Context

- WC province population ~7 million people

- HIV is leading cause of years of life lost

- Government public health services
  - Free HIV testing and lifelong ART

		% of Total YLLs
1	HIV/AIDS	10.4%
2	Tuberculosis	7.7%
3	Ischaemic heart disease	6.9%
4	Interpersonal violence	5.8%
5	Mechanical forces	5.8%
6	Cerebrovascular disease	5.7%
7	COPD	4.3%
8	Trachea/bronchi/lung	4.2%
9	Diabetes mellitus	3.7%
10	Lower respiratory infections	2.8%
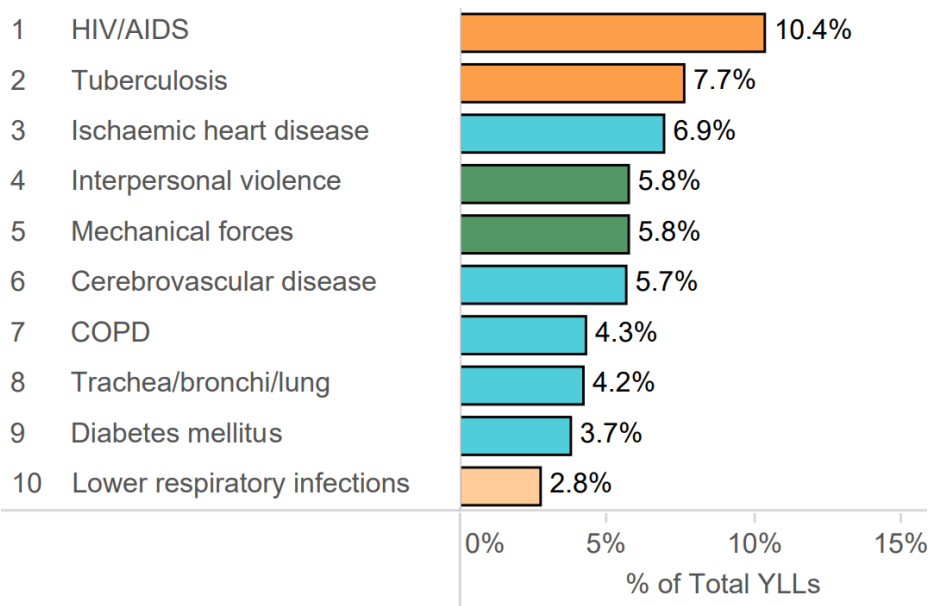
Leading causes of years of life lost in WC

icap Global Health

Western Cape Government

Identifiers

- South African Identification Number

- Health Patient Registration Number

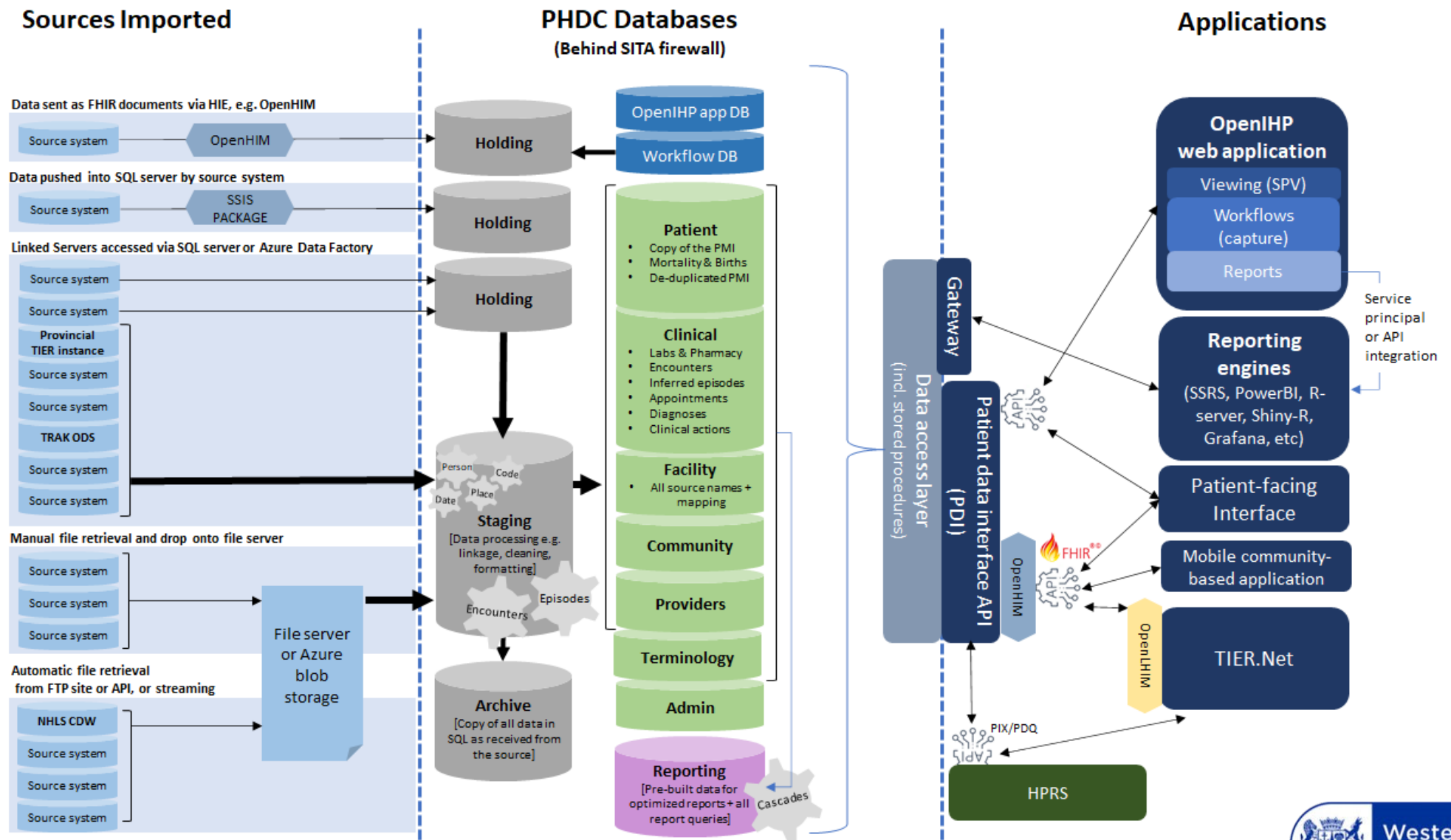- **Folder Number** – link person-level data across data sources

GEO 109 235 664 A
94G004
Tel: 082 123 9876
14 Lavender Avenue,
Treemount Suburb,
Woodsville, 9123
SANDILE ZAMUXOLO
MCHUNU
Male, 29 Feb 1967
664
5

The Provincial Health Data Centre (PHDC)

Building cascades – the old way

Evidences extracted from all possible sources

Evidence	Source	Category	Date	Score
Positive Rapid test	Labs	Weak-Mod	2020-01-16	0.25
ICD10 code	Admission	Supp	2020-04-03	0.1
Detectable Viral load	Labs	High	2020-04-05 →	0.7
Valid ART regimen dispensed	Drugs	High	2020-04-05	0.7
Valid ART regimen dispensed	Drugs	High	2020-06-01	0.7
ART treatment register	Disease Register (TIER)	High	2020-06-01	0.7

Total score = 0.99
1-(1-0.25)*(1-0.1)*(1-0.7)*(1-0.7)*(1-0.7)*(1-0.7)

Rolled up into a single record per HIV episode

Pt	Eps nr	Start Date	Treatment start date	Last Contact date	Evidence list	Last date evidence list	Last evidence Facility	Score
xxx	1	2020-01-16	2020-04-05	2020-06-01	Positive Rapid, ICD10 code, Detectable Viral Load, ART dispensed, Treatment register	ART treatment register, Valid ART regimen	KHC	0.99 → High confidence

Combined with other key indicators into a cascade

Pt	First evidence date	ART start date	Last VL date	Last VL value	Allocated Treatment facility	ART regimen	Last ART in Hand date
xxx	2020-01-16	2020-04-05	2020-04-05	10000	KHC	TLD	2020-08-01

icap Global Health

Western Cape Government

Reporting cascades – the old way

Tested   **On ART**   **Confirmed suppressed**   **Net performance**

PROVINCE WIDE 90-90-90

Tested	ART Status					Confirmed suppressed	Net Performance
Known HIV	Never Started ART	Started ART not ON ART***	On ART	VL in the past 15 months	VL < 1000	Confirmed suppressed	Overall control
467354 (78.9%)	28624 (6.1%)	143607 (30.7%)	295123 (63.1%)	264553 (89.9%)	246469 (93.2%)	246469 (83.5%)	246469 (41.6%)

More dynamic, non-linear cascades proposed

A new cascade of HIV care for the era of "treat all"

Matthew P. Fox[1,2,3]*, Sydney Rosen[1,3]
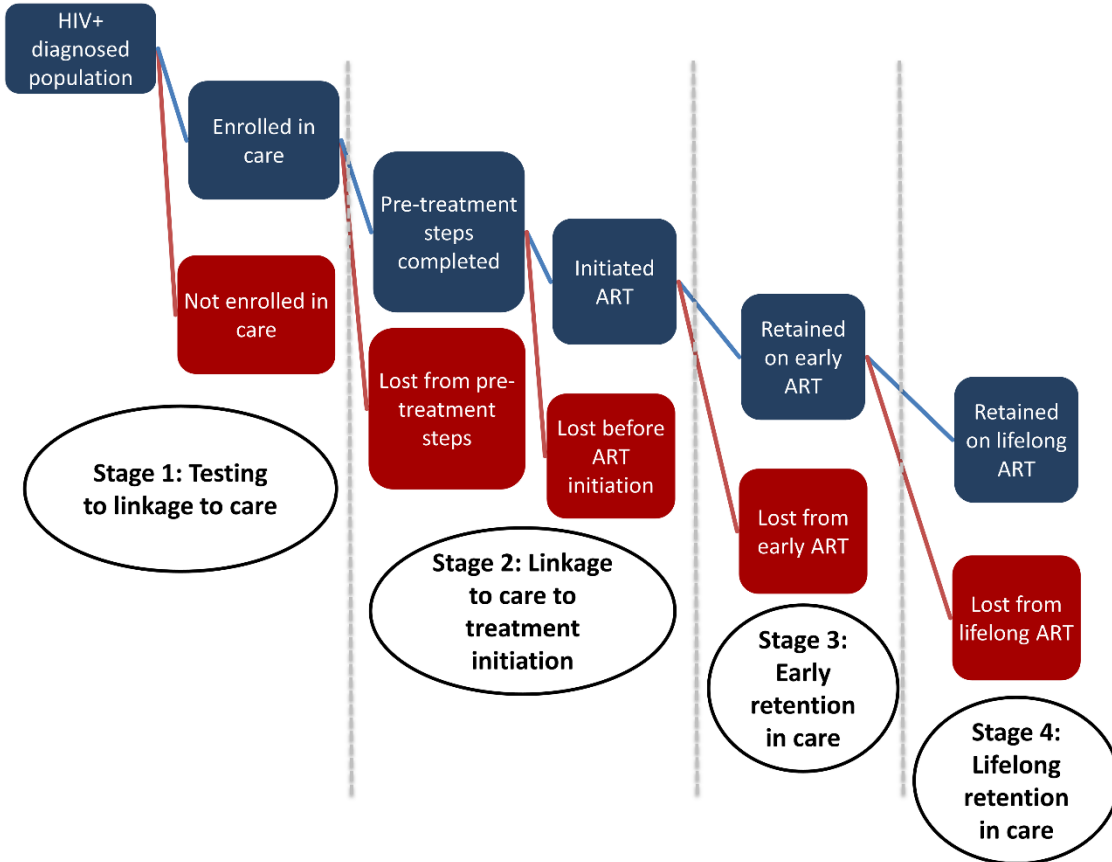
The revolving door of HIV care: Revising the service delivery cascade to achieve the UNAIDS 95-95-95 goals

Peter Ehrenkranz[1]*, Sydney Rosen[2,3], Andrew Boulle[4], Jeffrey W. Eaton[5], Nathan Ford[6,7], Matthew P. Fox[2,3,8], Anna Grimsrud[9], Brian D. Rice[10], Izukanji Sikazwe[11], Charles B. Holmes[12]

HIV Cascade Workshop

Western Cape Government
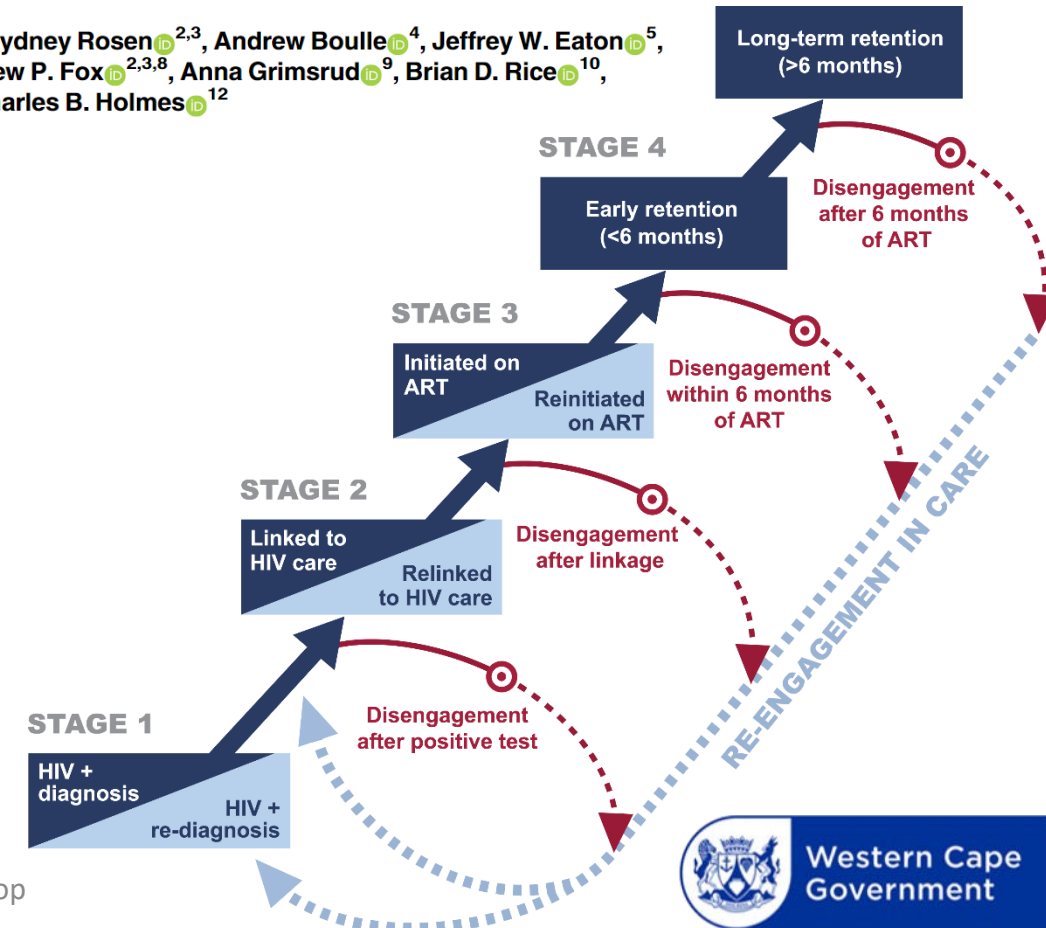
Performance

- Old cascade build takes > 40 minutes

- Need minimal data set prepared to build cascade

- Fully parameterised
  - Cannot pre-calculate anything
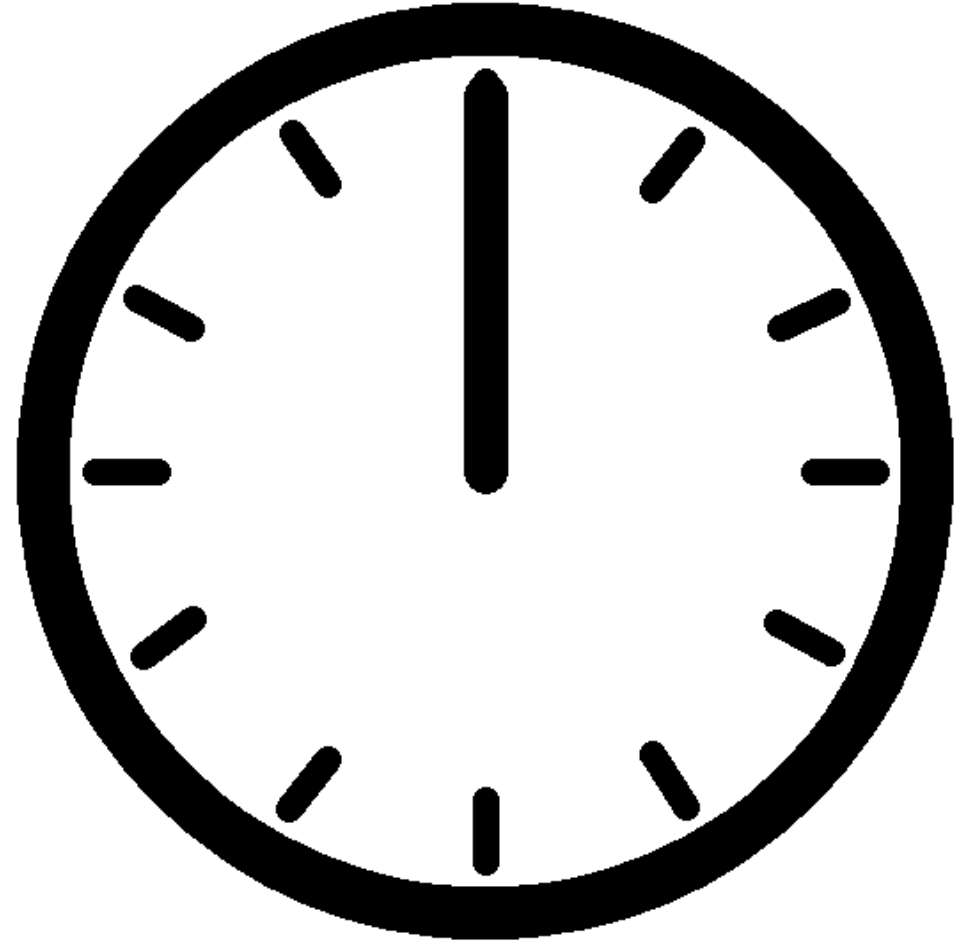
The "long" table

- One table with everything needed
- One row per person per event date
- Carry forwards
  - Latest version of truth on every row
  - e.g. last VL date, last VL value

pharm

pmi_id	pharm_issue_date	datasource_id	pharm_code	days
123456789	2021-01-29	1	J05AA1	28
123456789	2021-01-29	1	J05AA2	28
123456789	2021-01-29	1	J05AA3	28
123456789	2021-01-29	12	J05AA1	56
123456789	2021-01-29	12	J05AA2	56
123456789	2021-01-29	12	J05AA3	56
123456789	2021-01-01	1	J05AA1	28
123456789	2021-01-01	1	J05AA2	28
123456789	2021-01-01	1	J05AA3	28

observations

pmi_id	observation_date	observation_type	value
123456789	2001-01-01	x	n

labs

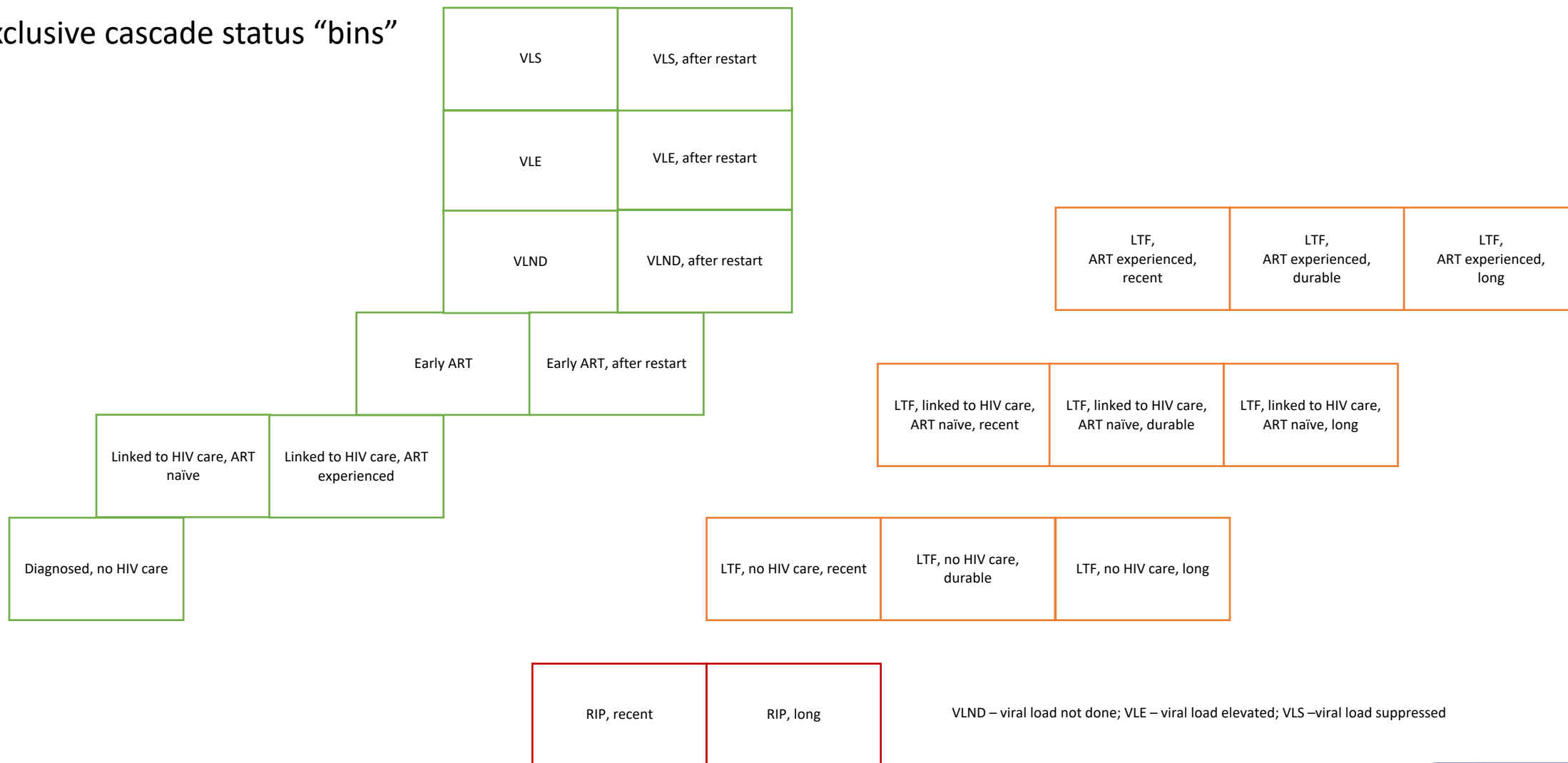| pmi_id	lab_date	lab_code	value
123456789	2021-01-14	VL	40

⇧ carry forwards

long table

pmi_id	encounter_date	last_art_fac_id	last_art_date	last_laih_date	last_vl_date	last_vl_value	last_x_date	last_x_value
123456789	2021-01-29	170	2021-01-29	2021-03-26	2021-01-14	40	2001-01-01	n
123456789	2021-01-14	170	2021-01-01	2021-01-29	2021-01-14	40	2001-01-01	n
123456789	2021-01-01	170	2021-01-01	2021-01-29	null		2001-01-01	n

Cascade status

- Exclusive cascade status "bins"

VLS	VLS, after restart
VLE	VLE, after restart
VLND	VLND, after restart

Early ART	Early ART, after restart

Linked to HIV care, ART naïve	Linked to HIV care, ART experienced

Diagnosed, no HIV care

LTF, ART experienced, recent	LTF, ART experienced, durable	LTF, ART experienced, long

LTF, linked to HIV care, ART naïve, recent	LTF, linked to HIV care, ART naïve, durable	LTF, linked to HIV care, ART naïve, long

LTF, no HIV care, recent	LTF, no HIV care, durable	LTF, no HIV care, long

RIP, recent	RIP, long

VLND – viral load not done; VLE – viral load elevated; VLS – viral load suppressed

icap Global Health

Western Cape Government

Branch logic

- Simple yes/no logic gates
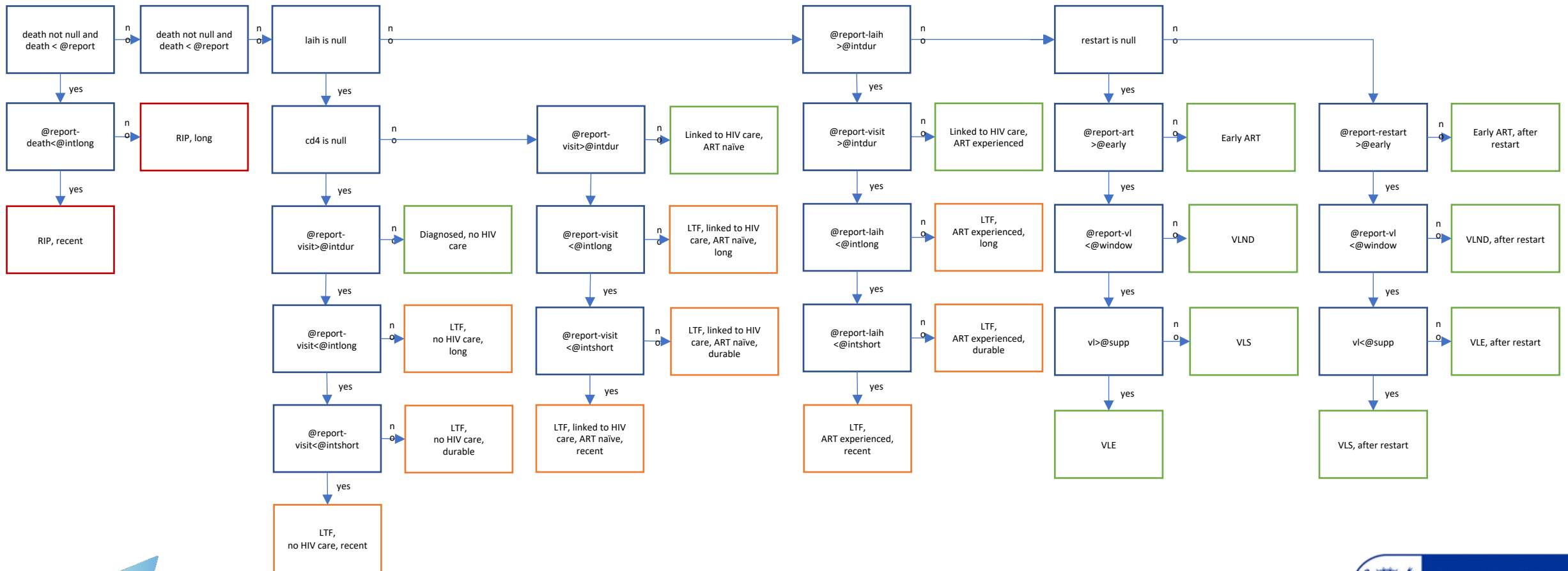
Branch logic implementation

- Nested case statement

- Incredibly efficient

```sql
case
  when date_of_death is not null and date_of_death <= @report then 'RIP'
  when last_aih_date is null then
    case
      when last_cd4_date is null then
        case
          when datediff(day,visit_date,@report)>@minLTF then 'LTF, no HIV care'
          else 'Diagnosed, no HIV care'
        end
      else
        case
          when datediff(day,visit_date,@report)>@minLTF then 'LTF, linked to HIV care, ART naive'
          else 'Linked to HIV care, ART naive'
        end
    end
  else
    case
      when datediff(day,last_aih_date,@report)>@minLTF then
        case
          when datediff(day,visit_date,@report)>@minLTF then
            case
              when datediff(day,last_aih_date,@report)<@longLTF then
                case
                  when datediff(day,last_aih_date,@report)<@shortLTF then 'LTF, ART experienced, recent'
                  else 'LTF, ART experienced, durable'
                end
              else 'LTF, ART experienced, long'
            end
        else 'Linked to HIV care, ART experienced'
```

icap Global Health

Western Cape Government

PowerBI cascade visualisation

PowerBI movement visualisation

Khayelitsha (Site B) CHC ▽

executionDate	ReportEnd_TP1	ReportEnd_TP2	minLTF	shortLTF	longLTF	SuppVL	WindowVL	earlyART
2022-05-26	2021-09-30	2022-03-31	90	180	365	1000	567	184

Existing patients

Patients

2367

New patients

Patients

401

IC at start of TP1

Status	Patients
In Care	13412

At TP2

Care Status	Patients
In Care	12460
LTF	1489
Total	**13949**

Patients left

Patients

1031

Total deaths

Patients

35

Differentiated service delivery

DSD Uptake by District

Cape Winelands District Municipality

- 10.38K (46.77%)
- 11.82K (53.23%)
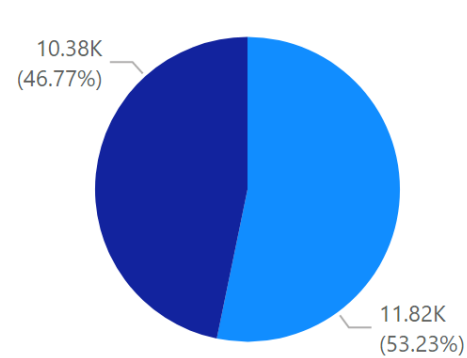
Model ● DSD ● Clinic

Central Karoo District Municipality

- 0.44K (24.15%)
- 1.39K (75.85%)
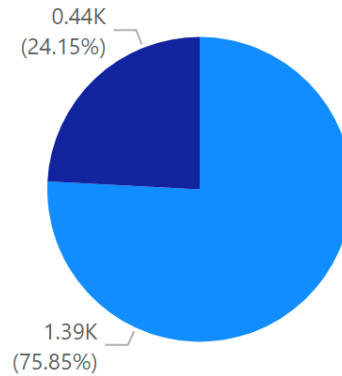
Model ● DSD ● Clinic

City of Cape Town Metropolitan Municipality

- 82.85K (41.37%)
- 117.41K (58.63%)
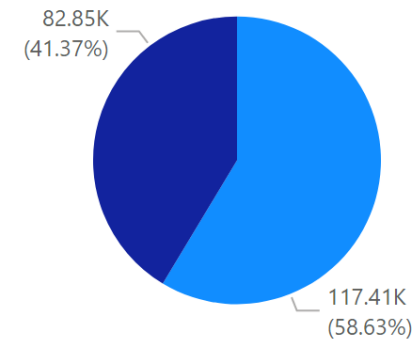
Model ● DSD ● Clinic

Garden Route District Municipality

- 4.59K (21.56%)
- 16.71K (78.44%)
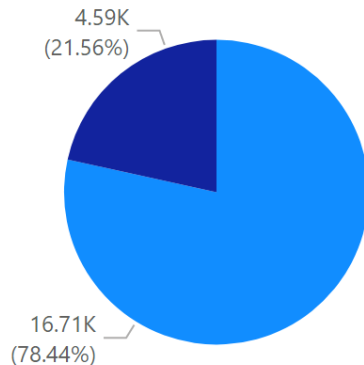
Model ● DSD ● Clinic

Overberg District Municipality

- 5.06K (48.47%)
- 5.38K (51.53%)
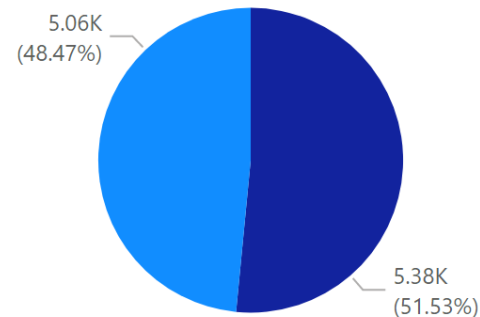
Model ● Clinic ● DSD

West Coast District Municipality

- 4.63K (45.47%)
- 5.55K (54.53%)
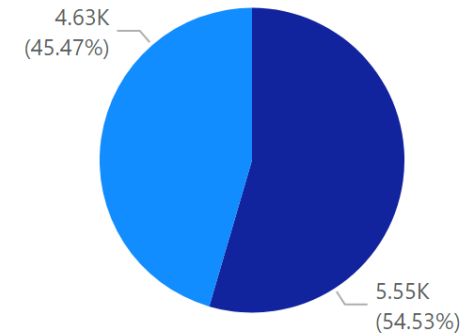
Model ● Clinic ● DSD

Next steps

- **Rewrite HIV reports** to run off the long table
  - Action lists, e.g. missed appointment, viral load due
  - Facility management reports
  - Quarterly reporting
  - PEPFAR reporting
  - Operational research
- Create **long tables for other conditions**

Thank you!