

Treatment Outcome by Sex for Rifampicin-Resistant Tuberculosis (RR-TB) in South Africa: A Nested Prospective Cohort

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Background

- South Africa has high rates of rifampicin-resistant tuberculosis (RR-TB), which disproportionately affects people living with HIV (PWH).
- Treatment outcomes in PWH are poorer, with death and loss to follow-up (LTFU) consistently greater.
- Newer all-oral RR-TB treatment regimens offer hope to improve outcomes yet may require ART substitution.
- Little is known about real-world use of oral regimens and their impact on outcome in PWH.

Methods

- We evaluated a prospective, nested cohort within the control arm of a cluster randomized nurse case management trial in 10 public hospitals, 2013-2020.
- Baseline demographics, RR-TB regimen type, social determinants of health (SDH) and HIV clinical data were included.
- A multinomial logistic regression model was used to compare treatment success against failure, LTFU and death.

Consort Diagram

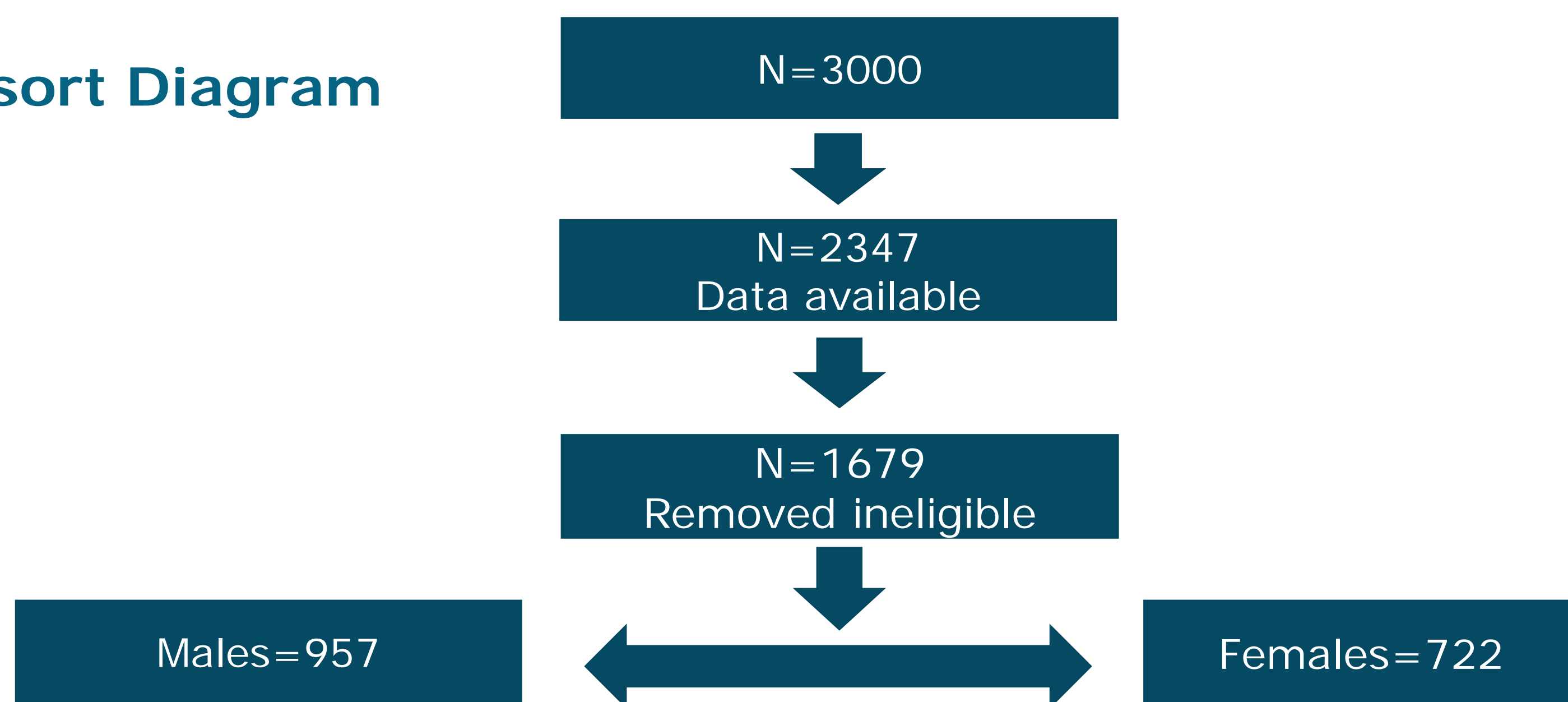


Table 1: Socio-demographics Variables at RR-TB Treatment Initiation

| SOCIO-DEMOGRAPHIC | Total (N=1679) N(%) or Mean (SD) | Male (N=957) N(%) or Mean (SD) | Female (N=722) N(%) or Mean (SD) | P-value |
|-----------------------------|-------------------------------------|-----------------------------------|-------------------------------------|---------|
| Age (Mean, SD) | 37.49 (12.25) | 38.59 (11.80) | 36.04 (12.68) | <0.001 |
| Marital status* | | | | 0.2 |
| Single/Separate/Widow | 1064 (63.79) | 595 (62.57) | 469 (65.41) | |
| Married/Partner | 604 (36.21) | 356 (37.43) | 248 (34.59) | |
| Housing * | | | | 0.03 |
| Town/CBD/Suburb | 738 (44.24) | 443 (46.53) | 295 (41.20) | |
| Village/Farm | 930 (55.76) | 509 (53.47) | 421 (58.80) | |
| Educational status | | | | 0.02 |
| Less than secondary | 1202 (71.59) | 706 (73.77) | 496 (68.70) | |
| >= Secondary | 477 (28.41) | 251 (26.23) | 226 (31.30) | |
| Employment status | | | | <0.001 |
| Employed/Pensioner | 591 (35.20) | 369 (38.56) | 222 (30.75) | |
| Unemployed | 1088 (64.80) | 588 (61.44) | 500 (69.25) | |
| Total Housing number | 5.19 (24.1) | 4.07 (3.08) | 6.6 (3.8) | <0.01 |
| Adequate food* (Yes) | 1277 (78.44) | 732 (78.88) | 545 (77.86) | 0.6 |
| Mobile Phone* (Yes) | 1473 (88.26) | 826 (86.76) | 647 (90.24) | 0.02 |
| BMI* (Mean, SD) | 20.69 (4.8) | 19.34 (3.58) | 22.56 (5.74) | <0.001 |
| PWH | 1236 (73.62) | 663 (69.38) | 573 (79.36) | <0.01 |
| Type of regimen | | | | 0.006 |
| Oral | 502 (29.90) | 315 (32.92) | 187 (25.90) | |
| Injectable | 900 (53.60) | 487 (50.89) | 413 (57.20) | |
| Switched to oral | 277 (16.50) | 155 (16.20) | 122 (16.90) | |
| Arm (Intervention) | 923 (54.97) | 551 (57.58) | 372 (51.52) | 0.01 |

*Indicates missing values

Results

- Among 1679 participants, the mean age was 37.5 years, 43.0% female, 71.6% without high school, 64.8% unemployed
- Women were significantly younger (36.0 vs 38.6, p<0.001), less employed (30.8% vs 38.6%, p<0.001), with a higher household size (6.6 vs 4.1, p<0.01), and greater HIV co-infection (79.4% vs 69.4%, p<0.001), yet more likely to own a mobile phone (90.2% vs 86.8%, p=0.02).
- Treatment success was greater in women (66.2% vs 59.1%, p<0.001) driven by higher proportion of men being lost to follow-up (LTFU) (24.2% vs 16.1%, p<0.001).

Table 2: Multinomial logistic regression, Outcome by Sex (N=1679)

| Outcome | Total (N=1679) N(%) | Male (N=957) N(%) | Female (N=722) N(%) | P-value |
|-------------------|------------------------|----------------------|------------------------|---------|
| | | | | <0.001 |
| Successful | 1044 (62.18) | 566 (59.14) | 478 (66.20) | |
| Treatment Failure | 62 (3.69) | 36 (3.76) | 26 (3.60) | |
| Died | 225 (13.40) | 123 (12.85) | 102 (14.13) | |
| LTFU | 348 (20.73) | 232 (24.24) | 116 (16.07) | |

Table 3: Multinomial logistic regression model, Males only (N=957)

| | Failure a(OR) | 95% CI | Death a(OR) | 95% CI | LTFU a(OR) | 95% CI |
|---|------------------|-----------|----------------|-----------|---------------|-----------|
| Regimen Injectable (ref: Oral) | 5.78 | 0.94-20.0 | 1.94 | 1.22-3.37 | 1.73 | 1.17-2.59 |
| Mobile phone (ref=no) | 0.54 | 0.16-1.81 | 0.49 | 0.22-0.83 | 0.61 | 0.37-1.01 |
| Marital Status (ref: Single) | 1.36 | 0.59-3.13 | 0.83 | 0.49-1.40 | 0.62 | 0.43-0.91 |
| BMI | 1.01 | 0.90-1.12 | 0.87 | 0.79-0.95 | 1.01 | 0.96-1.06 |

Legend: a(OR), adjusted odds ratio; CI, confidence interval; ref., reference

Table 4: Multinomial logistic regression model, Females only (N=722)

| | Failure a(OR) | 95% CI | Death a(OR) | 95% CI | LTFU a(OR) | 95% CI |
|---|------------------|-----------|----------------|-----------|---------------|-----------|
| Regimen Injectable (ref: Oral) | 1.46 | 0.40-5.29 | 1.16 | 0.63-2.16 | 2.83 | 1.40-5.70 |
| Arm (ref=control) | 0.41 | 0.12-1.29 | 0.66 | 0.37-1.17 | 0.48 | 0.25-0.82 |
| BMI | 0.88 | 0.78-1.00 | 0.93 | 0.88-0.98 | 0.98 | 0.93-1.02 |

Legend: a(OR), adjusted odds ratio; CI, confidence interval; ref., reference

Women had greater RR-TB treatment success despite a higher prevalence of multiple social determinants of health.

Conclusions

- Despite having greater prevalence of SDHs, women had better treatment outcomes. This appears to be an intervention effect for women.
- Owning a mobile phone, being married, and having a higher BMI all influenced outcome for men, yet only BMI influenced a woman's outcome.

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