

A woman in a red dress stands in a spotlight on a stage. In the background, large, dark letters spell out 'HIV'. The scene is dimly lit, with the spotlight illuminating the woman and the letters behind her.

The Physiological and Health consequences of HIV Stigma

A public health crisis

Andrew Clark

Disclosures

- Employed by ViiV Healthcare

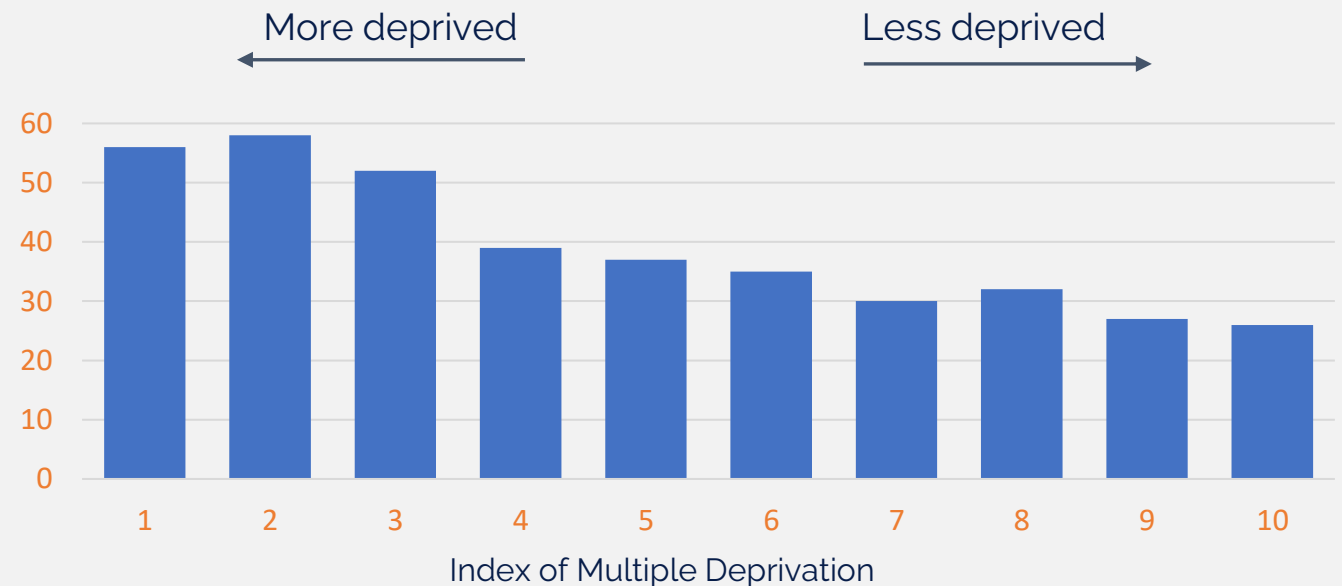
Social factors impact on infections

- **Poor outcomes for many infections are associated with homelessness and poverty**, notably HCV, HIV and more recently COVID-19
- **Social factors are intrinsic to immune health and social adversity**, particularly amongst the socially excluded with demonstrable impact on;
 - Immune dysfunction
 - Morbidity and mortality including in PWH
 - Women appear more profoundly impacted than men

Coronavirus deaths higher in England's poorest communities

/ Deaths per 100,000 people

/ COVID mortality March-June 2020: x2.26 (England ONS)



The Index of Multiple Deprivation ranks English areas from most deprived (1) to least deprived (10)

Adapted from Office for National Statistics. Available at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid192020incharts/2020-12-18>. Accessed April 2022

Stigma creates barriers to HIV care

Stigma creates barriers across the HIV prevention and care continuums

detering HIV testing and knowing one's HIV status



hindering access to



optimal treatment
preventive care
services crucial for ending the epidemic



CDC and the WHO recognize societal stigma as a public health priority because of its adverse effects on effective prevention, treatment of diseases and its potential to accelerate disease processes

WHO adopted Goal 16 of the 2030 Agenda for Sustainable Development which encourages inclusive societies that promote non-discrimination

Counter negative consequences of stigma which make stigmatized populations more susceptible

chronic disease and mortality

Suffering

delayed treatment

declines in daily activities

unfair access to health insurance and appropriate medical care

HIV stigma is prevalent across 64 low/middle income countries

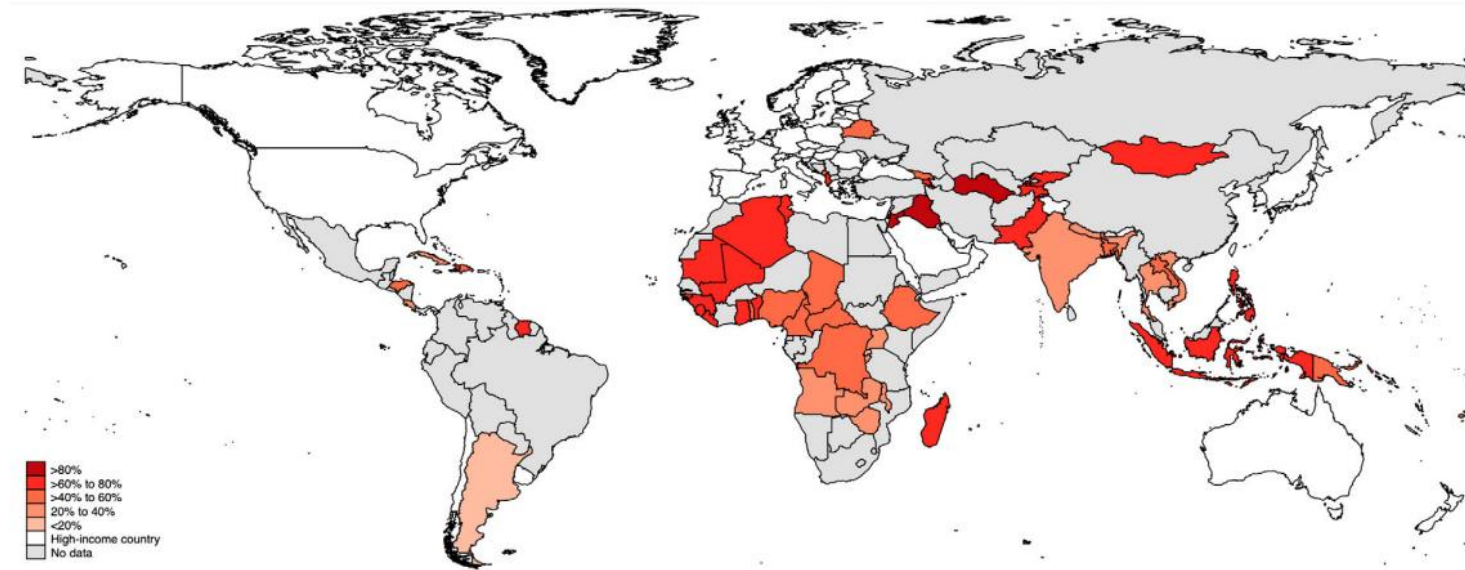


FIGURE 1 Map of prevalence estimates of stigma towards people with HIV among the population aged 15–49 years. Latest available data from 2015 to 2021. *Note:* High-income countries per the World Bank country income classification as of 2021.

large cross-sectional study of ~ 1.2 million individuals in 64 low- and middle-income countries

HIV stigma prevalent across all countries and > 10% of WHO target for 2030

Level of HIV public stigma was associated with sociodemographic characteristics.

- Disadvantaged individuals with lower educational level and wealth
- Women and adolescents

Associated with lower HIV testing uptake

HIV stigma is common across 64 low/middle income countries representing >1.6 billion people

Prevalence estimates of stigma towards people living with HIV

- Public HIV stigma is broadly prevalent >10% in all 64 countries
 - 13% in Rwanda
 - 91% in Samoa,
 - average prevalence of 44%
- WHO Global Sector's target for 2025/2030 for the percentage of people living with HIV who experience HIV-related stigma is <10%
- Consistent dose-response effect on public HIV stigma by both individual-level and country-level socioeconomic status with **lower income** and **education levels** linked to **higher stigma**
- Public HIV stigma was associated with lower levels of HIV testing, when examining both lifetime testing as well as testing in the past year

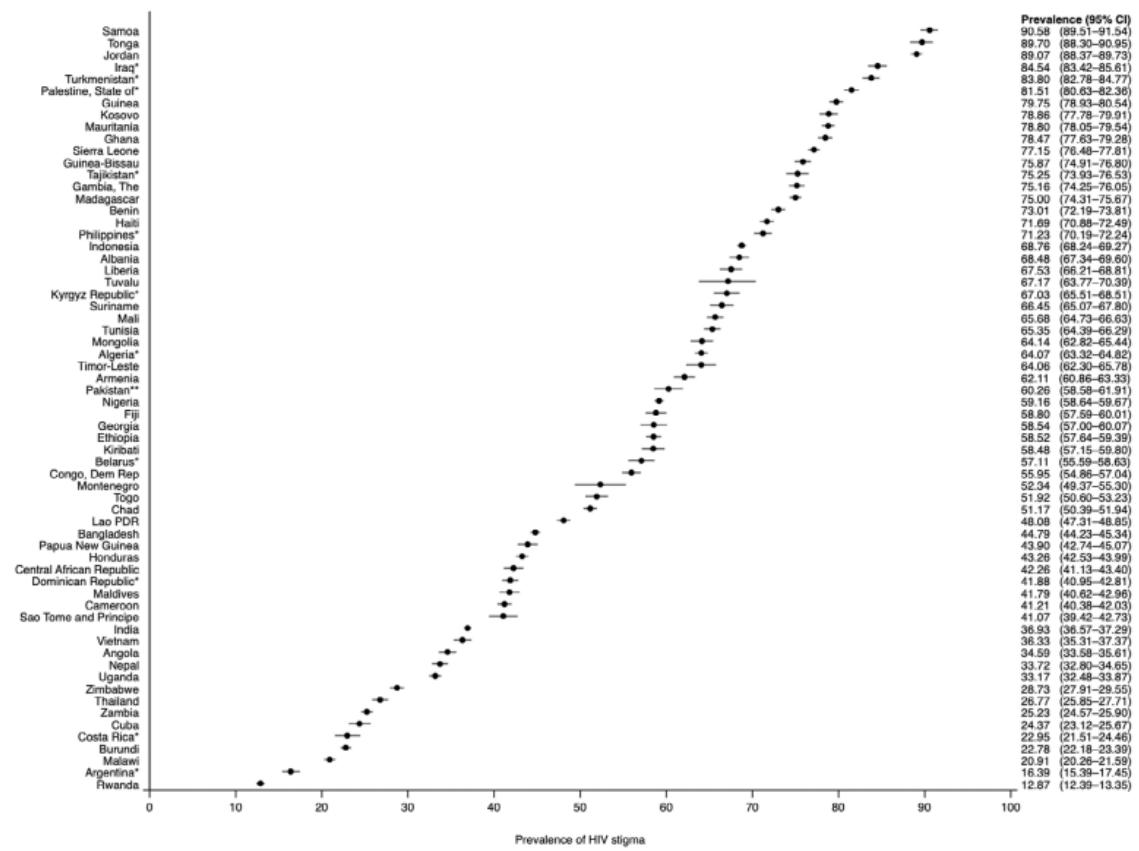
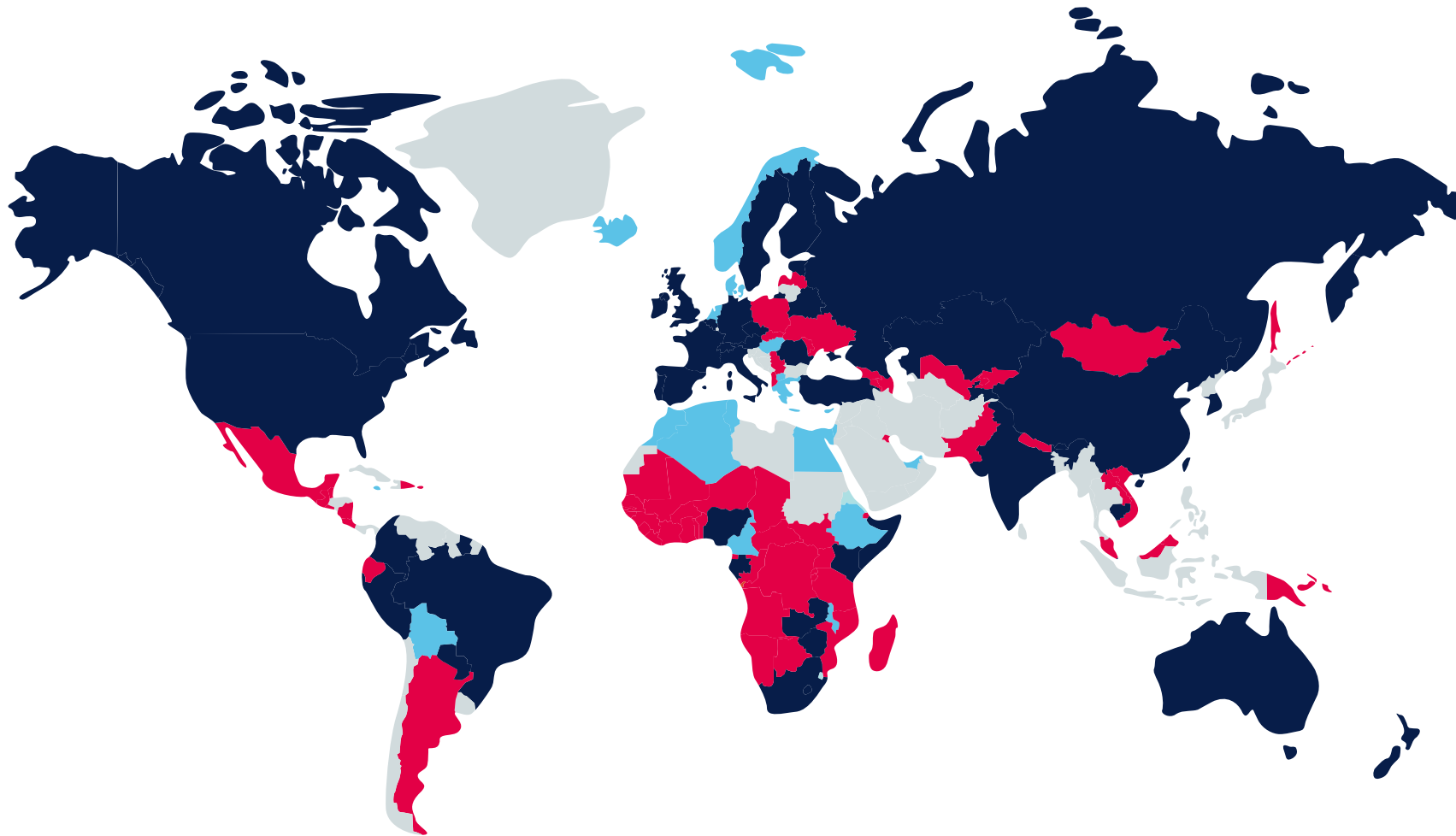


FIGURE 2 Prevalence estimates and 95% confidence intervals (CIs) of stigma towards people with HIV among the population aged 15-49 years. Latest available data from 2015 to 2021. PDR, People's Democratic Republic. Note: *The sample only included women. **The sample only included ever-married women and men.

HIV CRIMINALISATION ACROSS GLOBE



- Ever used criminal law, but not since 2017 (n=20)
- Current or proposed HIV-specific criminal or similar law (n=60)
- Reported cases since 2017 using any kind of criminal or similar law (n=50)

Adapted from HIV justice network 2021. Available at: https://www.hivjustice.net/wp-content/uploads/2021/06/HJN-Strategic-Plan-2022-26.final_.pdf. Accessed April 2022

COUNTRIES with LAWS DisCRiminating Against Hiv

HIV justice network Audit – 1/10/15 and 31/12/2018

- Globally, laws used for HIV criminalisation are often written or applied based on **myths and misconceptions about HIV and its modes of transmission**
- Significant proportion of prosecutions for acts that constitute no or very little risk of HIV transmission
 - eg vaginal and anal sex when condoms had been used/ or the person with HIV had a low viral load /oral sex/single acts of breastfeeding, biting, scratching or spitting

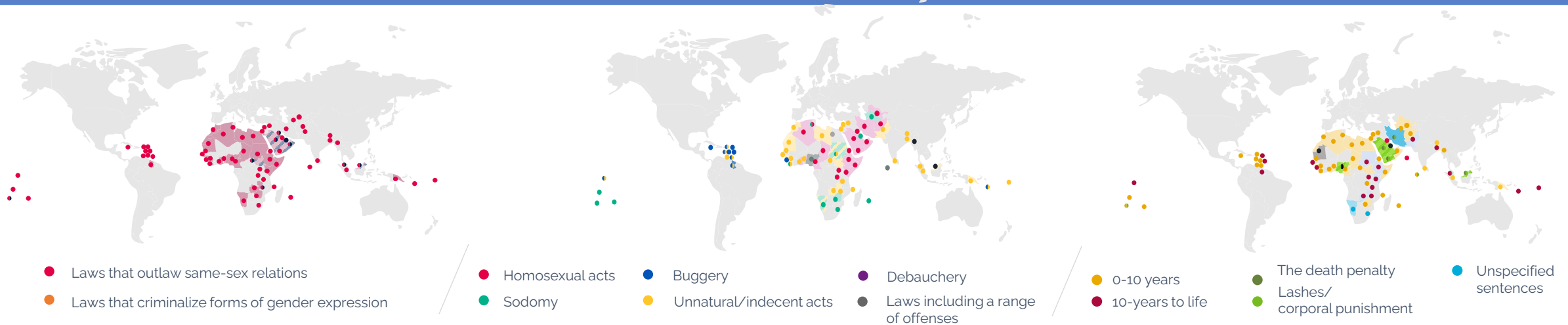
The highest number of cases were reported in:



Adapted from: HIV Justice Network 2019. Available at: <https://www.hivjustice.net/wp-content/uploads/2019/05/AHJ3-Full-Report-English-Final.pdf>. Accessed April 2022

Anti-Same-sex Laws remain in ~70 countries with variable definitions and

LEGAL SANCTIONS AGAINST SAME-SEX CONDUCT VARY IN SCOPE AND APPLICATION



69

countries have national laws criminalizing same-sex relations between consenting adults.

9

countries have national laws criminalizing forms of gender expression that target transgender and gender nonconforming people.

IN 11 USA states

unenforceable laws prohibiting consensual same-sex conduct remain on the books despite a 2003 Supreme Court decision that found such laws unconstitutional.

RUSSIA AND LITHUANIA

do not criminalize same-sex acts or forms of gender expression, but they prohibit "propaganda" in support of LGBT rights, to silence activists. Many other countries have erected barriers to freedom of association and assembly for LGBT groups

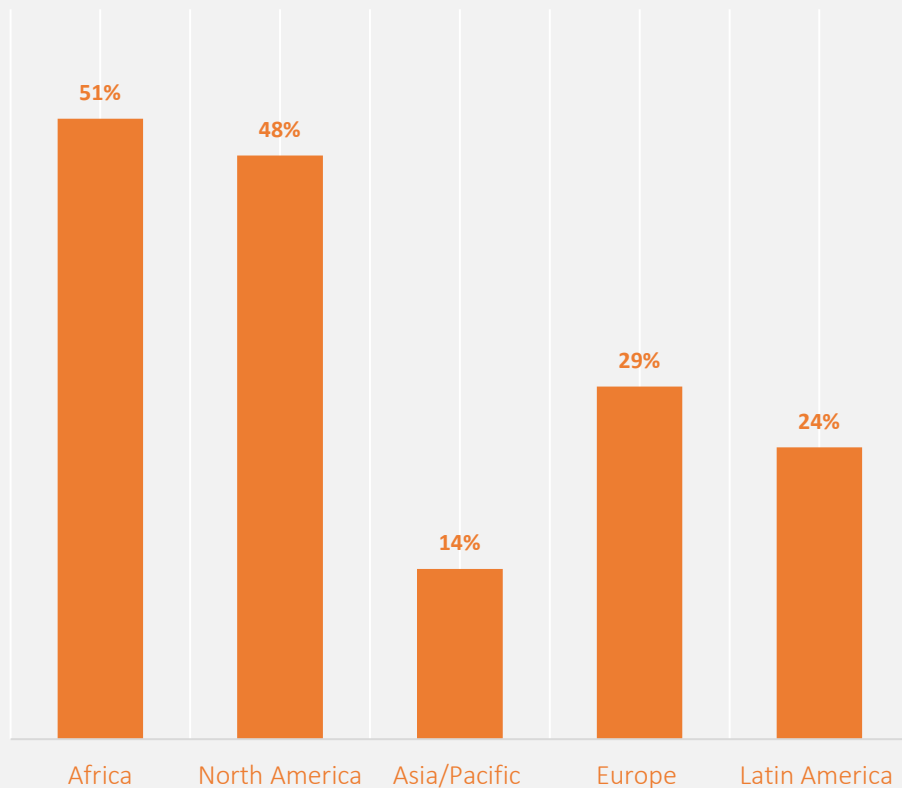
Adapted from Human Rights Watch. Available at:

http://internap.hrw.org/features/features/lgbt_laws/.

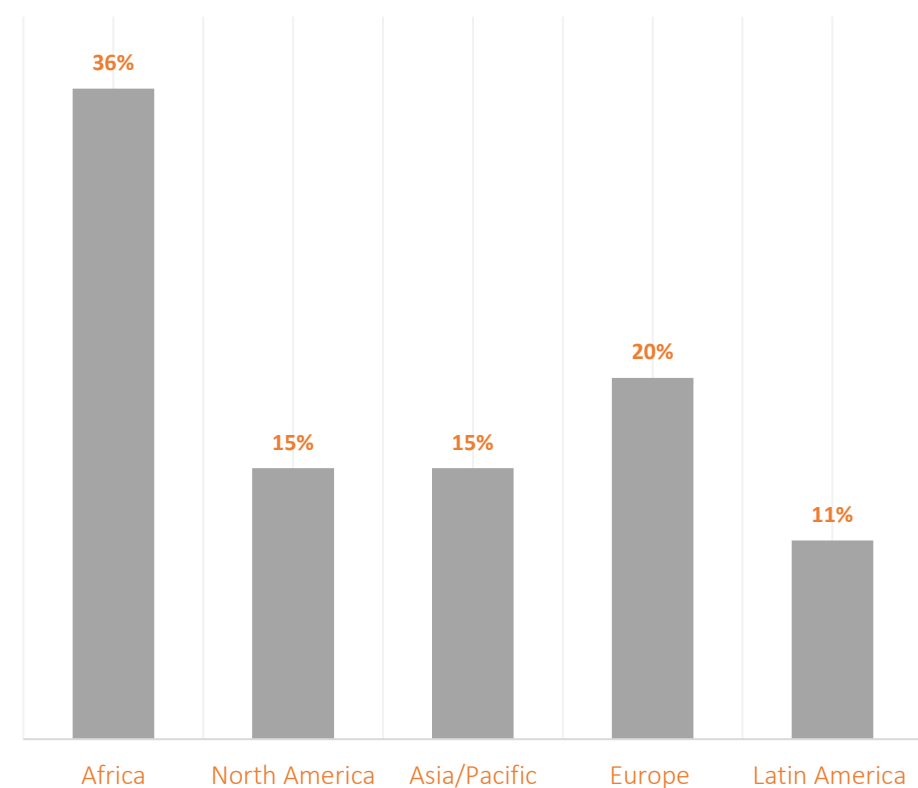
Accessed April 2022

Hiv Stigma and discrimination Are prevalent in the healthcare setting across all regions

Respondents Experiencing Stigma and/or Discrimination By Their Community



Respondents Experiencing Stigma and/or Discrimination By A Healthcare Facility Or Healthcare Worker



Adapted from Castel AD. Available at: <https://vdocument.in/the-90-90-90-goals-and-fast-track-cities-a-success-relationships-social-inclusion.html?page=28>. Accessed April 2022

DRIVERS OF HIV RELATED STIGMA FROM HEALTHCARE WORKERS



Lack of awareness

- / Healthcare workers may be unaware that their attitudes, words & actions are stigmatizing



Moral judgement

- / Healthcare workers may make negative judgements about people who are "different"
- / May not understand the lives, identities & sexuality of key populations vulnerable to HIV
- / MSM, transgender individuals, sex workers & PWUD may be seen as sinful or immoral, thus deserving of shame & blame




Fear & ignorance

- / Healthcare workers may lack knowledge about & have misconceptions about HIV transmission & fear acquiring HIV through casual contact or medical procedures
- / Such fear & ignorance drives stigma



Religion Ideology

- / Personal and Cultural ideology of Healthcare Workers, that may impact their care of patients



HUMAN RIGHTS AND HEALTH – A FUNDAMENTAL RIGHT OFTEN VIOLATED BY HIV HEALTHCARE DELIVERY

HUMAN RIGHTS VIOLATIONS ARE COMMON IN HEALTH SETTINGS:

- / Ubiquitous in healthcare settings
- / Limiting or denying access to quality health services for specific populations

HIV SEROPOSITIVE HEALTH CARE WORKERS FACE DISCRIMINATION

- / From co-workers and employers
- / Limitations to their roles – not allowed to work in settings/ opportunities are limited
- / Live in environments where their occupational rights, responsibilities and roles are not recognised or respected

HEALTH CARE WORKERS WHO TREAT HIV FACE LIMITATIONS TO THEIR PRACTICE

- / Health care professionals working in clinics or hospitals treating PLHIV face discrimination and limitations on their work may be limited eg seen or treated differently

HUMAN RIGHTS VIOLATIONS OCCUR IN HEALTHCARE SETTINGS EVERYWHERE

- / Coercion of patients
- / Substandard and lack of quality of care
- / Breaches of confidentiality

Social determinants of health



Economic stability

- / Employment
- / Income
- / Expenses
- / Debt
- / Medical costs
- / Support



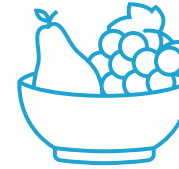
Neighbourhood and physical environment

- / Housing
- / Sanitation
- / Transportation
- / Safety
- / Walkability
- / Geography



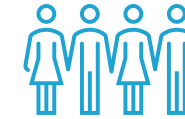
Education

- / Literacy
- / Language
- / Education
- / Vocational training
- / Higher education



Food

- / Food security
- / Access to healthy options



Community and social context

- / Social integration
- / Support systems
- / Community engagement
- / Stress
- / Violence/trauma

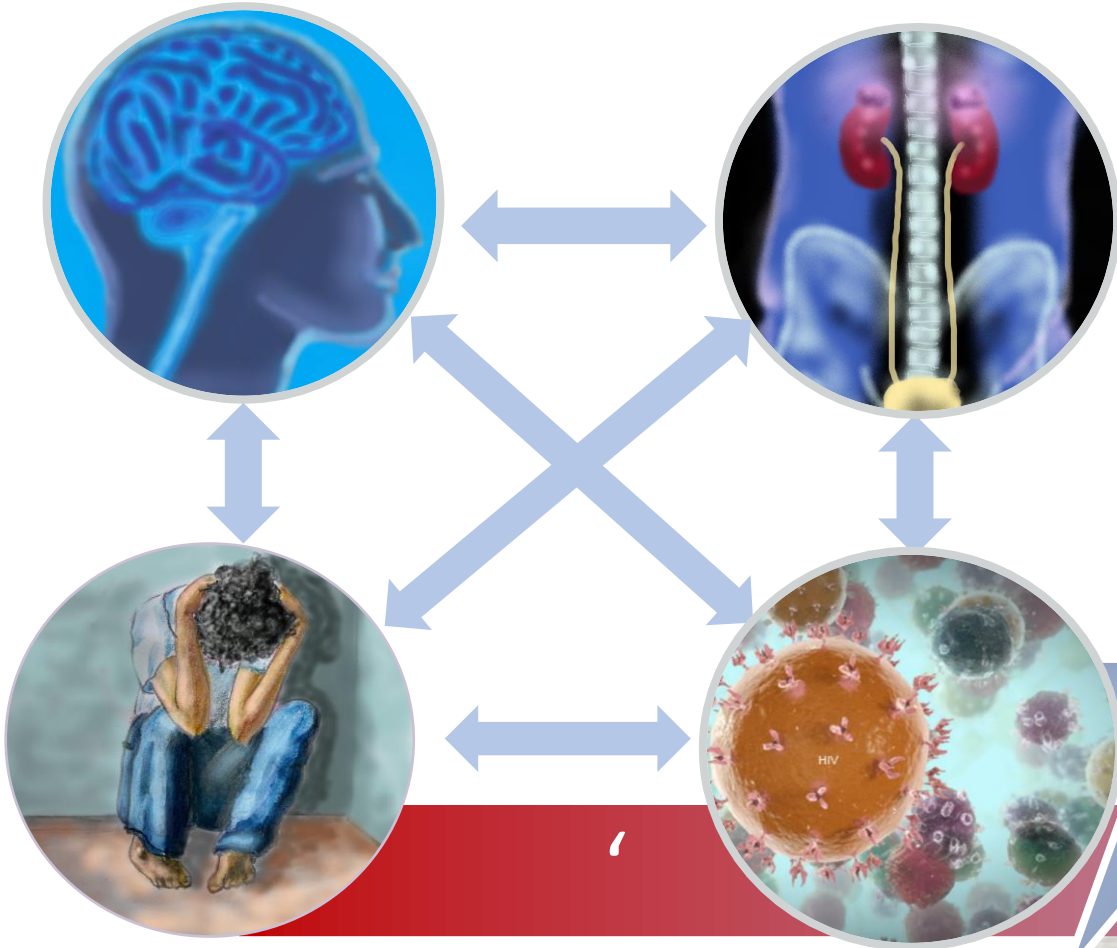


Healthcare system

- / Health coverage
- / Facility availability
- / Provider availability
- / Provider linguistic and cultural competency
- / Quality of care

Health outcomes: Health status, functional limitations, morbidity, QoL, life expectancy, mortality

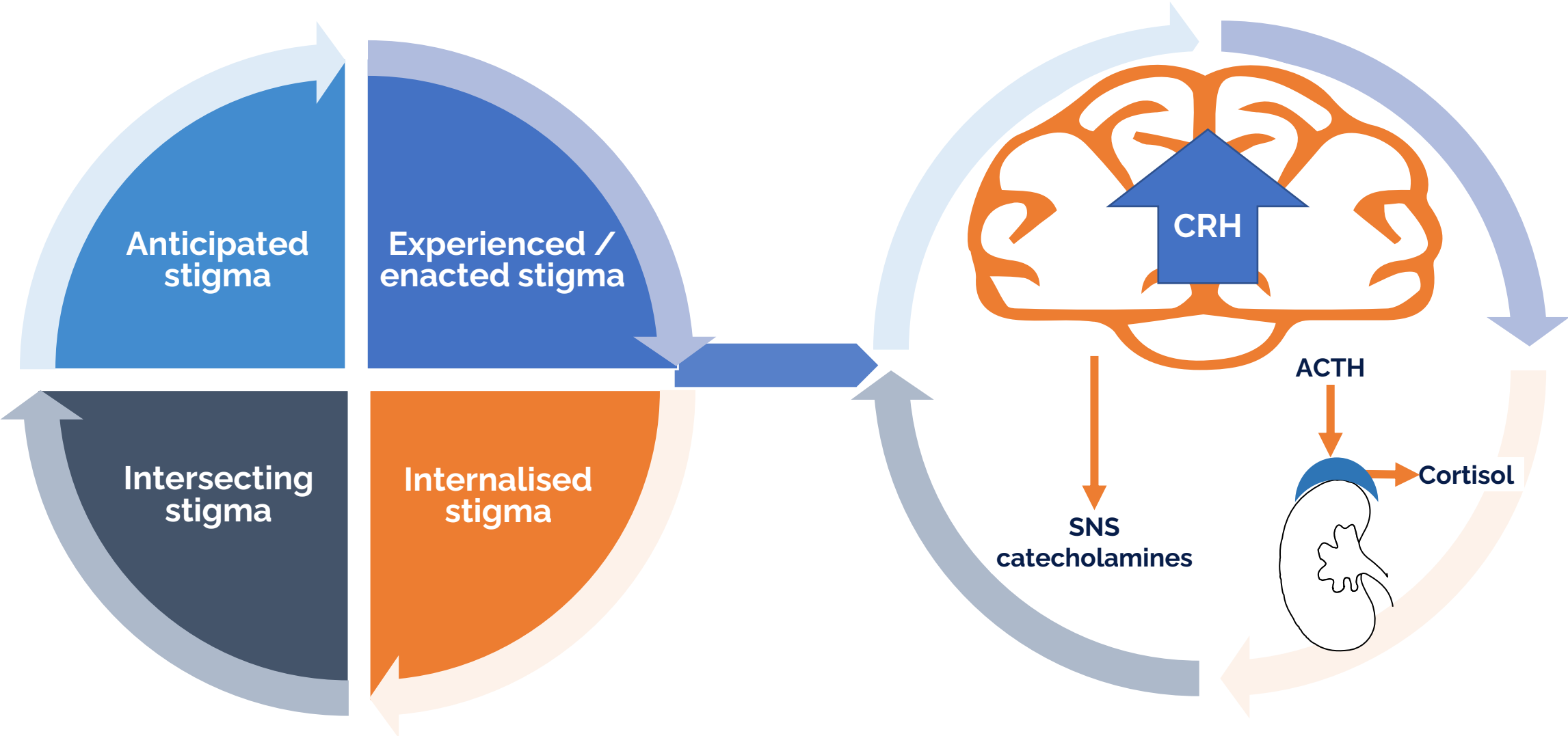
Sensing Adversity



'FLIGHT OR FIGHT'

threat vigilance

Diverse Stigmas Trigger Stress Response



Social safety determinants and consequences for stigmatised populations

Family

Family rejection associated with depression, suicide, substance use, sexual risk behaviour, Cardiometabolic disease and inflammation

School

Exclusion, marginalisation, negative stereotypes,, restrictive state laws on education of sexual and gender-diversity facilitate bullying, victimisation, poor mental health, suicide, substance use

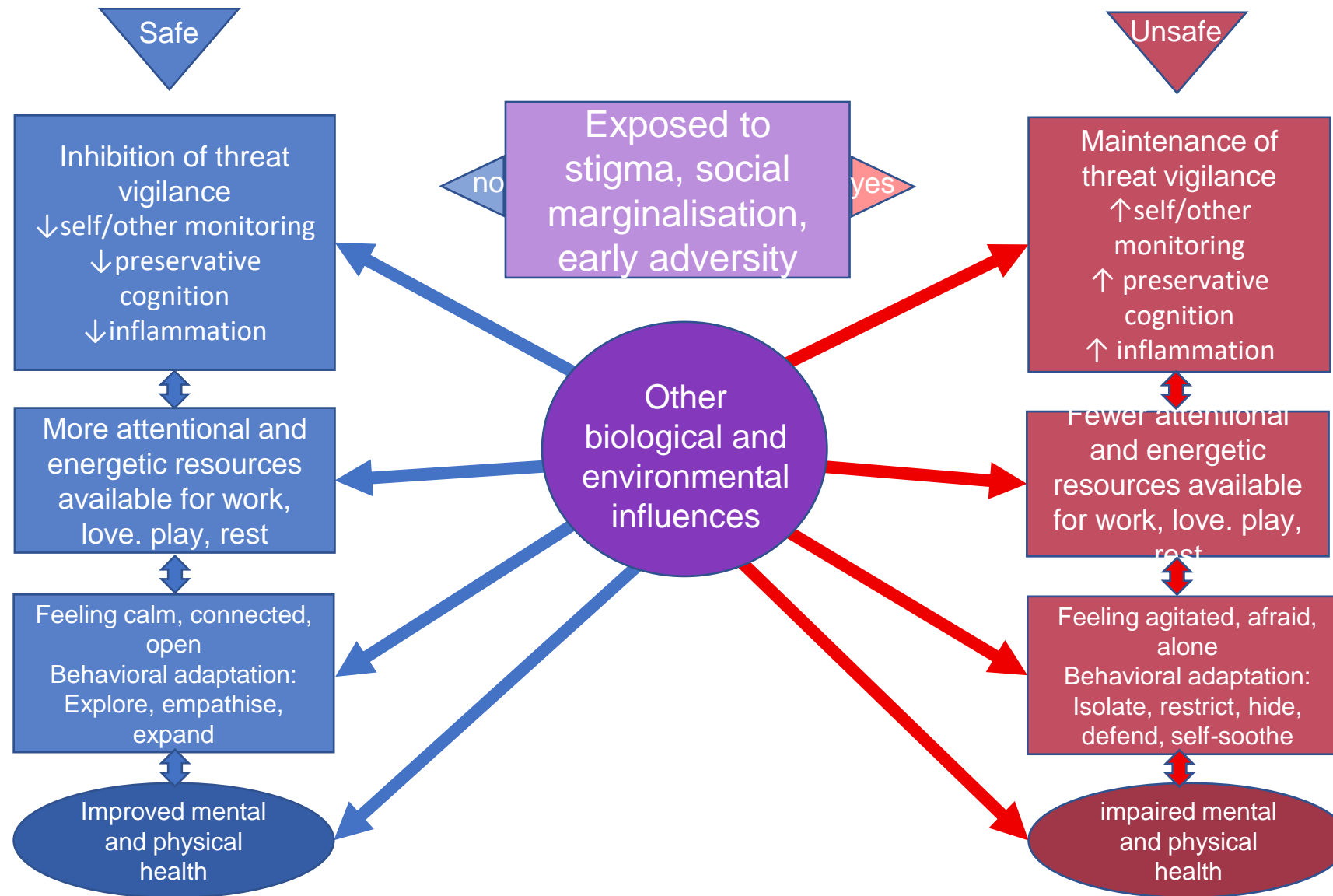
Community

Reduced social status or socially-discredited characteristics eliciting disgust result in lack of basic courtesy, disrespect, avoidance, aggression and violence
Constant threat-vigilance and monitoring for cues of disgust

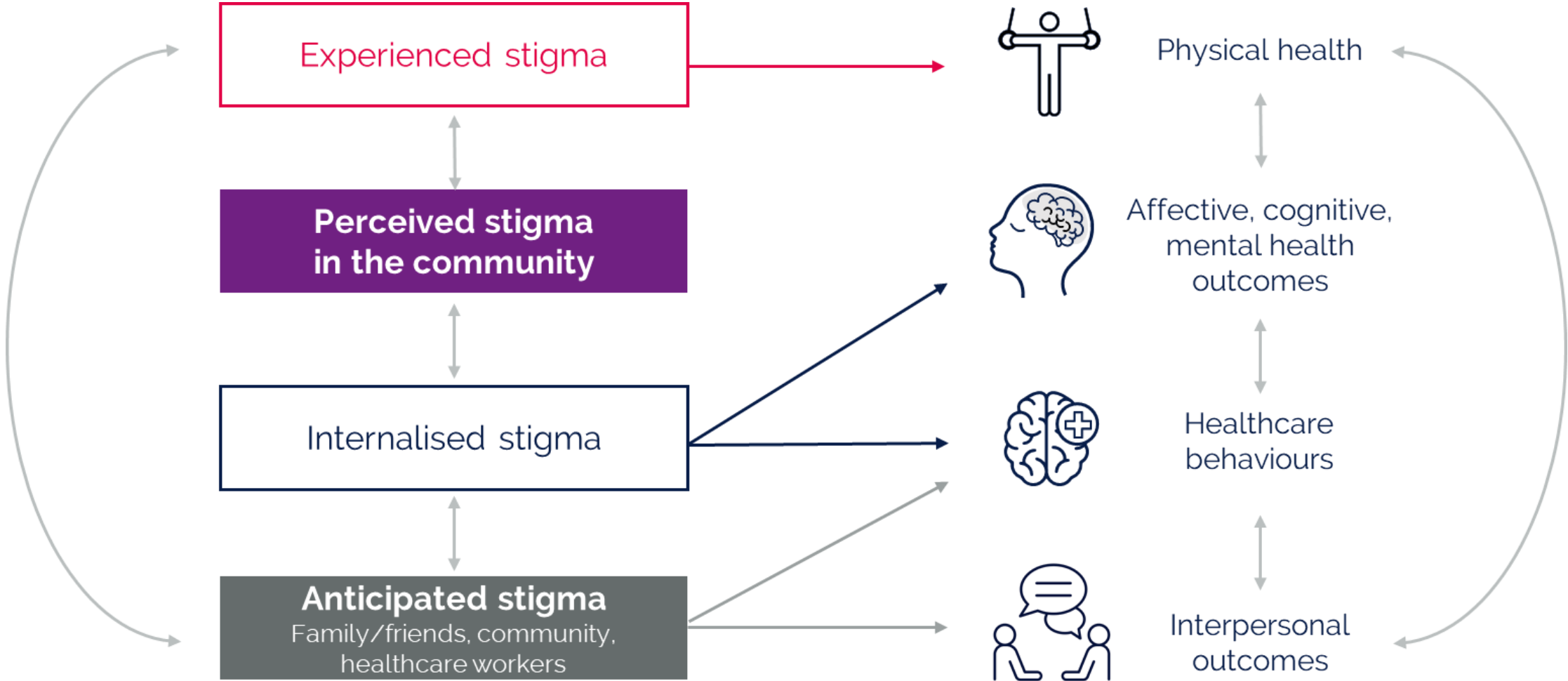
State

Discriminatory laws, policies and religions targeting stigmatised populations associated with ↑ HIV prevalence, suicide, barrier to healthcare, poor mental health, substance use, higher all-cause mortality

Social Safety impacts multiple domains of functioning



People Living with HIV Experience and Respond to Social Stigma Through HIV-related Stigma Mechanisms: Impacts Health Outcomes



Social and political identities combine to create unique modes of discrimination and privilege leading to multiple discredited social identities for people living with HIV

VULNERABLE POPULATIONS

Women
MSM/transgender
Adolescents/elderly
Sex workers



SOCIALLY DEPRIVED

Immigrants
Poverty
Housing insecurity
Incarcerated



STIGMAS

HIV
Sexual orientation
IDUs/sex workers
Religion/culture/ethnic



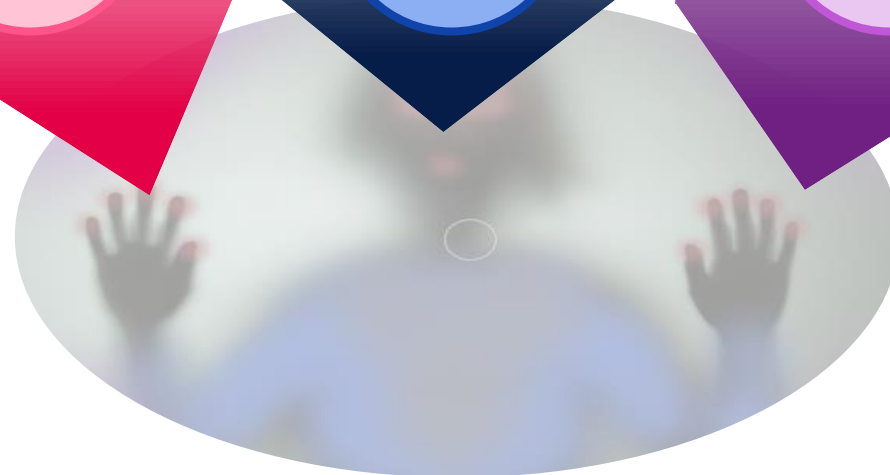
NEUROPSYCHIATRIC

Anxiety disorders
Major depressive disorder
Psychosis
Substance use



ENVIRONMENT

State discrimination
Intimate partner violence
Health access inequality
War/community violence



Chronic Inflammation Secondary to Long-term Stress Manifests as Immune Dysfunction



Proliferation and release of inflammatory monocytes and neutrophils
Long-term and chronic stress

Persistently high cortisol and corticosteroid levels

Resistance to cortisol and impaired anti-inflammatory effects on the immune system



CRP, C-reactive protein; IL, interleukin; NK, natural killer; TNF, tumour necrosis factor

STRESS:

Impedes the wound healing processes via multiple physiological pathways

Impairs immune responses to influenza vaccination

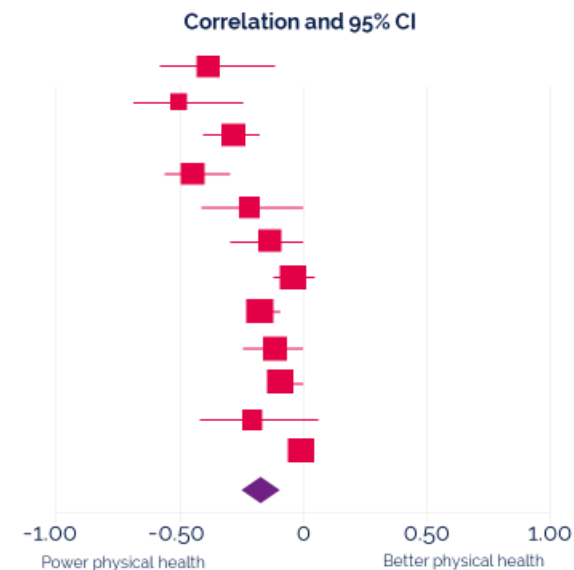
Increases susceptibility to infections, reactivation of latent herpesviruses, and progression of HIV
(\uparrow VL, \downarrow CD4)

Inflammatory markers associated with depression (CRP; IL-1 β ; IL-6, TNF) impair the function of lymphocytes and NK activity, contributing to HIV disease progression

META – ANALYSIS: HIV STIGMA IS ASSOCIATED WITH LOWER PHYSICAL HEALTH

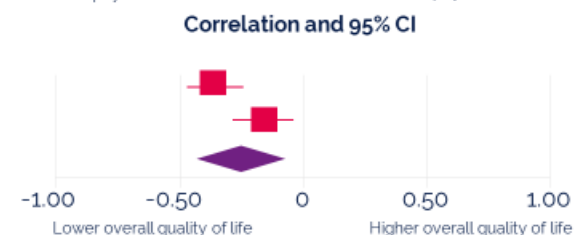
Univariate Results

	Statistics for Each Study				
	Correlation	Lower Limit	Upper limit	Z-Value	p-Value
Miles (1997)	-0.390	-0.596	-0.136	-2.941	0.003
Bozarth (1998)	-0.510	-0.703	-0.248	-3.559	0.000
Demi (1998)	-0.290	-0.408	-0.162	-4.337	0.000
Reece (2001)	-0.450	-0.577	-0.302	-5.505	0.000
Heckman (2002)	-0.220	-0.416	-0.005	-2.000	0.045
Sayles (2008)	-0.140	-0.273	-0.002	-1.988	0.047
Kalichman Cape Town (2009)	-0.050	-0.110	0.010	-1.633	0.102
Kalichman Swaziland (2009)	-0.180	-0.237	-0.122	-6.000	0.000
Kalichman Atlanta (2009)	-0.120	-0.249	0.013	-1.772	0.076
Grov (2010)	-0.090	-0.154	-0.025	-2.724	0.006
Nyamathi (2013)	-0.210	-0.427	0.030	-1.719	0.086
Sumari-de Boer (2012)	-0.008	-0.020	0.003	-1.418	0.156
Summary measure	-0.190	-0.264	-0.113	-4.798	0.000



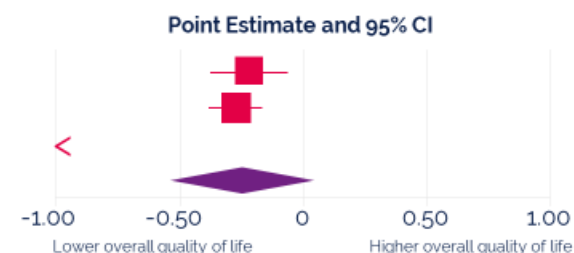
Univariate Results

	Statistics for Each Study				
	Correlation	Lower Limit	Upper limit	Z-Value	p-Value
Tam Van (2012)	-0.360	-0.468	-0.241	-5.653	0.000
Newman (2012)	-0.160	-0.284	-0.027	-2.361	0.018
Summary measure	-0.263	-0.447	-0.058	-2.503	0.012



Multivariate Results

Slater (2013)	-0.210	-0.367	-0.053	-2.625	-0.009
Vyavaharkar (2012)	-0.260	-0.378	-0.142	-4.333	0.000
Abboud (2010)	-21.510	-35.387	-7.633	-3.038	0.002
Summary measure	-0.245	-0.526	0.037	-1.702	0.089



Social Stress is associated with an ageing immune phenotype

Lifetime exposure to stressful conditions is a known risk factor for poor health, increasing the risk for early onset of age-related disease and premature death

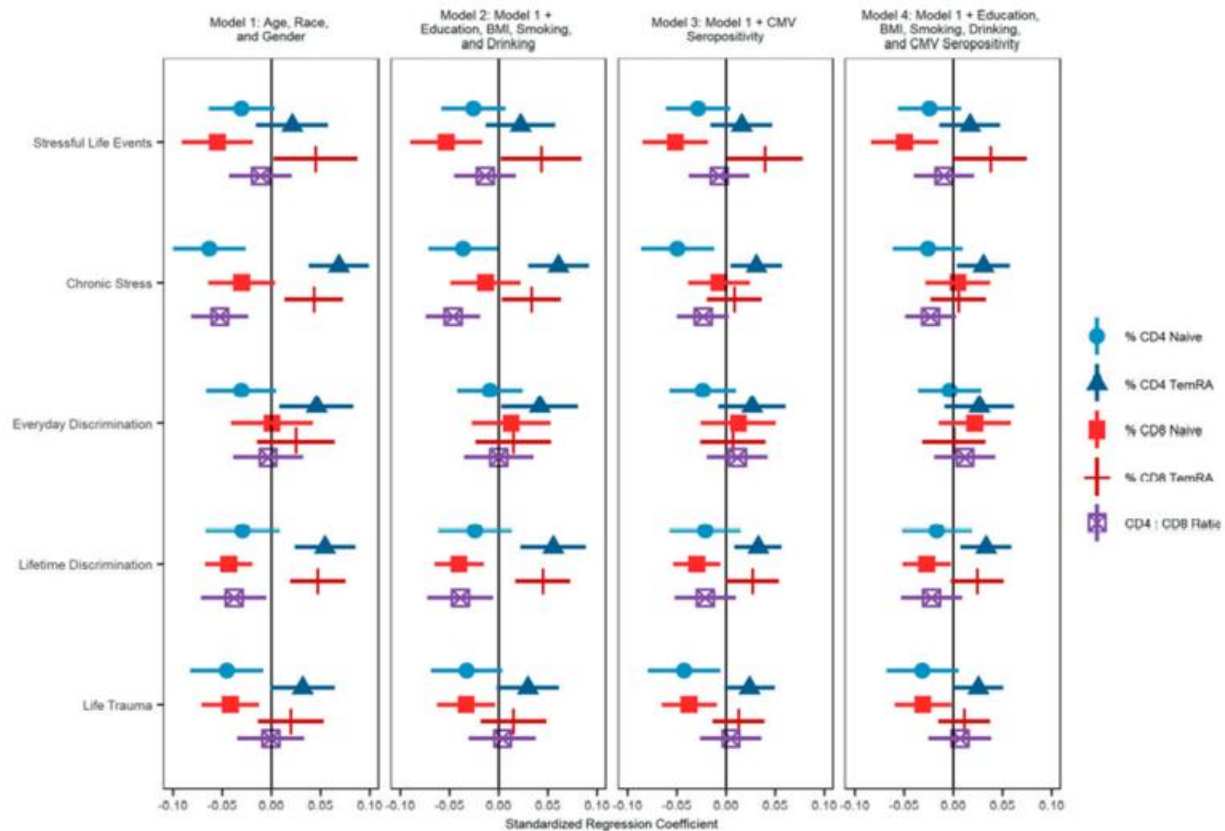


Fig. 1. Regression coefficients and 95% CIs from nested analyses regressing cell subset percentage/ratio on each stressor and mediators. All models control for age, race, and sex.

/ National sample of >5000 older US adults found that exposure to social stress was associated with T cell distributions indicative of accelerated immune aging*

/ Life trauma and chronic stress associated with ↓% CD4+ naïve T cells

/ Everyday discrimination, lifetime discrimination, and chronic stress were associated with an ↑% of terminally differentiated CD4+ T cells

/ Stressful life events, lifetime discrimination and life trauma associated with a ↓% of CD8+ naïve T cells,

/ Stressful life events, lifetime discrimination, and chronic stress significantly associated with an ↑% of terminally differentiated CD8+ T cells

/ Lifetime discrimination and chronic stress were associated with lower CD4:CD8 ratio

Immune aging is associated with chronic diseases: cancer and cardiovascular disease, weakened response to acute infections, increased risk of pneumonia, reduced efficacy of vaccines and organ system ageing

Sexual minority stress correlates with multiple inflammation-associated diseases

Cytokines affect the **activity of the two biological systems** that are **most associated** with the pathophysiology of **depression**:

Lesbian, gay, and bisexual people raised in hostile environments where minority sexual orientations are highly stigmatized show blunted cortisol responses to social stress

Chronic stress induces glucocorticoid resistance with failure to downregulate inflammation and impaired response to viral challenge

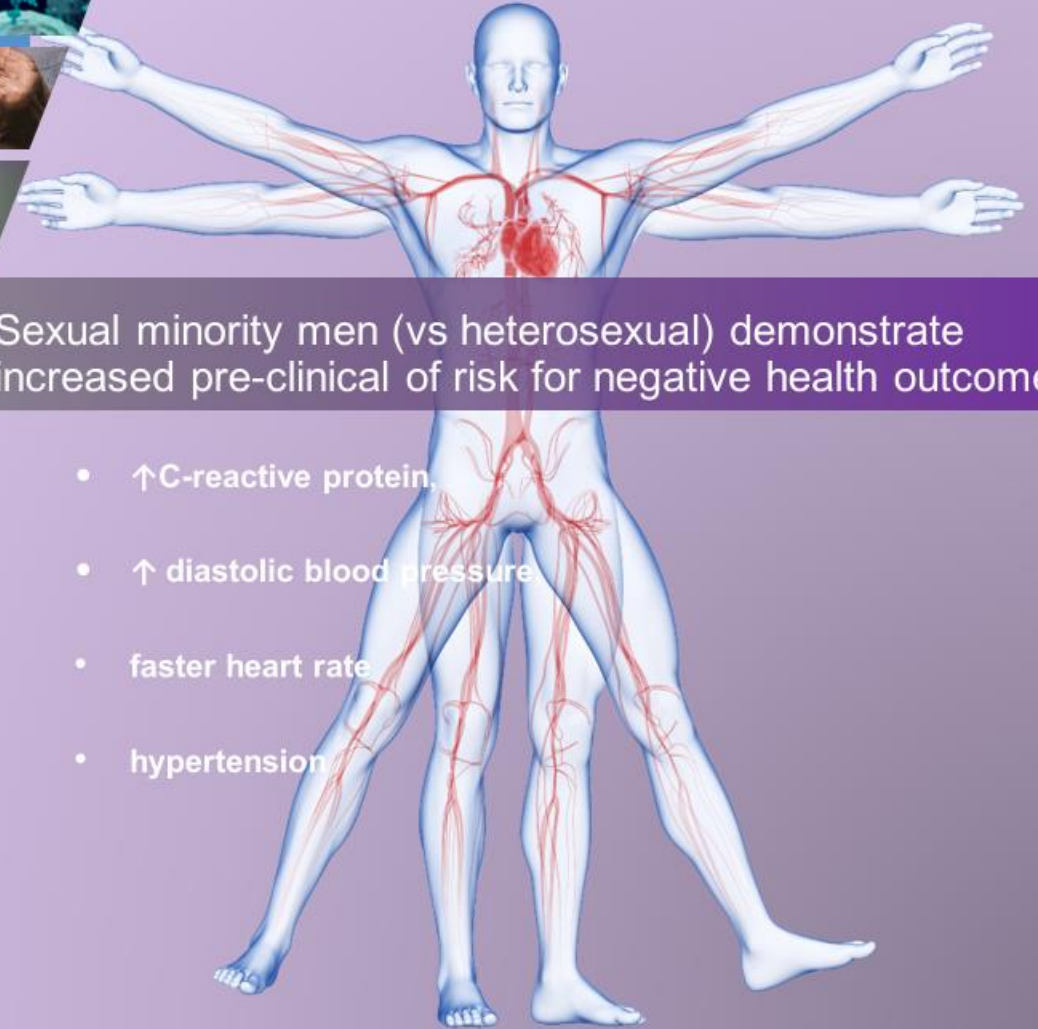
Stress exposure: triggers changes in the **immune system, neurotransmitters, neuroendocrine system and central nervous system**

- ↑ expression of pro-inflammatory genes,
- ↓ IFN-response genes
- ↓ immune response to novel pathogens
- Cytokines mediate depression

Flenje 2018; Jeon S et al. 2016;.

Sexual minority men (vs heterosexual) demonstrate increased pre-clinical of risk for negative health outcomes:

- ↑C-reactive protein,
- ↑ diastolic blood pressure
- faster heart rate
- hypertension



Sexual minority stress is related to differential expression of individual genes and pathways in leukocytes that are implicated in inflammation, immune function, cancer, and cardiovascular function

Thirty-eight men living with HIV with minority stress had RNA sequenced vs 23 participants lacking minority stress

90 genes were differentially expressed at an FDR of 0.10.
69 upregulated and 21 downregulated

41 differentially expressed genes, 35 2-directionally perturbed pathways functionally related to mechanisms of inflammation, cancer, immune function, and cardiovascular function

7 genes and 16 pathways related to inflammation or immune functioning were differentially expressed between low and high minority stress groups.

BTLA, whose proteins are associated with homeostasis of inflammatory responses within cells KLRB1, which inhibits natural killer cell cytotoxicity

CD69, which has a role in the regulation of immune function and inflammation

32 differentially expressed genes and 8 perturbed pathways were related to cancer

neuroactive ligand receptor interaction pathway

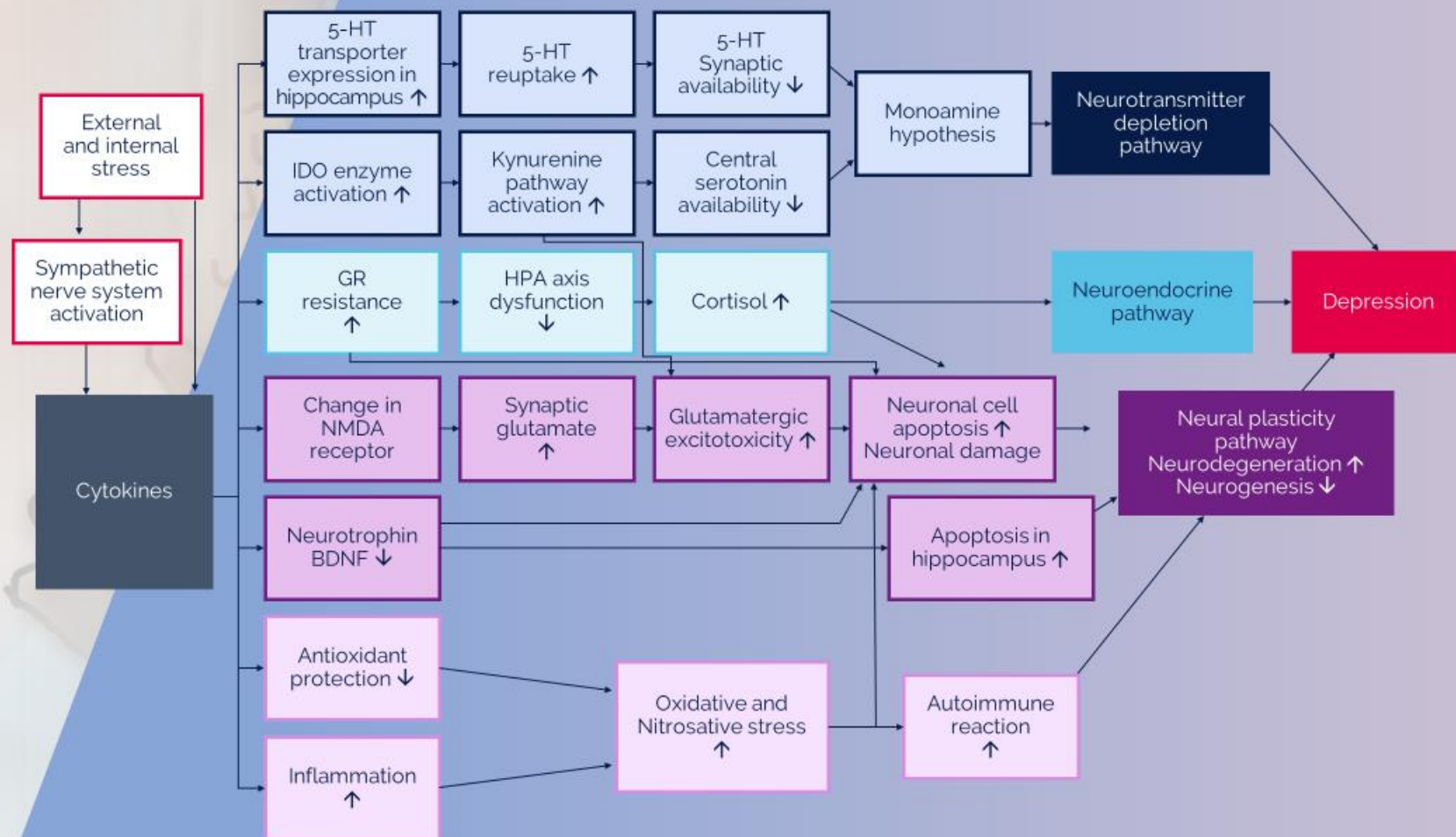
expression of ZNF426 (role of autonomic nervous system activity in the reactivation of Kaposi's sarcoma associated herpes virus)

Multiple Interactions Between Pathways Provide Evidence of a Complex Pathogenesis Model for Depression

Cytokine production is activated by stress and sympathetic nerve system activation

Cytokines act via 3 pathways

- / Neurotransmitter depletion
- / Neuroendocrine
- / Neural plasticity



PTSD and cytokine dysregulation



Cytokine signature differs by gender

Intrinsically low levels of circulating cortisol

Excessive levels of cell-mediated and proinflammatory cytokine expression

co-morbid with MDD have higher levels of serum IL-6

Several other individual cytokines and chemokines were significantly different in the PTSD 0900 hours plasmas compared with healthy control plasma, IL-1 β ↓ > two-fold; TNF α ↑ ca.64%; IP-10 ↑ ca. 50%

Elevated chemokine MCP-4 (monocyte chemoattractant protein-4; CCL11) and reduced chemokine MCP-1 (monocyte chemoattractant protein-1; CCL2) significantly distinguish PTSD subjects from healthy controls

MCP-4/MCP-1 ratio was found to be a significantly elevated, gender-independent, biomarker for PTSD over the entire circadian period

Chemokines also distinguish PTSD patients from healthy controls on the basis of gender over the circadian period

MCP-4 and MIP-1 β (monocyte interacting protein 1 β ;CCL4) to significantly biomark PTSD in females

MCP-1 and the lymphokine TARC (thymus and activation-regulated chemokine; CCL17) significantly biomarks PTSD in males;

Stigma is associated with Cardiovascular disease

Both acute and chronic stress influence cardiovascular function

Acute stress induces 'fight or flight' response

↑ heart rate

↑ blood pressure

secretion of stress hormones (e.g., adrenaline, noradrenaline, and cortisol)

Chronic stress induces sustained sympathetic nervous system stimulation

Sustained elevated heart rate and blood pressure

Endothelial dysfunction with vasoconstriction

Atherosclerosis

Arrhythmias due to ↑ in pro-arrhythmogenic potential

Increased risk for thrombosis (platelet activation, haemostatic changes, haemocentration)

Stigma and CVD in the literature: The current evidence implies an association between perceived discrimination and cardiovascular health

Review including 84 studies over 31 years to 2017

Studies categorized according to demonstrated links between stigma and cardiovascular disease risk factors

Blood pressure n = 45

Heart rate variability n = 6

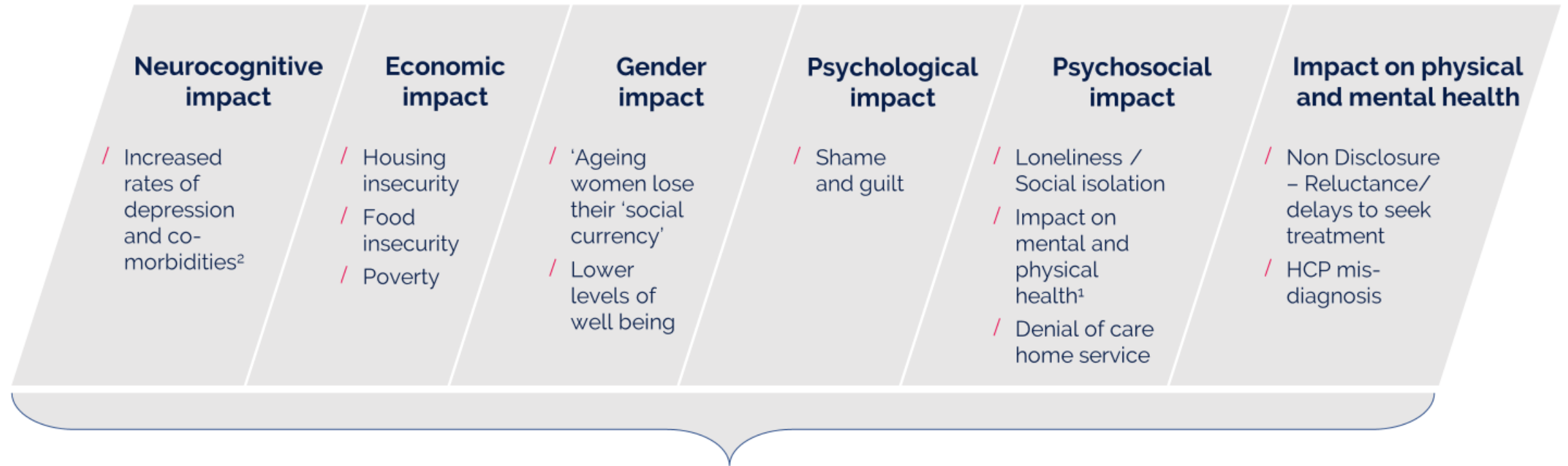
Blood/saliva CV biomarkers n=18

Other indicators of cardiovascular health n = 15

86% concluded that there was a significant relationship among stigma or discrimination and cardiovascular health indicators among socially stigmatized groups

Varying degrees of evidence supporting these relationships, depending on the type of discrimination and cardiovascular health indicator

IMPACT OF HIV STIGMA ON OLDER PEOPLE LIVING WITH HIV



Tailored interventions for older people living with HIV

Stigma in older people living with HiV

DIRECT ADVERSE HEALTH EFFECTS



Stress response



Chronic inflammation



Comorbidities



Immune function



Mental health:

- / Neuropsychiatric
- / Neuroendocrine effects

DIRECT ADVERSE ENVIRONMENTAL FACTORS

HCP discrimination and bias

Impact on health seeking behaviour and adherence to ARVs

Societal factors:

- / Criminalisation of HIV religion/fait, isolation
- / Barriers to accessing PrEP
- / Impact of COVID-19 pandemic
- / Socioeconomic effect

STIGMA IN OLDER PEOPLE LIVING WITH HIV

- / For older adults, the fear of stigma was related to concerns about **rejection and social isolation** as people limit social contacts
- / Older people living with HIV often reported **high rates of depression**
- / 39% of older people living with HIV had **major depression related to loneliness and stigma**
- / Concurrent drug use among older people living with HIV is higher than their non-HIV counterparts and was **associated with increased rates of mental health and medical problems**



Loneliness

Increases odds of
early death by
26-45%

29%
increased risk
of **heart disease**

32%
increased
risk of **stroke**

Adapted from: Siegel K *et al. J Pain Symptom Manage* 2010;40:353-69; Grov C *et al. AIDS Care* 2010;22:630-9;
Green TC *et al. Drug Alcohol Depend* 2010;110:208-20
Adapted from Wilson RS *et al. Arch Gen Psychiatry* 2007;64:234-40; Holt-Lundstad J *et al. PLoS Med* 2010;7 e1000316;
Holt-Lundstad J *et al. Perspect Psychol Sci* 2015;10:227-37; Valtorta NK *et al. Heart* 2016;102:1009-16

Associated with **more rapid cognitive decline** in later life

HIV-Related Stigma is significantly associated with Multidimensional Frailty Among Older Latinos With HIV

HIV-related stigma is a stressor for Latino people with HIV and an important barrier to HIV care

The association between **HIV-related stigma** and **multidimensional frailty** among Latino PWH aged >50 was evaluated in a cross-sectional design with 120 Latino PWH

- Self-reported questionnaires to assess multidimensional frailty*
- HIV-related stigma (HIV stigma scale)

Participants:


- 59.1 ± 7.0 years old,
- primarily White-Hispanic (85.00%, $n = 102$),
- single (48.33%, $n = 58$)
- male (73.30%, $n = 88$)

Nearly half of the participants were **frail** (45.85%, $n = 55$)

Frail individuals (vs non-frail) had

- significantly higher scores in the total **HIV-related stigma** ($M = 98.5 \pm 24.7$ vs. $M = 85.3 \pm 25.6$, $p = .020$) and all subscales.
- multidimensional frailty were 1.021 times higher for people with higher HIV-related stigma scores ($p = .007$) significant after adjustment for income and comorbidities ($p = .049$)

*Tilburg Frailty Indicator



Efforts to prevent multidimensional frailty should consider addressing HIV-related stigma through age-appropriate and culturally tailored resources for this group

CONSEQUENCES OF POOR ADHERENCE

**POOR
ADHERENCE**



ViRAL FAILuRE¹

- / Transmission
- / Disease progression



**MiSSED CLiNc
APPOiNTMENTS²**

- / Poor management of comorbidities
- / Loss of viral control



DECREASeD QOL³

- / Neuropsychiatric disorders
- / Isolation



**RiSk OF EMERgENT
DRUG RESiSTANCE⁴**

- / Reduced treatment options
- / Increasingly complex ART



**CLiNcAL PROGRESsiON OF
DiSEASE⁵**

- / Increasingly complex management
- / Poor QoL



**iNCREASeD
HOSPITALiZATIOn RATES⁶**

- / Increased cost of care
- / Poor QoL



iNCREASeD MORBiDiTY⁴

- / Multiple comorbidities and risk of DDIs
- / Increased HCP exposure
- / Poor QoL and increased risk of mortality

QOL, quality of life; ART, antiretroviral therapy

1. Sumari-de Boer IM *et al. AIDS Behav* 2012;16:1681-89

2. Horstmann E *et al. Clin Infect Dis* 2010;50:752-61

3. de Oliveira e Silva AC *et al. Rev Lat Am Enfermagem* 2014;22:994-1000

4. Nacheга JB *et al. Infect Disord Drug Targets* 2011;11:167-74

5. Lucas GM. *J Antimicrob Chemother* 2005;55:413-16

6. Sax PE *et al. Plos One* 2012;7:e31591

STIGMA IS A BARRIER TO ART ADHERENCE WITH CONSEQUENT VIROLOGICAL FAILURE

/ Meta-analysis of 125 studies

/ Included:

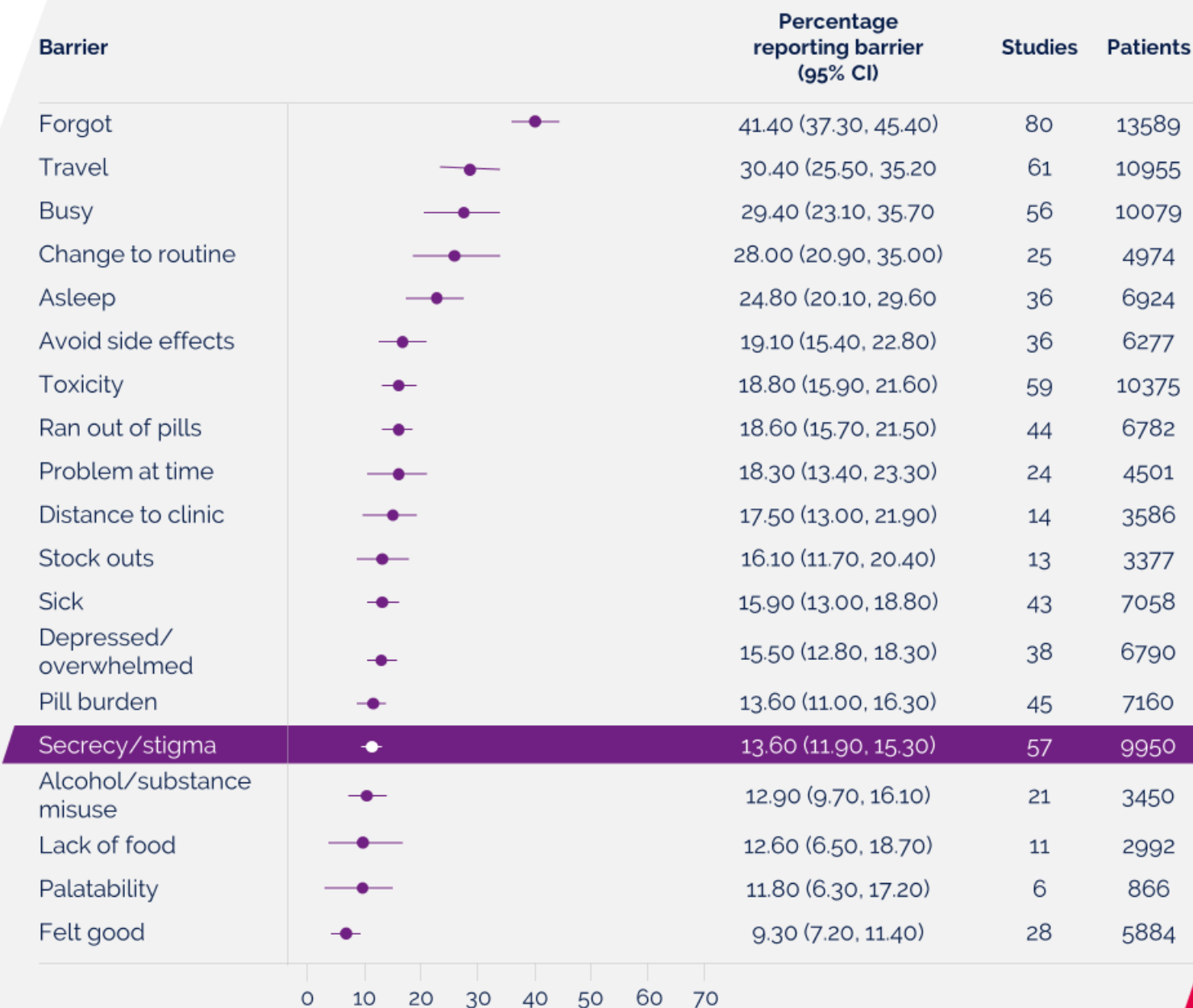
/ 17,061 adults

/ 1099 children

/ 856 adolescents

/ 13.6% of adults across studies listed stigma as a barrier to ART adherence

/ Higher risk of virological failure with worse adherence



Socially Excluded People Living With HIV Have Lower CD4 counts and Worse Outcomes

Factors influencing CD4 count and outcomes of socially excluded people living with HIV can include:



Systematic review and meta-analysis¹

- / **Food-insecure** people had **1.32 times greater odds** of having **lower CD4 counts** compared to food-secure people (OR = 1.32, 95% CI: 1.15, 1.53)
- / **Food-insecure** people had on average **91 fewer CD4 cells/ μ l** compared to their food secure counterparts (mean difference: -91.09; 95% CI: -156.16, -26.02)

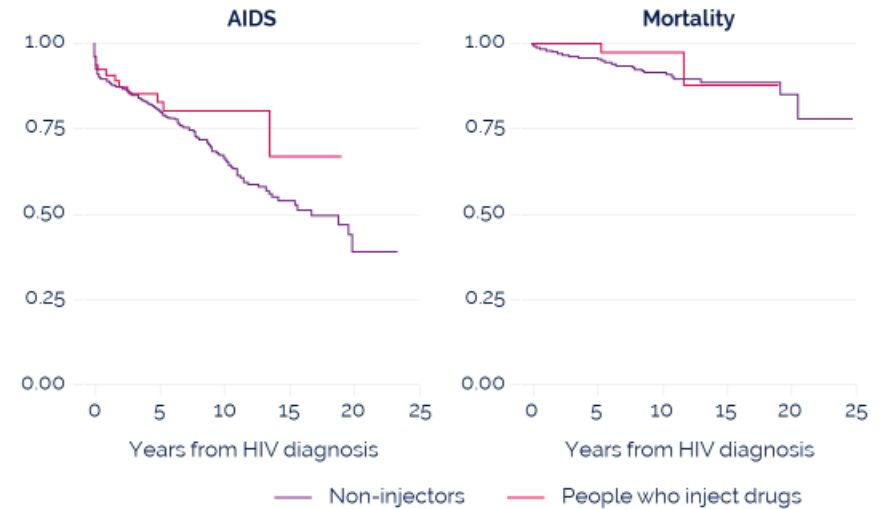
Multivariate logistic regression models for factors affecting CD4 counts among people living with HIV in Guangxi, N=11983



- / People living with HIV with **high socioeconomic status** (SES) were more likely to have **higher CD4 counts** (adjusted OR: 1.44, 95%CI: 1.08, 1.91) than people with **low SES**, after adjusting for potential confounders



HIV infected individuals on ART in Victoria 1996 – 2008 Kaplan-Meier estimates by injecting status²



- / **Older age, low initial CD4 cell count (<200/ mm^3), ever having a CD4 count <200/ mm^3 (before or during treatment) and high initial viral load (>5 \log_{10}) were associated with increased risk of AIDS and death**

1. Adapted from Aibibula W *et al. AIDS Care* 2016;28:1577–85

2. Adapted from Walsh N *et al. BMC Infect Dis* 2014;14:707

3. Adapted from Yang X *et al. AIDS Care* 2021;33:347–51

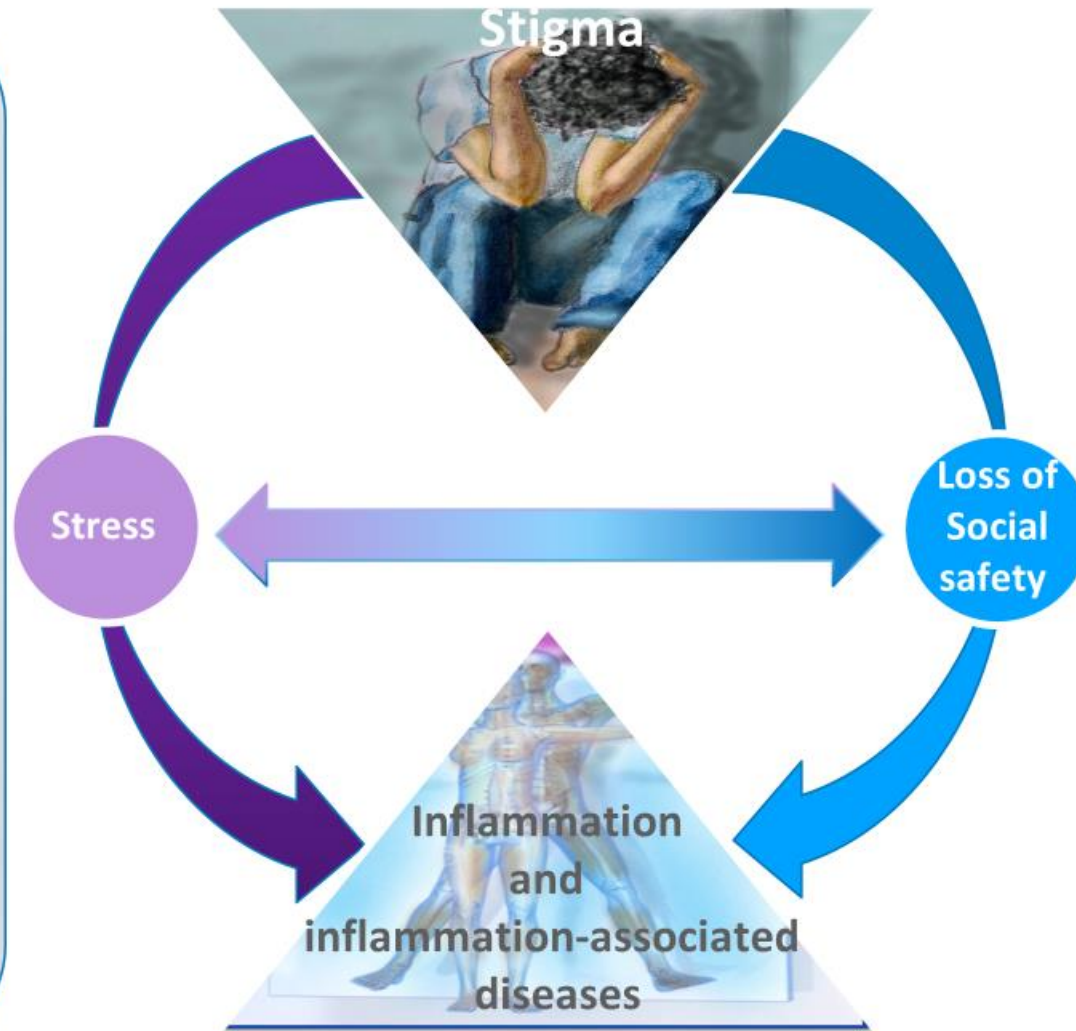
Stigma induces chronic inflammation and inflammation-associated diseases via 2 major pathways

Minority stress (chronic cumulative) associated with Stigma

Repeated exposure overwhelms individual's stress response systems

- ↑ vulnerability to stress-related health problems
- ↑ allostatic load: cumulative psychological and biological toll of stress
- ↑ autonomic and Hypothalamic-pituitary-adrenal activity
- ↑ health disparities vs non-stigmatised

- Depression
- Anxiety
- Suicide
- Cardiovascular disease
- Diabetes
- Hypertension
- Arthritis
- Cancer



Human neurobiological default state is threat-vigilance

Social safety is an essential human need at all stages of life

- Reliable social connection
- Social belonging
- Social inclusion
- Social recognition
- Social protection

Insufficient social safety activates neuroimmune pathways of self-perseverance

- Isolation
- Restricted activity
- Concealment
- Defensive aggression
- self-harm
- Inflammation and associated disease

To reduce health disparities in stigmatised populations, both reductions in stressors and amplification of social safety are required

'INCLUDE'... FOSTERING A STIGMA FREE ENVIRONMENT

INCLUDE

Key populations in
healthcare service
design and
implementation

Stigma and
discrimination
reduction as a
goal in national
strategies

UNAIDS
TERMINOLOGY
GUIDELINES

Talk openly
about HIV
and Stigma

Choose
supportive
language
that is not
stigmatizing

Speak out to
correct
myths and
stereotypes

Educate
yourself and
others

STAND UP TO STIGMA

**MUCHAS
GRACIAS**

