Impact of Tracing on LTFU HIV Patients – Progress Update

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11/14/2019

Group Introduction

- David Chen
  - Masters of Biostatistics interested in approaches to optimal dynamic treatment and applications in mental health
- Max Murphy
  - PhD. Biostatistics working on malaria transmission dynamics jointly with Dr. Rasmus Nielsen at UCB and Dr. Bryan Greenhouse at UCSF

Study Background

- A 2015-2017 study was conducted in Zambia to improve estimates of baseline mortality due to HIV
- A subset of individuals who were lost to follow up were randomized to receive extra care through follow up outreach by community health workers
- What are the impacts of this type of intervention
  - Returning people to care
  - Maintaining care over time.

Target Population

Pop 1

Zambian, HIV positive adult patients on ART who are lost to follow-up (≥ 90 days late for their last appointment or ≥ 180 days without clinic visit for patients with no future appointment scheduled at their last visit).

Pop 2

Patients satisfying the above criteria who have also already returned to care.

Target Parameter

The treatment specific survival curve

$$\Psi(P_0) = \mathbb{E}_{P_0}[S_0(t_0|A = d(w), W)]$$
$$S_0(t_0|A, W) = \prod_{t \in [0,t_0]} (1 - \Lambda_0(dt|A, W))$$

We're interested in comparing the impact of tracing assignment on (1) time to return to care and (2) duration of retention in care.

Progress - Data Processing

- Conducted data cleaning and imputation of missing values
- Compiled data set consisting of 30374 entries
  - 3207 individuals assigned to treatment
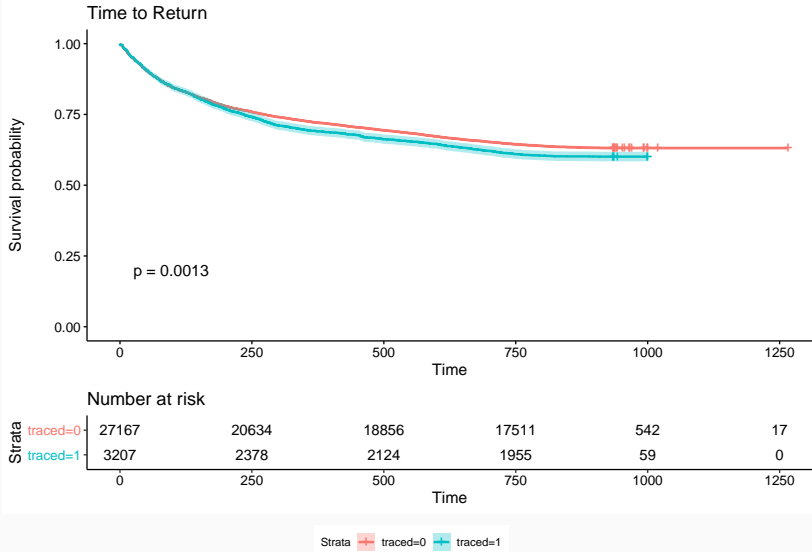 - 27167 individuals assigned to control

Characteristics

	Untraced (n=27167)	Traced (n=3207)	Overall (n=30374)
Age			
Mean (SD)	38.2 (10.2)	38.8 (10.5)	38.3 (10.3)
Median [Min, Max]	37.0 [15.1, 84.4]	37.6 [18.1, 84.6]	37.1 [15.1, 84.6]
Province			
Eastern	3275 (12.1%)	624 (19.5%)	3899 (12.8%)
Southern	2438 (9.0%)	565 (17.6%)	3003 (9.9%)
Lusaka	17665 (65.0%)	1409 (43.9%)	19074 (62.8%)
Western	3789 (13.9%)	609 (19.0%)	4398 (14.5%)
Facility Type			
hospital	6992 (25.7%)	844 (26.3%)	7836 (25.8%)
rural	2770 (10.2%)	731 (22.8%)	3501 (11.5%)
urban	17405 (64.1%)	1632 (50.9%)	19037 (62.7%)
Education Level			
1-6	6063 (22.3%)	783 (24.4%)	6846 (22.5%)
7-12	17735 (65.3%)	1959 (61.1%)	19694 (64.8%)
none	2024 (7.5%)	310 (9.7%)	2334 (7.7%)
college/univ	1345 (5.0%)	155 (4.8%)	1500 (4.9%)
HIV Stage at Enrollment			
Mean (SD)	1.94 (0.952)	1.91 (0.941)	1.94 (0.951)
Median [Min, Max]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]
Household Income			
<50K	4433 (16.3%)	615 (19.2%)	5048 (16.6%)
50-99K	2102 (7.7%)	318 (9.9%)	2420 (8.0%)
100-199K	3311 (12.2%)	469 (14.6%)	3780 (12.4%)
200-499K	7288 (26.8%)	872 (27.2%)	8160 (26.9%)
>500K	10033 (36.9%)	933 (29.1%)	10966 (36.1%)
Sex			
Female	16483 (60.7%)	1922 (59.9%)	18405 (60.6%)
Male	10684 (39.3%)	1285 (40.1%)	11969 (39.4%)

Progress - Analysis

- Currently exploring techniques of estimating survival curves
    - Attempting to use `survtmle` and `MOSS`
    - Issues with `MOSS` on this data set, experiencing memory usage problems

Time to Return Characteristics

	Censored (n=19075)	Returned (n=11299)	Overall (n=30374)
Age			
Mean (SD)	38.2 (10.4)	38.4 (10.0)	38.3 (10.3)
Median [Min, Max]	37.0 [15.1, 84.6]	37.3 [16.1, 82.2]	37.1 [15.1, 84.6]
Province			
Eastern	2205 (11.6%)	1694 (15.0%)	3899 (12.8%)
Southern	1990 (10.4%)	1013 (9.0%)	3003 (9.9%)
Lusaka	12179 (63.8%)	6895 (61.0%)	19074 (62.8%)
Western	2701 (14.2%)	1697 (15.0%)	4398 (14.5%)
Facility Type			
hospital	5183 (27.2%)	2653 (23.5%)	7836 (25.8%)
rural	1484 (7.8%)	2017 (17.9%)	3501 (11.5%)
urban	12408 (65.0%)	6629 (58.7%)	19037 (62.7%)
Education Level			
1-6	4162 (21.8%)	2684 (23.8%)	6846 (22.5%)
7-12	12562 (65.9%)	7132 (63.1%)	19694 (64.8%)
none	1377 (7.2%)	957 (8.5%)	2334 (7.7%)
college/univ	974 (5.1%)	526 (4.7%)	1500 (4.9%)
HIV Stage at Enrollment			
Mean (SD)	1.99 (0.964)	1.85 (0.923)	1.94 (0.951)
Median [Min, Max]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]
Household Income			
<50K	2860 (15.0%)	2188 (19.4%)	5048 (16.6%)
50-99K	1478 (7.7%)	942 (8.3%)	2420 (8.0%)
100-199K	2351 (12.3%)	1429 (12.6%)	3780 (12.4%)
200-499K	5173 (27.1%)	2987 (26.4%)	8160 (26.9%)
>500K	7213 (37.8%)	3753 (33.2%)	10966 (36.1%)
Sex			
Female	11168 (58.5%)	7237 (64.0%)	18405 (60.6%)
Male	7907 (41.5%)	4062 (36.0%)	11969 (39.4%)
Traced Status			
Untraced	17148 (89.9%)	10019 (88.7%)	27167 (89.4%)
Traced	1927 (10.1%)	1280 (11.3%)	3207 (10.6%)

Time to Return Survival Curve

Time to Return

p = 0.0013

Number at risk

Strata	0	250	500	750	1000	1250
traced=0	27167	20634	18856	17511	542	17
traced=1	3207	2378	2124	1955	59	0

Strata — traced=0 — traced=1

Time to Return Characteristics

	Censored (n=6823)	Re-LTFU (n=4476)	Overall (n=11299)
Age			
Mean (SD)	38.3 (10.1)	38.4 (9.84)	38.4 (10.0)
Median [Min, Max]	37.2 [16.1, 81.8]	37.4 [18.4, 82.2]	37.3 [16.1, 82.2]
Province			
Eastern	976 (14.3%)	718 (16.0%)	1694 (15.0%)
Southern	603 (8.8%)	410 (9.2%)	1013 (9.0%)
Lusaka	4191 (61.4%)	2704 (60.4%)	6895 (61.0%)
Western	1053 (15.4%)	644 (14.4%)	1697 (15.0%)
Facility Type			
hospital	1665 (24.4%)	988 (22.1%)	2653 (23.5%)
rural	1190 (17.4%)	827 (18.5%)	2017 (17.9%)
urban	3968 (58.2%)	2661 (59.5%)	6629 (58.7%)
Education Level			
1-6	1624 (23.8%)	1060 (23.7%)	2684 (23.8%)
7-12	4340 (63.6%)	2792 (62.4%)	7132 (63.1%)
none	555 (8.1%)	402 (9.0%)	957 (8.5%)
college/univ	304 (4.5%)	222 (5.0%)	526 (4.7%)
HIV Stage at Enrollment			
Mean (SD)	1.83 (0.915)	1.89 (0.934)	1.85 (0.923)
Median [Min, Max]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]
Household Income			
<50K	1324 (19.4%)	864 (19.3%)	2188 (19.4%)
50-99K	559 (8.2%)	383 (8.6%)	942 (8.3%)
100-199K	856 (12.5%)	573 (12.8%)	1429 (12.6%)
200-499K	1814 (26.6%)	1173 (26.2%)	2987 (26.4%)
>500K	2270 (33.3%)	1483 (33.1%)	3753 (33.2%)
Sex			
Female	4295 (62.9%)	2942 (65.7%)	7237 (64.0%)
Male	2528 (37.1%)	1534 (34.3%)	4062 (36.0%)
Traced Status			
Untraced	6049 (88.7%)	3970 (88.7%)	10019 (88.7%)
Traced	774 (11.3%)	506 (11.3%)	1280 (11.3%)

Lost To Follow Up

Time to Lost To Follow Up