

Additional File 2: Studies of demographic heterogeneity of 90-90-90 which met inclusion criteria

| First author (publication year) | Country(s) | Study period | Study design | Sampling design | Sample size | Outcome(s) Reported | | | | Outcome(s) Stratified by: | | | | | | |
|---------------------------------------|----------------------|------------------------|--------------|-----------------|-------------|---------------------|---------|-------------------|------|---------------------------|--------|-----------|------------------|---------------------|----------|------------|
| | | | | | | Awareness | ART Use | Viral Suppression | PWVS | Age | Gender | Education | Income or wealth | Relationship status | Mobility | Occupation |
| Peer-reviewed literature | | | | | | | | | | | | | | | | |
| ME. Charurat (2015) ¹ | Nigeria | Mar. 2013 - Aug. 2014 | C | RDS | 186 | | X | X | | X | | X | | X | | X |
| L. Myer (2015) ² | South Africa | Apr. 2013 - Jun. 2014 | CS | CFB | 1521 | | X | X | | X | | X | | X | | X |
| NE. Rosenberg (2015) ³ | Malawi | Mar. 2014 - Oct. 2014 | RCT | CFB | 200 | X | | | | | | | | | | |
| JM. Baeten (2016) ⁴ | Kenya, Uganda | Nov. 2012 - Aug. 2014 | C | CB | 1013 | | | | X | | | | | | | |
| RV. Barnabas (2016) ⁵ | South Africa, Uganda | Jun. 2013 - Feb. 2015 | RCT | CB | 15322 | X | X | X | | | | | | | | |
| S. Boyer (2016) ⁶ | South Africa | 2012 - 2015 | RCT | PB | 514 | | X | | | X | X | X | X | X | | X |
| MM. Chanda (2017) ⁷ | Zambia | Sept. 2016 - Oct. 2016 | RCT | CB | 965 | | X | | | | | | | | | |
| SE. Collins (2016) ⁸ | Rwanda | Apr. 2014 - Sept. 2014 | RCT | CFB | 150 | | | X | | X | X | | | | | |
| T. Gaolathe (2016) ⁹ | Botswana | Oct. 2013 - Nov. 2015 | RCT | PB | 3596 | X | X | X | X | X | X | X | X | X | X | X |
| A. Grobler (2017) ¹⁰ | South Africa | Jun. 2014 - Jun. 2015 | CS | PB | 9812 | X | X | X | X | X | X | | X | X | | |
| KE. Lancaster (2016) ¹¹ | Malawi | Jul. 2014 - Sep. 2014 | CS | VB | 138 | X | | | | | | | | | | |
| J. Manne-Goehler (2016) ¹² | South Africa | Nov. 2014 - Nov. 2015 | C | CB | 4767 | | X | | | | | | | | | |
| T. Nakanyala (2016) ¹³ | Namibia | Dec. 2014 - Jul. 2015 | CS | CB | 2163 | X | X | X | X | X | X | | | | | |
| A. Rao (2016) ¹⁴ | South Africa | Oct. 2014 - Apr. 2015 | CS | RDS | 391 | X | | | | X | | X | X | X | | |
| S. Stahlman (2016) ¹⁵ | Lesotho | Feb. 2014 - Jun. 2014 | CS | RDS | 318 | X | | | | | | | | | | |
| S. Ahmed (2017) ¹⁶ | Malawi | Jul. 2014 - Apr. 2015 | C | CB | 711 | X | X | | | X | | | | | | |
| S. Asimwe (2017) ¹⁷ | Uganda | Oct. 2015 - Mar. 2016 | CS | CB | 43696 | | X | | | | | | | | | |
| B. Elul (2017) ¹⁸ | Mozambique | Apr. 2013 - Jun. 2016 | RCT | CFB | 2004 | | X | | | | | | | | | |
| AG. Flynn (2017) ¹⁹ | Uganda | 2006 - 2016 | C | CFB | 1353 | X | X | | | | | | | | | |
| MK. Grabowski (2017) ²⁰ | Uganda | Apr. 1999 - Sep. 2016 | C | PB | 33937 | | X | | X | | X | | | | | |
| R. Hayes (2017) ²¹ | Zambia | Dec. 2013 - Jun. 2015 | RCT | PB | 101102 | X | X | | | X | X | | | | | |
| CJ. Hoffmann (2017) ²² | South Africa | Mar. 2013 - Oct. 2014 | RCT | CFB | 2558 | | X | | | | | | | | | |
| D. Kerrigan (2017) ²³ | Tanzania | Oct. 2015-Apr. 2016 | CS | VB | 496 | X | X | X | X | X | | X | | X | X | X |
| A. Laher (2017) ²⁴ | South Africa | Mar. 2016-Aug. 2016 | C | CFB | 159 | | | X | | | | | | | | |

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|--------------------------------------|--|---|--------------|-----------------|-------------|---------------------|---------|-------------------|------|---------------------------|--------|-----------|------------------|---------------------|----------|------------|
| | | | | | | Awareness | ART Use | Viral Suppression | PWVS | Age | Gender | Education | Income or wealth | Relationship status | Mobility | Occupation |
| CE. Lyons (2017) ²⁵ | Senegal | Sep. 2013 - Sep. 2016 | C | RDS | 1482 | X | X | X | | | | | | | | |
| R. Mafigiri (2017) ²⁶ | Uganda | 2013 - 2014 | CS | CB | 792 | | X | | | | X | | | | | |
| B. Myburgh (2017) ²⁷ | South Africa | Oct. 2013 - Jun. 2014 | CS | CFB | 100 | | X | | | | | | | | | |
| K. Ortblad (2017) ²⁸ | Uganda | Oct. 2016 - 2017 | RCT | CB | 960 | | X | | | | | | | | | |
| M. Petersen (2017) ²⁹ | Kenya, Uganda | Jun. 2013 - Jun. 2016 | RCT | PB | 77774 | X | X | X | X | X | X | X | X | X | X | X |
| S. Phiri (2017) ³⁰ | Malawi | Nov. 2013 - Nov. 2014 | RCT | CFB | 1269 | | X | X | | | | | | | | |
| NE. Rosenberg (2017) ³¹ | Malawi | Dec. 2015 - Aug. 2016 | C | CFB | 137 | X | | | | | | | | | | |
| EC. Ruria (2017) ³² | Kenya | Jul. 2015 - Dec. 2016 | C | CFB | 952 | | X | | | | | | | | | |
| E. Ruzagira (2017) ³³ | Uganda | Mar. 2015 - Mar. 2016 | RCT | CB | 412 | X | X | | | | | | | | | |
| S. Schwartz (2017) ³⁴ | South Africa | Oct. 2014 - Apr. 2015 | CS | RDS | 410 | X | X | X | | | | | | | | |
| A. Vos (2017) ³⁵ | South Africa | Apr. - May 2016 | CS | CB | 201 | | X | | | | | | | | | |
| L. Vu (2017) ³⁶ | Uganda | Oct. 2014 - Sep. 2015 | C | CB | 473 | | X | | | | | | | | | |
| K. Brown (2018) ³⁷ | Zimbabwe, Malawi, Zambia, Uganda, Swaziland, Tanzania, Lesotho | 2015 - 2017 | CS | PB | 28152 | X | X | X | X | | | | | | | |
| MB. Chagomerana (2018) ³⁸ | Malawi | Jun. 2015 - Nov. 2016 | C | CFB | 299 | | | X | | | X | | X | | | |
| RKD. Ephraim (2018) ³⁹ | Ghana | Jan. 2014 - Apr. 2014 | CC | CFB | 110 | | X | | | X | X | | | | | |
| B. Hansoti (2018) ⁴⁰ | South Africa | Sep. 2016 - Nov. 2016 | CS | CFB | 1714 | X | | | | | X | | | | | |
| B. Hansoti (2018) ⁴¹ | South Africa | Sep. 2016 - Nov. 2016 | CS | CFB | 2100 | | | X | | | X | | | | | |
| CB. Holmes (2018) ⁴² | Zambia | Aug. 2013 - Jul. 2015 | CS | CFB | 165464 | | X | | | | X | | | | | |
| F. Moyo (2018) ⁴³ | South Africa | May 2016 - Sep. 2016 | CS | CFB | 367 | | X | X | | X | | | | | | |
| A. Mujugira (2018) ⁴⁴ | Kenya, Uganda | Nov. 2012 - Jun. 2016 | RCT | CFB | 904 | | | X | | | X | | | | | |
| CM. North (2018) ⁴⁵ | Uganda | Dec. 2013 - Dec. 2018 | C | CFB | 269 | | | X | | | | | | | | |
| S. Okawa (2018) ⁴⁶ | Zambia | Apr. 2014 - Jul. 2014 | CS | CFB | 175 | | X | | | | X | | | | | |
| J. Ousley (2018) ⁴⁷ | Kenya, Democratic Republic of Congo | Jan. - Mar. 2015 (Kenya), May - Jul. 2017 (DRC) | CS | CFB | 707 | | X | X | | X | X | | | | | |
| M. Seyoum (2018) ⁴⁸ | Ethiopia | Feb. 2017 - May 2017 | CS | CFB | 200 | | X | | | X | X | X | | X | | |
| JO. Ugboaja (2018) ⁴⁹ | Nigeria | Jan. 2016 - Jan. 2017 | CS | CFB | 110 | | X | | | | | | | | | |
| Y. Zhang (2018) ⁵⁰ | Kenya, Malawi, South Africa | Jul. 2015 - Apr. 2018 | RCT | CFB | 183 | | X | | | X | X | | | | X | |

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|--------------------------------------|--|-----------------------|--------------|-----------------|-------------|---------------------|---------|-------------------|------|---------------------------|--------|-----------|------------------|---------------------|----------|
| | | | | | | Awareness | ART Use | Viral Suppression | PWVS | Age | Gender | Education | Income or wealth | Relationship status | Mobility |
| Grey literature | | | | | | | | | | | | | | | |
| RA. Ayanga (2015) ⁵¹ | Uganda | Nov. 2014 - Jan. 2015 | C | CFB | 1008 | | | X | | | | | | | |
| V. Jain (2015) ⁵² | Uganda | 2014 | CS | CB | 4897 | | | | X | | | | | | |
| J. Rhein (2015) ⁵³ | Uganda | Aug. 2013 - Aug. 2014 | C | CFB | 165 | | X | | | | | | | | |
| SR. Schwartz (2015) ⁵⁴ | South Africa | Jul. 2013 - Sep. 2014 | C | CFB | 126 | | X | X | | | | | | | |
| SJ. Aston (2016) ⁵⁵ | Malawi | May 2013 - Jan. 2015 | C | CFB | 459 | X | X | | | | | | | | |
| I. Casavant (2016) ⁵⁶ | Mozambique | 2014 - 2015 | CS | PB | 25344 | X | | | | | | | | | |
| A Kharsany (2016) ⁵⁷ | South Africa | 2014 - 2015 | CS | CB | 9812 | | | | X | X | X | | | | |
| M. Lahuerta (2016) ⁵⁸ | Mali | Oct. 2014 - Feb. 2015 | CS | RDS | 552 | X | X | | | | | | | | |
| WB. MacLeod (2016) ⁵⁹ | South Africa | Apr. 2014 - Mar. 2015 | CS | CFB | 2199890 | | | X | | | | | | | |
| PHIA (2016) ⁶⁰ | Malawi | Nov. 2015 - Aug. 2016 | CS | PB | NA | X | X | X | X | X | X | | | | |
| PHIA (2016) ⁶¹ | Tanzania | Oct. 2016 - Aug. 2017 | CS | PB | NA | X | X | X | X | X | X | | | | |
| PHIA (2016) ⁶² | Uganda | Aug. 2016 - Mar. 2017 | CS | PB | NA | X | X | X | X | X | X | | | | |
| PHIA (2016) ⁶³ | Zambia | Mar. 2016 - Aug. 2016 | CS | PB | NA | X | X | X | X | X | X | | | | |
| PHIA (2016) ⁶⁴ | Zimbabwe | Oct. 2015 - Aug. 2016 | CS | PB | NA | X | X | X | X | | | | | | |
| M. Ribakare (2016) ⁶⁵ | Rwanda | Jan. 2014 - Dec. 2014 | CS | CFB | 117226 | | | X | | | | | | | |
| B. Tippett Barr (2016) ⁶⁶ | Malawi | Sep. 2013 – Sep. 2016 | C | CFB | 1851 | X | X | | | | | | | | |
| L. Abuogi (2017) ⁶⁷ | Kenya | Sep. 2014 - Feb. 2016 | C | CFB | 164 | | X | X | | | | | | | |
| G. Breton (2017) ⁶⁸ | Burundi, Cameroon, Guinea, Cote d'Ivoire | Aug. 2014 - Mar. 2016 | C | CFB | 31286 | | | X | | | | | | | |
| C. Couderc (2017) ⁶⁹ | Mali, Cote d'Ivoire, Togo, Burkina Faso | Jun. 2015 - Jan. 2017 | C | CB | 679 | | X | | | | | | | | |
| AB. Kharsany (2017) ⁷⁰ | South Africa | Jun. 2014 - Jun. 2016 | CS | PB | 9812 | | X | X | | | X | | | | |
| SM. Kiene (2017) ⁷¹ | Uganda | Dec. 2015 – Dec. 2016 | CS | PB | 5401 | X | X | X | X | | | | | | |
| T. Malaba (2017) ⁷² | South Africa | Apr. 2015 - Oct. 2016 | C | CFB | 1060 | | X | | | | | | | | |
| SC. Mendelsohn (2017) ⁷³ | Malawi | Jun. 2014 - Dec. 2014 | C | VB | 4166 | | X | X | | | | | | | |
| N. Mutenda (2017) ⁷⁴ | Namibia | Jan. 2014 - Mar. 2015 | C | CFB | 8366 | | | X | | | | | | | |
| H. Ndagire (2017) ⁷⁵ | Uganda | Oct. 2014 - Jun. 2016 | C | VB | 2815 | | X | X | | | | | | | |

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|---|----------------------|------------------------|--------------|-----------------|-------------|---------------------|---------|-------------------|------|---------------------------|--------|-----------|------------------|---------------------|----------|------------|
| | | | | | | Awareness | ART Use | Viral Suppression | PWVS | Age | Gender | Education | Income or wealth | Relationship status | Mobility | Occupation |
| S. Nicholas (2017) ⁷⁶ | Uganda | Sept. 2013 - Nov. 2016 | C | CFB | 9305 | | | X | | | | | | | | |
| A. Nikuze (2017) ⁷⁷ | Kenya | Feb. 2016 - Jul. 2016 | CS | CFB | 3585 | X | X | X | | | | | | | | |
| M. Nsumba (2017) ⁷⁸ | Uganda | Jan. 2015 - Dec. 2016 | C | CFB | 5867 | | | X | | X | X | | | | | |
| P. Olang'o (2017) ⁷⁹ | Kenya | Nov. 2015 - Sep. 2016 | C | CFB | 5290 | | X | X | | | | | | | | |
| I. Pathmanathan (2017) ⁸⁰ | Swaziland | Jul. 2014 - Sept. 2014 | C | CFB | 466 | | X | | | | | | | | | |
| PHIA (2017) ⁸¹ | Lesotho | Nov. 2016 - May 2017 | CS | PB | 14028 | X | X | X | X | X | X | | | | | |
| PHIA (2017) ⁸² | Eswatini | Aug. 2016 - Mar. 2017 | CS | PB | 10879 | X | X | X | X | X | X | | | | | |
| S. Dadabhai (2018) ⁸³ | Malawi | Jan. 2016 - Sep. 2017 | C | CFB | 1278 | | | X | | | | | | | | |
| C. Hoffmann (2018) ⁸⁴ | South Africa | Apr. 2016 - Jun. 2016 | C | CFB | 121 | X | X | | | | | | | | | |
| HSRC (2018) ⁸⁵ | South Africa | Jan. 2017 - Dec. 2017 | CS | PB | | X | X | X | X | X | X | | | | | |
| LT. Matthews (2018) ⁸⁶ | South Africa, Uganda | 2015 - 2017 | C | CFB | 439 | | | | X | | | | | | | |
| PHIA (2018) ⁸⁷ | Cameroon | Jul. 2017 - Feb. 2018 | CS | PB | | X | X | X | X | X | X | | | | | |
| PHIA (2018) ⁸⁸ | Cote d'Ivoire | Aug. 2017 - Mar. 2018 | CS | PB | | X | X | X | X | X | X | | | | | |
| PHIA (2018) ⁸⁹ | Namibia | Jun. - Dec. 2017 | CS | PB | | X | X | X | X | X | X | | | | | |
| PHIA (2018) ⁹⁰ | Ethiopia | Oct. 2017 - Apr. 2018 | CS | PB | | X | X | X | X | X | X | | | | | |
| JT. Price (2018) ⁹¹ | Zambia | Aug. 2015 - Aug. 2017 | C | CFB | 1425 | | X | X | X | | | | | | | |
| E. Zielinski-Gutierrez (2018) ⁹² | Kenya | Aug. 2014 - Mar. 2015 | CS | CB | 3462 | | X | | | | | | | | | |

PHIA: Population-based HIV impact assessment

HSRC: Human sciences research council

Study design: C: Cohort, CS: Cross-sectional, RCT: randomized controlled trial, CC: case-control.

Sample design: RDS: respondent-driven sample, CFB: clinic- or facility-based, CB: community-based, PB: population-based, VB: venue-based

PWVS: Population-wide viral suppression

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