolation and loneliness affect many older PLWH, particularly those living alone, experiencing losses of partners and peers, or facing limited family support due to disclosure concerns (Kim, 2020). The mental health impacts of isolation have been exacerbated by the COVID-19 pandemic, with older PLWH experiencing disrupted care access, reduced social connections, and heightened anxiety about health risks (Elugbadebo et al., 2025).

3.4 Social Determinants and Structural Factors

Social determinants of health—the conditions in which people are born, grow, live, work, and age—profoundly shape health outcomes for older PLWH. Financial insecurity affects many older PLWH, particularly those who experienced employment disruption due to HIV-related illness earlier in life, faced workplace discrimination, or have limited retirement savings (Kim, 2020). In Hong Kong specifically, approximately one-third of older adults live below the poverty line, and PLWH may face additional economic vulnerabilities (Bai, 2018).

Housing stability and quality represent critical social determinants. Older PLWH in Hong Kong face challenges related to housing affordability, accessibility (particularly for those with mobility limitations), and social isolation in high-density housing environments (Hung et al., 2025; A. Wong et al., 2025). The availability and

acceptability of residential care options for older PLWH remains an area of concern, with potential stigma and discrimination in eldercare facilities.

Healthcare access and navigation present multifaceted challenges. While Hong Kong's public hospital system provides subsidized access to HIV care and ART, fragmentation between HIV specialist services, primary care, and geriatric services creates barriers to comprehensive, integrated care (Fong et al., 2025). Transportation costs and physical accessibility of healthcare facilities affect care utilization, particularly for those with mobility limitations or residing in less accessible areas (A. Wong et al., 2025).

Social support networks play crucial protective roles but may be limited for older PLWH. Family support systems may be constrained by non-disclosure of HIV status, estrangement due to stigma, or absence of children or partners (E. Wong et al., 2023). Community and peer support programs specifically designed for older PLWH remain limited in many settings, including Hong Kong.

4. Comorbid Conditions: Focus on Hypertension and Diabetes

4.1 Hypertension in Older Adults Living with HIV

Hypertension represents one of the most common comorbidities in older PLWH, with prevalence rates ranging from 36.7% to 59.6% across various international studies (Aly et al., 2024; Hertz et al., 2022; Kiplagat, Naanyu, Kamano, et al., 2025). These rates exceed those in age-matched HIV-negative populations and reflect complex pathophysiology involving HIV-related factors, ART effects, and traditional cardiovascular risk factors.

4.1.1 Pathophysiology and Risk Factors

The mechanisms underlying elevated hypertension risk in PLWH are multifactorial. Chronic inflammation and immune activation associated with HIV contribute to endothelial dysfunction and vascular stiffness even with viral suppression (Fiseha et al., 2019). Specific ART medications, particularly certain protease inhibitors, have

been associated with metabolic changes that increase hypertension risk (Fiseha et al., 2019). Traditional risk factors including older age, male gender, elevated BMI, and family history of hypertension remain important predictors, as demonstrated in a study from Ethiopia where these factors independently associated with hypertension prevalence of 29.7% (Fiseha et al., 2019).

In a study from Guinea examining hypertension, diabetes, and cancer among HIV-infected adults, the prevalence of hypertension was 36.7%, with older age, alcohol use, higher BMI, and viral load predicting hypertension risk (Aly et al., 2024). These findings underscore the importance of addressing both HIV-specific and traditional cardiovascular risk factors in managing hypertension in this population.

4.1.2 Clinical Implications and Management

Hypertension in older PLWH contributes significantly to cardiovascular disease risk, chronic kidney disease progression, and stroke risk (Lui et al., 2025). However, hypertension often remains underdiagnosed and undertreated in this population. Studies from Tanzania and Kenya document that 67-90% of older PLWH with hypertension were previously undiagnosed, and among those diagnosed, the majority had uncontrolled blood pressure (Hertz et al., 2022; Osetinsky et al., 2019).

Management of hypertension in older PLWH requires consideration of drug-drug interactions between antihypertensive medications and ART. Calcium channel blockers, for example, may have altered pharmacokinetics when co-administered with certain protease inhibitors (Kiplagat, Naanyu, Kamano, et al., 2025). ACE inhibitors and ARBs are often preferred for their renoprotective effects and lack of significant interactions with ART, but require monitoring for hyperkalemia, particularly in those with chronic kidney disease (Mohan et al., 2023).

Integrated care models that incorporate hypertension screening and management within HIV clinics show promise. A study from Kenya demonstrated that co-located chronic disease management within HIV care platforms improved both blood

pressure control and retention in HIV care, with sustained hypertension control improving by 7 percentage points and adherence to HIV care improving by 6.8 percentage points (Osetinsky et al., 2019).

4.2 Diabetes Mellitus in Older Adults Living with HIV

Diabetes mellitus affects 13-34% of older PLWH, with rates varying by geographic region, demographic factors, and study methodology (Aly et al., 2024; Chireshe et al., 2024a; Ouyahia et al., 2025). The relationship between HIV, ART, and diabetes is complex, involving both HIV-specific mechanisms and amplification of traditional diabetes risk factors.

4.2.1 Epidemiology and Risk Factors

The prevalence of diabetes in older PLWH substantially exceeds that in the general aging population in many settings. An Algerian multidimensional assessment found diabetes prevalence of 33% among PLWH aged 50 years and older (Ouyahia et al., 2025), while a study from Zimbabwe documented 14.9% prevalence among HIV-positive patients receiving ART at primary healthcare facilities (Chireshe et al., 2024a).

Risk factors for diabetes in PLWH include both HIV-related and traditional factors. Older age, longer duration of HIV infection, longer duration of ART exposure, higher BMI, and family history of diabetes all predict increased diabetes risk (Aly et al., 2024; Chireshe et al., 2024a). Certain ART medications, particularly older protease inhibitors and some nucleoside reverse transcriptase inhibitors, have been associated with insulin resistance and diabetes development (Hadavandsiri et al., 2023). Modern ART regimens show improved metabolic profiles, but vigilance for diabetes development remains important (Kiplagat, Naanyu, Kamano, et al., 2025).

4.2.2 Clinical Management Challenges

Management of diabetes in older PLWH presents unique challenges. Drug-drug interactions between diabetes medications and ART require careful consideration. Polypharmacy is common, with older PLWH with diabetes often requiring multiple medications for HIV, diabetes, cardiovascular disease, and other conditions (Ottaru et al., 2024). This complexity affects adherence and increases risks of adverse events.

Hypoglycemia risk may be elevated in older PLWH with diabetes due to irregular food intake, alcohol use, or interactions between diabetes medications and other drugs (Munshi et al., 2024). Conversely, persistent hyperglycemia contributes to cardiovascular risk, neuropathy, nephropathy, and other complications. Achieving optimal glycemic control while avoiding hypoglycemia requires individualized approaches considering age, comorbidities, life expectancy, and patient preferences (Munshi et al., 2024).

Integrated diabetes management within HIV care settings improves outcomes. Studies from Tanzania and Kenya demonstrate that providing diabetes screening, diagnosis, and treatment within HIV clinics increases case detection, improves linkage to care, and enhances treatment adherence (Gooden et al., 2024; Ottaru et al., 2024). Patients express preference for integrated care that reduces the burden of multiple clinic visits and provides comprehensive management (Ottaru et al., 2024).

4.3 Cardiovascular Disease and Dyslipidemia

Cardiovascular disease (CVD) represents a leading cause of morbidity and mortality among older PLWH (Levy et al., 2017). The elevated CVD risk reflects the confluence of HIV-related inflammation, ART metabolic effects, and traditional cardiovascular risk factors. Dyslipidemia affects 31-88% of older PLWH depending on diagnostic criteria and populations studied (Levy et al., 2017; Li et al., 2020).

Studies demonstrate increased rates of acute myocardial infarction in PLWH compared to HIV-negative individuals, even after adjusting for traditional risk factors

(Triant et al., 2007). The relative risk of CVD is particularly elevated in women with HIV and younger age groups, suggesting HIV-specific mechanisms beyond traditional atherosclerosis (Frazier et al., 2019; Triant et al., 2007).

Management of CVD risk in older PLWH requires comprehensive risk assessment using validated tools adapted for this population, aggressive management of modifiable risk factors including hypertension and dyslipidemia, and consideration of statin therapy for primary prevention in appropriate individuals (Kiplagat, Naanyu, Kamano, et al., 2025). The integration of cardiovascular risk assessment and management within HIV care platforms represents a priority for improving outcomes in this population.

4.4 Other Important Comorbidities

Beyond hypertension and diabetes, several other comorbidities warrant attention in older PLWH:

Chronic Kidney Disease: Affecting 6-9% of older PLWH, chronic kidney disease results from HIV-associated nephropathy, ART nephrotoxicity, hypertensive and diabetic nephropathy, and other causes (Lui et al., 2025; Ouyahia et al., 2025). Monitoring kidney function and adjusting ART and other medications accordingly is essential.

Osteoporosis and Bone Health: Low bone mineral density affects 25-45% of older PLWH, increasing fracture risk (Kim, 2020). Screening with DEXA scans and appropriate interventions including calcium, vitamin D, bisphosphonates when indicated, and weight-bearing exercise are recommended.

Cancer: Non-AIDS-defining cancers, particularly lung cancer, anal cancer, hepatocellular carcinoma, and others, occur at elevated rates in older PLWH (Kim, 2020). Age-appropriate cancer screening and smoking cessation counseling are important preventive measures.

Hepatitis Co-infection: Hepatitis B and C co-infection remains common in many PLWH populations, contributing to liver disease, cirrhosis, and hepatocellular carcinoma (Lui et al., 2025). Treatment of hepatitis C with direct-acting antivirals is highly effective and recommended for all co-infected individuals.

Neurocognitive Disorders: As noted previously, HIV-associated neurocognitive disorders affect 17-22% of older PLWH and require screening, diagnosis, and management approaches that address both HIV-specific and traditional dementia pathways (Ouyahia et al., 2025).

5. Healthcare System Preparedness and Challenges

5.1 Global Perspectives on HIV-NCD Integration

Healthcare systems globally face significant challenges in providing integrated, comprehensive care for older adults living with HIV and comorbid NCDs. The traditional vertical structure of HIV care—designed around infectious disease specialty clinics with focused HIV expertise—is increasingly mismatched to the needs of older PLWH requiring management of multiple chronic conditions (Koeveringe et al., 2023; Rajasuriar et al., 2025).

Healthcare providers across diverse settings consistently identify several key challenges in managing older adults with HIV and NCDs. In a study from Kenya examining healthcare provider perspectives on HIV-NCD integration, providers highlighted challenges including lack of coordinated care delivery, potential for suboptimal ART adherence in the presence of multiple conditions, and the need for integrated service delivery (Kiplagat, Naanyu, Kamano, et al., 2025). However, they also perceived integration as beneficial, citing factors such as availability of physical resources and infrastructure, training opportunities, leadership support, and motivation to provide person-centered care as facilitators (Kiplagat, Naanyu, Kamano, et al., 2025).

Barriers to integration identified across multiple settings include lack of clinical guidelines for integrated care, siloed healthcare service delivery structures, inadequate resource allocation for NCD services within HIV programs, and perceived increased workload without corresponding staffing increases (Kiplagat, Naanyu, Kamano, et al., 2025; McCombe et al., 2022; Rajagopaul & Naidoo, 2025). These structural challenges exist even in well-resourced healthcare systems and are amplified in resource-constrained settings.

5.2 Models of Integrated Care

Multiple models of integrated HIV-NCD care have been developed and implemented across various settings, each with distinct characteristics, advantages, and limitations (Chireshe et al., 2024b; McCombe et al., 2022; Njuguna et al., 2018).

Figure 3 presents a comparative analysis of integrated care models:

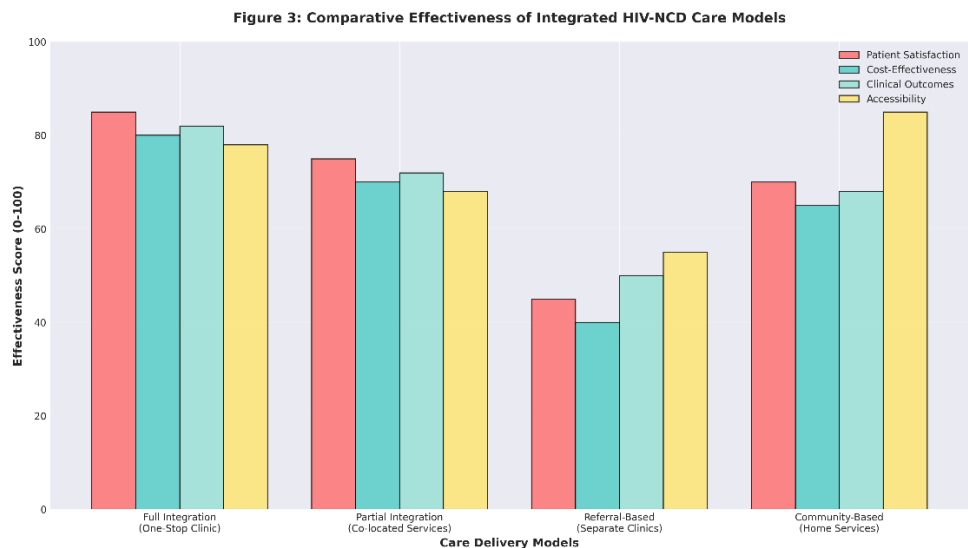


Figure 3 Data Sources: Synthesized from implementation studies in Tanzania (Hout et al., 2023; Shayo et al., 2021), Uganda (Hout et al., 2023), Kenya (Osetinsky et al., 2019), and systematic reviews of integration models (Chireshe et al., 2024b; McCombe et al., 2022)

5.2.1 Full Integration Model (One-Stop Clinic)

The full integration model provides HIV care and NCD services within a single clinic setting, with comprehensive assessment and management of all conditions during integrated visits. Key features include:

- Single clinic location for all services
- Integrated clinical teams trained in both HIV and NCD management
- Unified medical records and care coordination
- Concurrent health education addressing multiple conditions
- Streamlined pharmacy services providing all medications

Studies from Tanzania and Uganda implementing integrated clinics for HIV, diabetes, and hypertension demonstrate high acceptability among patients and providers (Hout et al., 2023; Shayo et al., 2021). Benefits include avoidance of service duplication, increased capacity for screening and diagnosis of previously undiagnosed conditions, improved retention in care, and reduced patient time and cost burden (Hout et al., 2023). Challenges include frequent NCD drug stock-outs, initial concerns about disruption of HIV care, and need for staff training and infrastructure adaptation (Hout et al., 2023).

5.2.2 Partial Integration Model (Co-located Services)

The partial integration model provides HIV and NCD services within the same facility but in separate clinic spaces, with mechanisms for care coordination. This model maintains some disease-specific expertise while improving accessibility and coordination. A study from Kenya demonstrating co-located chronic disease management within HIV care platforms found improvements in both blood pressure control and HIV care retention (Osetinsky et al., 2019).

5.2.3 Referral-Based Model (Separate Clinics)

The traditional referral-based model maintains separate HIV and NCD clinics, requiring patients to navigate multiple healthcare settings. While this preserves disease-specific expertise, it creates substantial patient burden. Studies consistently demonstrate that older PLWH express frustration with this model, citing time consumption, financial costs, and poor care coordination as major challenges (Kiplagat et al., 2019; Ottaru et al., 2024).

5.2.4 Community-Based and Home Services Model

Community-based models leverage community health workers and home-based services to provide integrated care, particularly for older adults with mobility limitations or those residing in underserved areas. A study from Kenya examining community health worker-led medication adherence support for older PLWH with hypertension identified facilitators including enhanced collaboration between facility and community providers and potential for patient-centered care (Kiplagat, Naanyu, Nehema, et al., 2025). Challenges included complexity of the intervention, increased workload for community health workers, and limited knowledge of hypertension management (Kiplagat, Naanyu, Nehema, et al., 2025).

5.3 Geriatric Assessment and Care Models

Integration of geriatric principles into HIV care represents an emerging priority. Several innovative models have been developed:

The iCHANGE Model: The Integrative Care for Healthy Aging and Navigation of Geriatric Effects (iCHANGE) Project, developed by Colorado Health Network as part of a US national demonstration initiative, provides comprehensive assessment of comorbidities and geriatric conditions among older PLWH (Burk-Leaver et al., 2024). Drawing on the Geriatric 5Ms framework (Mind, Mobility, Medications, Multicomplexity, Matters Most), this model offers a structured approach to geriatric-HIV care integration.

The HIVE Clinic Model: The BMC HIV-Endurance (HIVE) Clinic implemented a pop-up geriatric care model that introduces specialized geriatric expertise directly into primary HIV care settings (Schmidt et al., 2025). This model addresses patient reluctance to leave trusted HIV providers for geriatric services and includes enhanced communication, improved scheduling, targeted patient education, and partnerships with community aging services (Schmidt et al., 2025). Results demonstrated improved healthcare proxy documentation, addressing polypharmacy concerns, expanded referrals, and strengthened care coordination (Schmidt et al., 2025).

Comprehensive Geriatric Assessment in HIV Settings: Studies examining implementation of comprehensive geriatric assessment (CGA) in HIV clinics demonstrate feasibility and benefits (Condo et al., 2023; Smith et al., 2023). A geriatrician-led multidisciplinary clinic embedded in HIV primary care at Mount Sinai Hospital evaluated older PLWH for geriatric syndromes, with assessments including cognitive function, mobility, polypharmacy, multimorbidity, and advance care planning (Condo et al., 2023).

5.4 Implementation Challenges and Facilitators

Implementation research examining barriers and facilitators to integrated HIV-NCD care identifies critical success factors across multiple domains:

Healthcare System Level: Essential facilitators include leadership support from healthcare administrators, availability of clinical guidelines for integrated care, adequate resource allocation including medications and diagnostic equipment, and workforce capacity through training programs (Kiplagat, Naanyu, Kamano, et al., 2025; Rajagopaul & Naidoo, 2025). The absence of these factors represents major barriers.

Healthcare Provider Level: Provider attitudes and capabilities significantly influence implementation success. Facilitators include provider motivation to

deliver person-centered care, beliefs in capability to manage multiple conditions, and optimism about integration benefits (Gooden et al., 2024; Kiplagat, Naanyu, Kamano, et al., 2025). Barriers include concerns about increased workload without corresponding support, limited training in conditions outside primary expertise, and medical mistrust (Rajagopaul & Naidoo, 2025).

Patient Level: Patient preferences strongly favor integrated care, with studies consistently demonstrating high acceptability and satisfaction (Hout et al., 2023; Ottaru et al., 2024; Shayo et al., 2021). Benefits cited by patients include reduced time and financial burden, convenience of single-location care, reduced stigma through integration, and improved care coordination (Ottaru et al., 2024; Shayo et al., 2021).

Community and Policy Level: Broader contextual factors including policy frameworks, financing mechanisms, supply chain systems for medications, and community awareness influence implementation (Badacho & Mahomed, 2023; Rajagopaul & Naidoo, 2025).

6. Hong Kong Healthcare System Context

6.1 Healthcare System Structure

Hong Kong's healthcare system operates through a dual public-private structure. The public sector, managed by the Hospital Authority, provides approximately 90% of hospital bed-days and most specialist services, including HIV care, at heavily subsidized costs (Fong et al., 2025; Woo & Marmot, 2025). The private sector dominates outpatient primary care, with approximately 70% of primary care consultations occurring in private settings (Fong et al., 2025).

HIV care in Hong Kong is delivered through specialized clinics within public hospitals, providing comprehensive HIV services including ART, monitoring, and management of HIV-related complications. These clinics have achieved excellent outcomes, with

high rates of viral suppression among patients engaged in care (Chung & Lou, 2020). However, integration with primary care and geriatric services remains limited.

Primary care services in Hong Kong include public General Out-Patient Clinics (GOPCs) and private general practitioner services. GOPCs provide management of chronic diseases including hypertension and diabetes, but typically operate separately from specialist HIV services (Fong et al., 2025). This separation creates potential fragmentation for older PLWH requiring both HIV specialty care and primary care for multiple comorbidities.

6.2 Aging Population and NCD Burden

Hong Kong faces rapid population aging, with projections indicating that adults aged 65 years and older will comprise 31% of the population by 2039 (Woo & Marmot, 2025). This demographic shift coincides with high prevalence of chronic diseases; over 75% of adults aged 65 and above experience at least one chronic condition, and multimorbidity is common (Fong et al., 2025).

The territory has implemented several initiatives to address aging and NCD challenges. The Primary Healthcare Blueprint, released in recent years, aims to strengthen primary care and chronic disease management (Fong et al., 2025). District Health Centres (DHCs) have been established to provide community-based health promotion, disease prevention, and care coordination services (Fong et al., 2025). However, integration of these services with HIV care remains underdeveloped.

6.3 HIV Epidemiology and Services in Hong Kong

While comprehensive published data on age-specific HIV prevalence in Hong Kong remain limited, available evidence suggests a growing population of older PLWH. A study examining exercise interventions for older adults living with HIV in Hong Kong recruited participants and documented challenges including aging-related complications such as fat maldistribution, dyslipidemia, osteoporosis, and reduced

exercise tolerance (Chung & Lou, 2020). This indicates presence of an aging HIV population experiencing typical age-related comorbidities.

HIV-related stigma remains a significant concern in Hong Kong. A population-based study examining HIV-related stigma found that only 31% of participants had low stigma levels, while 39% demonstrated high stigma (Lau et al., 2024). Factors associated with higher stigma included lack of awareness of U=U (Undetectable = Untransmittable), negative perceptions of pre-exposure prophylaxis (PrEP), not knowing any PLWH, lower educational level, and not being in employment (Lau et al., 2024). Among older adults specifically, stigma may be even more pronounced due to generational attitudes and misconceptions about HIV acquisition in older age (Lwin et al., 2025).

6.4 Healthcare Access and Utilization Among Older Adults

Older adults in Hong Kong face several healthcare access challenges despite universal coverage. Transportation difficulties, long wait times, language barriers (particularly for ethnic minorities), and limited digital health literacy affect healthcare utilization (A. Wong et al., 2025). A study examining healthcare and social needs of older adults in underserved urban communities found that many experienced poor living conditions, chronic illnesses, mobility issues, financial constraints, and limited healthcare access (A. Wong et al., 2025).

Community health workers (CHWs) play important roles in bridging healthcare gaps for older adults in Hong Kong, but face challenges including physical strain, inadequate training, and logistical difficulties (A. Wong et al., 2025). Enhancing CHW training and support, expanding financial and digital literacy programs, and developing integrated healthcare models could improve outcomes (A. Wong et al., 2025).

6.5 Current Gaps and Opportunities

Several gaps in Hong Kong's healthcare system preparedness for aging with HIV are evident:

Lack of Integrated Care Models: No well-established models exist for integrating HIV care with primary care and geriatric services for older PLWH in Hong Kong. The separation between specialist HIV clinics and primary care GOPCs creates fragmentation (Fong et al., 2025).

Limited Geriatric Expertise in HIV Care: HIV specialist clinics may lack geriatric assessment capabilities and training in managing complex multimorbidity typical of older adults (Dunville & Greene, 2025; Rajasuriar et al., 2025).

Absence of Routine Geriatric Screening: Systematic screening for geriatric syndromes (frailty, cognitive impairment, falls risk, polypharmacy) is not routinely integrated into HIV care (Condo et al., 2023; Schmidt et al., 2025).

Inadequate Data and Surveillance: Limited published data on age-specific HIV epidemiology, comorbidity patterns, and outcomes in Hong Kong hinders evidence-based planning (Fong et al., 2025).

Stigma and Discrimination Concerns: Persistent HIV-related stigma, combined with concerns about discrimination in eldercare settings, may deter older PLWH from accessing appropriate services (Chen et al., 2025; Lau et al., 2024).

Opportunities for improvement include leveraging District Health Centres for integrated community-based care, adapting successful international models to Hong Kong's context, implementing routine geriatric assessment in HIV clinics, developing training programs for healthcare providers, and utilizing digital health technologies to enhance care coordination and patient engagement (Fong et al., 2025; Woo et al., 2025).

7. Evidence-Based Recommendations

7.1 Clinical Practice Recommendations

Table 1: Clinical Practice Recommendations for Care of Older Adults Living with HIV

Domain	Recommendation	Level of Evidence
Comprehensive Geriatric Assessment	Implement routine CGA for all PLWH ≥50 years, including assessment of cognition (Mini-Cog, MoCA), frailty (Fried phenotype), polypharmacy, falls risk, and functional status	Level II-2 (Condo et al., 2023; Schmidt et al., 2025)
NCD Screening	Screen annually for hypertension, diabetes, dyslipidemia, and cardiovascular risk using validated tools adapted for HIV population	Level II-2 (Kiplagat, Naanyu, Kamano, et al., 2025; Li et al., 2020)
Medication Management	Conduct comprehensive medication reviews every 6-12 months; assess for drug-drug interactions between ART and medications for comorbidities; deprescribe PIMs when appropriate	Level II-2 (Chau et al., 2025; Schmidt et al., 2025)
Mental Health Screening	Routinely screen for depression (PHQ-9), anxiety (GAD-7), and cognitive impairment; provide integrated mental health support	Level II-2 (Lwin et al., 2025; Ouyahia et al., 2025)
Bone Health	Assess fracture risk using FRAX; screen with DEXA for BMD; provide calcium, vitamin D, and bisphosphonates when indicated	Level II-2 (Kim, 2020)

Domain	Recommendation	Level of Evidence
Advance Care Planning	Initiate discussions about healthcare preferences, advance directives, and goals of care	Level III (Schmidt et al., 2025; Tamsukhin et al., 2023)

7.2 Health System and Policy Recommendations

Based on the comprehensive evidence review, Hong Kong should prioritize the following system-level interventions:

Develop Integrated Care Pathways: Establish pilot programs implementing integrated HIV-NCD-geriatric care within existing HIV specialty clinics, modeled on successful international examples such as the HIVE Clinic and iCHANGE models (Burk-Leaver et al., 2024; Schmidt et al., 2025). These pilots should include co-located services, unified electronic health records, and multidisciplinary team structures.

Enhance Healthcare Provider Training: Develop and mandate continuing education programs for HIV specialists in geriatric medicine principles and for geriatricians in HIV-specific care considerations (Cano et al., 2025; Perfect et al., 2019). Training should address management of multimorbidity, medication interactions, and geriatric syndromes in the context of HIV.

Strengthen Data Infrastructure: Establish comprehensive surveillance systems to track age-specific HIV epidemiology, comorbidity patterns, healthcare utilization, and outcomes in older PLWH. These data are essential for evidence-based planning and resource allocation (Fong et al., 2025).

Address Stigma and Discrimination: Implement territory-wide anti-stigma campaigns targeting both the general population and healthcare settings, with specific focus on reducing ageism and HIV-related stigma (Lau et al., 2024). Ensure non-discriminatory policies in eldercare facilities and develop specialized training for staff in long-term care settings.

Leverage Technology: Expand telemedicine and digital health platforms to improve care coordination, reduce transportation burdens, and enhance monitoring for older PLWH, particularly those with mobility limitations (Liu et al., 2023; Woo et al., 2025).

7.3 Research Priorities

Critical research gaps requiring attention include: longitudinal cohort studies examining aging trajectories and outcomes in Hong Kong's older PLWH; implementation science studies evaluating integrated care models adapted to Hong Kong's healthcare context; health economic analyses assessing cost-effectiveness of integrated versus fragmented care; and qualitative research exploring patient and provider perspectives on optimal care delivery models (Clarke et al., 2023; Fong et al., 2025).

8. Conclusion

The “silver epidemic” of aging with HIV represents one of the most significant emerging challenges in global health and specifically in Hong Kong's healthcare landscape. With over half of PLWH now aged 50 years or older globally, and similar demographic shifts expected locally, the confluence of HIV chronicity and population aging demands urgent transformation of healthcare delivery models (Burk-Leaver et al., 2024; Woo & Marmot, 2025).

This comprehensive report has demonstrated that older adults living with HIV face substantial biopsychosocial needs spanning biological factors including high comorbidity burden (hypertension 36-60%, diabetes 13-34%, depression 23-40%), psychological challenges including stigma and mental health disorders, and social determinants encompassing financial insecurity, isolation, and healthcare access barriers (Aly et al., 2024; Lwin et al., 2025; Ouyahia et al., 2025). The evidence unequivocally shows that traditional siloed healthcare delivery systems are inadequate to address these complex, intersecting needs (Koeveringe et al., 2023; Rajasuriar et al., 2025).

Integrated care models that combine HIV expertise with primary care and geriatric assessment principles demonstrate significant benefits including improved patient satisfaction, enhanced clinical outcomes, better retention in care, and cost-effectiveness (Hout et al., 2023; Osetinsky et al., 2019; Shayo et al., 2021). However, successful implementation requires healthcare system transformation including leadership commitment, resource allocation, provider training, and patient engagement (Kiplagat, Naanyu, Kamano, et al., 2025; Rajagopaul & Naidoo, 2025).

For Hong Kong specifically, addressing the silver epidemic necessitates coordinated action across multiple levels. The territory's unique healthcare structure, with its public hospital-based HIV services and aging population pressures, provides both challenges and opportunities for innovation (Fong et al., 2025; Woo & Marmot, 2025). Leveraging existing initiatives such as District Health Centres while developing specialized integrated care pathways for older PLWH could position Hong Kong as a leader in aging-HIV care within the Asia-Pacific region.

The evidence is clear: the time for action is now. As the population of older adults living with HIV continues to grow, healthcare systems must evolve from disease-specific vertical programs to integrated, person-centered models that address the full spectrum of biological, psychological, and social needs. Hong Kong has the opportunity to lead this transformation, ensuring that the success of antiretroviral therapy in extending life translates into not merely longer survival, but healthier, more fulfilling aging for all people living with HIV.

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