# Supplementary Material

# Overview

This supplementary content is to give more detail regarding the search strategy, data extraction, quality assessment and description of the studies.

# Search strategy

A full search strategy for the database EMBASE (OVID) is shown in Figure 1. All databases were searched on the 24th May 2016 by N.C.

Figure 1 Search strategy for EMBASE (OVID)

All steps were limited to “2005-current”

1. Human immunodeficiency virus/64290
2. Acquired immune deficiency syndrome/39113
3. HIV.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 190097
4. Human immunodeficiency virus.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 202093
5. AIDS.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 67089
6. Acquired immune deficiency syndrome.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 39771
7. 1 OR 2 OR 3 OR 4 OR 5 OR 6 253121
8. Highly active antiretroviral therapy/27623
9. Antiretrovirus agent/24415
10. Antivirus agent/37033
11. Therapy/363550
12. Medicine/13736
13. Drug therapy/119097
14. Drug/12205
15. Pharmacology/15036
16. Prescription/92941
17. Pill/4988
18. Microcapsule/4002
19. Tablet/16544
20. Antiretroviral\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 57878
21. Anti-retroviral\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 3463
22. ART.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 77144
23. ARV.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 3562
24. Highly active antiretroviral therap\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 28885
25. Highly active anti-retroviral therap\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 740
26. HAART.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 12093
27. Combination therap\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 41887
28. Med\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 4116500
29. Drug\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 3306153
30. Pharma\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 628079
31. Prescription\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 124022
32. Treatment\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 3231156
33. Pill\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 20630
34. Therap\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 2413054
35. Capsule\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 50841
36. Tablet\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 44421
37. 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 7992289
38. Sub-Saharan Africa.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 13740
39. "Africa south of the Sahara"/5075
40. Angola/627
41. Benin/1258
42. Botswana/1174
43. Burkina Faso/2065
44. Burundi/293
45. Cameroon/3244
46. Cape Verde/187
47. Central African Republic/301
48. Chad/374
49. Comoros/178
50. Cote d'Ivoire/1251
51. Democratic Republic Congo/993
52. Djibouti/149
53. Equatorial Guinea/210
54. Eritrea/249
55. Ethiopia/6528
56. Gabon/694
57. Gambia/1030
58. Ghana/5080
59. Guinea/930
60. Guinea-Bissau/461
61. Kenya/9156
62. Lesotho/297
63. Liberia/698
64. Madagascar/1921
65. Malawi/3416
66. Mali/1696
67. Mauritania/238
68. Mauritius/425
69. Mozambique/1686
70. Namibia/695
71. Niger/938
72. Nigeria/18141
73. Congo/1757
74. Rwanda/1477
75. Senegal/2470
76. Seychelles/218
77. Sierra Leone/976
78. Somalia/800
79. South Africa/21458
80. Sudan/2812
81. Swaziland/422
82. Tanzania/7117
83. Togo/566
84. Uganda/8194
85. Zambia/2600
86. Zimbabwe/2184
87. Angola.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 823
88. Benin.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 2861
89. Botswana.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 1385
90. Burkina Faso.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 2667
91. Burundi.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 369
92. Cameroon.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 4109
93. Cape Verde.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 313
94. Central African republic.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 446
95. Chad.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 656
96. Comoros.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 273
97. Cote d'lvoire.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 32
98. Ivory coast.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 587
99. Democratic republic of congo.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 1790
100. Djibouti.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 221
101. Equatorial guinea.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 294
102. Eritrea.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 334
103. Ethiopia.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 7264
104. Gabon.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 980
105. Gambia.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 1227
106. Ghana.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 5938
107. Guinea.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 20577
108. Guinea-Bissau.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 592
109. Kenya.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 10538
110. Lesotho.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 387
111. Liberia.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 903
112. Madagascar.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 2582
113. Malawi.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 4049
114. Mali.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 2419
115. Mauritania.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 323
116. Mauritius.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 571
117. Mozambique.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 2166
118. Namibia.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 894
119. Niger.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 10572
120. Nigeria.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 21091
121. Republic of Congo.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 1998
122. Rwanda.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 1716
123. (Sao tome and principe).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 83
124. Senegal.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 3244
125. Seychelles.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 383
126. Sierra leone.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 1248
127. Somalia.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 961
128. South Africa.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 25581
129. South sudan.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 297
130. Sudan.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 4446
131. Swaziland.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 601
132. Tanzania.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 8038
133. Togo.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 802
134. Uganda.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 9370
135. Zambia.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 3029
136. Zimbabwe.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 2581
137. 38 OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51 OR 52 OR 53 OR 54 OR 55 OR 56 OR 57 OR 58 OR 59 OR 60 OR 61 OR 62 OR 63 OR 64 OR 65 OR 66 OR 67 OR 68 OR 69 OR 70 OR 71 OR 72 OR 73 OR 74 OR 75 OR 76 OR 77 OR 78 OR 79 OR 80 OR 81 OR 82 OR 83 OR 84 OR 85 OR 86 OR 87 OR 88 OR 89 OR 90 OR 91 OR 92 OR 93 OR 94 OR 95 OR 96 OR 97 OR 98 OR 99 OR 100 OR 101 OR 102 OR 103 OR 104 OR 105 OR 106 OR 107 OR 108 OR 109 OR 110 OR 111 OR 112 OR 113 OR 114 OR 115 OR 116 OR 117 OR 118 OR 119 OR 120 OR 121 OR 122 OR 123 OR 124 OR 125 OR 126 OR 127 OR 128 OR 129 OR 130 OR 131 OR 132 OR 133 OR 134 OR 135 OR 136 OR 137 157168
138. "compliance (physical)"/ 5242
139. patient compliance/72478
140. Adher\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 137914
141. Non-adher\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 8731
142. Nonadher\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 5834
143. Compli\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 1001840
144. Non-compli\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 7567
145. Noncompli\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 5588
146. Concord\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 51387
147. Non-concord\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 288
148. Nonconcord\*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 147
149. 139 OR 140 OR 141 OR 142 OR 143 OR 144 OR 145 OR 146 OR 147 OR 148 1146133
150. 7 AND 37 AND 138 AND 150 **3537**

# Data Extraction

## Extraction sheet

The centre for reviews and dissemination (CRD) guidance [1] was used to help develop the initial template which was then piloted in 20 studies. N.C. read all the qualitative and quantitative studies through twice to ensure all key barriers and facilitators identified were included. The extraction sheet also included title, authors, country, year, main focus, design, sample details, sampling technique, length of time on ART, number of participants not on ART, setting details and whether the participants had to pay for ART. The quantitative extraction sheet also included data on adherence and barriers measures utilised. Additionally the percentage of non-adherent participants for the barriers and adherent participants for the facilitators that reported each factor were extracted if applicable.

# Quality assessment

## Qualitative

### Measure

The qualitative studies were quality assessed using the RATS (Relevance, Appropriateness, Transparency, Soundness) measure [2] which has been used in previous health systematic reviews [3]. The RATS is noted as a comprehensive checklist [4] with clear criteria [5] and is recommended for quality assessment of qualitative studies [6]. The RATS is comprised of 25 questions focusing on different quality aspects including the study relevance, the appropriateness of the methodology, how transparent all the procedures are and how sound the analysis is. For each item the study was noted as having achieved or not achieved the necessary level of quality. A random sample of 15 was also quality assessed by M.Ah. and acceptable concordance was predefined as agreement on at least 90% of ratings, which was achieved.

### Results

The quality assessment of the 87 qualitative studies indicated that overall the studies showed high quality in all RATS categories with the exception of poor transparency of the procedure (see Table 1). The relevance of the study question and appropriateness of the qualitative method were discussed and present in the majority of studies (98.9% for both); however, five items exploring the transparency of procedures and one item exploring the soundness of the interpretative approach were present in less than half the studies. Only 20 studies (23.0%) [7-26] explicitly described details of recruitment whereas the majority mentioned recruitment, but did not go into specifics; therefore, the reader is unable to assess whether recruitment was conducted using appropriate methods. Only 18 studies (20.7%) [10-12,16,17,20,22,25-35] included details of who chose not to participate and why, which allows the reader to ascertain whether there may be a selection bias. Only 22 studies (25.3 %) [12-19,21,31,33,36-46] explicitly described the end of data collection and gave a justification which allows the reader to understand why and when data collection stopped and if this is reasonable. Only 14 studies (16.1%) [8,18,20,28,30,36,37,42,47-52] explored whether the researcher may have influenced the study (formulation of research question, data collection and interpretation). This is important to discuss since this helps the reader understand how the researcher may have biased (good or bad) the conduct or results of the study. Just under half of the studies (39; 44.8%) [7,8,10-16,18,20,23,24,28,30,32,34,35,37,38,40,49,53-69] discussed anonymity and confidentiality explicitly. This is important to describe since it allows the reader to understand that the ethical considerations of the participants have been ensured. Finally, over one third of the studies (34; 39.1%) [12-15,17,18,22,28-30,33,37-39,42,43,46,47,49,50,58,59,61,65-67,70-77] described and justified the method of data reliability check. This allows the reader to understand that the data is reliable and trustworthy.

Table 1 also compared the difference in quality between the studies found in the review and through additional searches. Overall the quality of the relevance of study question, appropriateness of the qualitative method and the majority of the items exploring the soundness of the interpretive approach were comparable. Of the 12 items exploring the transparency of procedures, the two items regarding sampling were comparable, the two items regarding recruitment had higher percentages of studies achieving the necessary quality in the additional studies than the review, two of the three data collection items (data collection methods and end of collection justified) had higher percentages in the additional studies, one of the two role of researchers items (appropriateness of researcher) was higher in the additional papers and two of the three ethics items (informed consent and anonymity) were higher in the additional studies. This suggests that overall the studies found through additional searches were not of significantly poorer quality than the studies from the review.

### Table 1. Quality assessment of qualitative studies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RATS item | Number of papers including item (%)  Total (87) | Comparison  Review (77) Additional (10) | |
| R Relevance of study question | Research question explicated stated | 86 (98.9%) | 76 (98.7%) | 10 (100.0%) |
| Research question justified and linked to existing knowledge | 86 (98.9%) | 76 (98.7%) | 10 (100.0%) |
| A Appropriateness of qualitative method | Study design described and justified | 63 (72.4%) | 55 (71.4%) | 8 (80.0%) |
| T Transparency of procedures | Criteria for study sample justified | 80 (92.0%) | 72 (93.5%) | 8 (80.0%) |
| Sampling strategy appropriate | 69 (79.3%) | 60 (77.9%) | 9 (90.0%) |
| Recruitment details of how and by whom | 20 (23.0%) | 16 (20.8%) | 4 (40.0%) |
| Details of who chose not to participate and why | 18 (20.7%) | 15 (19.5%) | 3 (30.0%) |
| Data collection methods outlined and examples given | 69 (79.3%) | 62 (80.5%) | 7 (70.0%) |
| Study group and setting clearly described | 60 (69.0%) | 55 (71.4%) | 5 (50.0%) |
| End of collection justified and described | 22 (25.3%) | 18 (23.4%) | 4 (40.0%) |
| Explore appropriateness of researcher(s) | 39 (44.8%) | 34 (44.2%) | 5 (50.0%) |
| Examine how researcher may influence study | 14 (16.1%) | 13 (16.9%) | 1 (10.0%) |
| Informed consent process explicitly and clearly detailed | 67 (77.0%) | 58 (75.3%) | 9 (90.0%) |
| Anonymity and confidentiality discussed | 39 (44.8%) | 32 (41.6%) | 7 (70.0%) |
| Ethics approval cited from appropriate committee | 77 (88.5%) | 69 (89.6%) | 8 (80.0%) |
| S Soundness of interpretive approach | Analytical approach described in depth and justified | 69 (79.3%) | 64 (83.1%) | 5 (50.0%) |
| Interpretations clearly presented and supported by evidence | 83 (95.4%) | 75 (97.4%) | 8 (80.0%) |
| Quotes used appropriate and effective | 83 (95.4%) | 75 (97.4%) | 8 (80.0%) |
| Method of reliability check described and justified | 34 (39.1%) | 32 (41.6%) | 2 (20.0%) |
| Findings grounded in theoretical or conceptual framework | 83 (95.4%) | 75 (97.4%) | 8 (80.0%) |
| Adequate account taken of previous knowledge and how current findings contribute | 84 (96.6%) | 74 (96.1%) | 10 (100.0%) |
| Strengths and limitations explicitly described and discussed | 59 (67.8%) | 54 (70.1%) | 5 (50.0%) |
| Manuscript well written and accessible | 87 (100.0%) | 77 (100.0%) | 10 (100.0%) |
| No red flags present | 72 (82.8%) | 64 (83.1%) | 8 (80.0%) |

## Quantitative

### Measure

The survey studies were quality assessed using a measure developed by Hawker and colleagues [78]. This measure allows authors to review methodological heterogeneous studies and can be adapted for a variety of data across disciplines [79,80]. This measure has been utilised in previous systematic reviews [80,81] including one identifying barriers and facilitators to ART adherence in Asian developing countries [82]. There are nine questions aimed at assessing quality in different aspects of the study including: abstract and title, introduction and aims, method and data, sampling, data analysis, ethics and bias, results, transferability or generalisability and implications and usefulness with four possible answers (good, fair, poor, very poor). For each of the questions one answer was chosen. A random sample of 15 were also quality assessed by M.Ah. and acceptable concordance was predefined as agreement on at least 90% of ratings, which was achieved.

### Results

The overall quality of the 71 quantitative survey studies was assessed and found all areas apart from ethics and bias had the majority of papers assessed as fair (see Table 2). Fifty-nine studies (83.1%) [64,68,83-139] had a fair abstract which identified most of the information whereas seven (9.9%) [50,140-145] had a good abstract which was structured with full information and a clear title. Fifty-nine studies (83.1 %) [39,64,68,83,84,86,88-92,94,96,98,100-105,107-128,130,131,133,134,136-140,142-149] had a fair introduction and aims which included some background and a literature review as well as outlining the research questions. Only two studies (2.8%) [93,129] included a fully comprehensive introduction and aims. The majority provided a concise background and highlighted gaps in knowledge; however, they did not give a clear statement of aims and objectives including research questions. Fifty-five studies (77.5%) [39,50,64,68,83-88,90-95,98-112,115,118-121,123,124,127,129-134,136-139,141-143,146,147,149] had a fair method and data section which included an appropriate method; however, the description of the data could have been more comprehensive and clear, which occurred in nine studies (12.7%) [89,96,113,114,116,117,126,140,145]. Just under half of the studies (34; 47.9%) [64,87-90,92,94-97,99-102,104,106,108-110,115,116,122,128,129,132-134,138-143,145] had a fair sampling section which justified the sample size and most of the relevant information was included, whereas 12 (16.9%) [84,91,98,107,113,114,120,121,126,127,144,146] also included specific details regarding recruitment, why this group was targeted and response rates shown and explained. Fifty-four studies (76.1%) [64,83-85,87-89,93,95,96,98-107,110-121,123-134,136-139,141,143,144,146,147,149] had a fair data analysis section which comprised of a descriptive discussion of analysis. Additional details such as reasons for tests selected was presented in seven studies (9.9%) [90,91,108,109,140,142,145]. Just under a third of studies (n=23; 32.4%) [68,86,88,92,96,99,100,108,109,113-117,120-125,127,128,137] had a fair ethics and bias section in which the researchers acknowledged ethical issues such as confidentiality, sensitivity and consent or acknowledged possible researcher bias, whereas four studies (5.6%) [133,134,138,139] addressed the ethical issues fully or were reflexive regarding the possible researcher biases and their impact. Forty-one studies (57.7%) [39,64,68,83-86,88,90,91,94,95,97-102,104,105,108,109,111,112,115-118,121-123,125-127,129,132,134,136,142,146,147] had a fair results section which mentioned that the findings and the data presented was related directly to the results; however, more explanation was necessary. Sixteen studies (22.5%) [50,87,89,92,93,96,107,113,114,120,124,140,141,143-145] had a good results section because the findings were explicit, easy to understand and in a logical progression. The tables were explained in the text, the results related directly to the aims and sufficient data was presented to support the findings. Fifty-one studies (71.8%) [64,87-96,98-105,107-121,126-129,132-134,138-147] had a fair transferability section which included some description of the context, setting and participants, whereas only one study (1.4%) [84] included sufficient detail. Forty-five studies (63.4%) [39,50,64,68,86,90-93,95,96,98,100-102,104-108,110-117,119-121,123,124,126,127,130,132,133,137,140,142-146] had a fair score for implications and usefulness. One study (1.4%) [109] scored a good score which required the study to contribute something new or different, suggest ideas for further research or suggest implications for policy or practice, whereas a fair score is a paper that only included two from the list.

Table 2 also compared the studies from the review and the studies from the additional searches. Overall the quality of the two were comparable in the abstract, introduction, method, data analysis and implications sections; however, the quality of the sampling, results and transferability sections for the additional studies were lower than the studies in the review. Moreover more additional studies for the ethics and bias section met the high quality criteria compared to the review studies.

## Table 2 Quality assessment of survey studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Good | Fair | Poor | Very Poor | Review  Higher quality (Good/Fair)  N = 59 | Additional  Higher quality  (Good/Fair)  N = 12 |
| Abstract and title | 7 (9.9%) | 59 (83.1%) | 5 (7.0%) | 0 (.0%) | 56 (94.9%) | 10 (83.3%) |
| Introduction and aims | 2 (2.8%) | 59 (83.1%) | 10 (14.1%) | 0 (.0%) | 49 (83.1%) | 12 (100.0%) |
| Method and data | 9 (12.7%) | 55 (77.5%) | 7 (9.9%) | 0 (.0%) | 54 (91.5%) | 10 (83.3%) |
| Sampling | 12 (16.9%) | 34 (47.9%) | 25 (35.2%) | 0 (.0%) | 40 (67.8%) | 6 (50.0%) |
| Data analysis | 7 (9.9%) | 54 (76.1%) | 8 (11.3%) | 2 (2.8%) | 52 (88.1%) | 9 (75.0%) |
| Ethics and bias | 4 (5.6%) | 23 (32.4%) | 35 (49.3%) | 9 (12.7%) | 19 (32.2%) | 8 (66.7%) |
| Results | 16 (22.5%) | 41 (57.7%) | 14 (19.7%) | 0 (.0%) | 51 (86.4%) | 6 (50.0%) |
| Transferability/  generalisability | 1 (1.4%) | 51 (71.8%) | 19 (26.8%) | 0 (.0%) | 46 (78.0%) | 6 (50.0%) |
| Implications and usefulness | 1 (1.4%) | 45 (63.4%) | 24 (33.8%) | 1 (1.4%) | 39 (66.1%) | 7 (58.3%) |

# Description of studies

Table 3 shows an overview of all the studies.

## Table 3 Studies Description

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| First author and year | Year of research | Country | Method (HIV positive participants) | Sample size (HIV positive participants) | N of HIV positive participants not receiving ART | Length of time on ART | Main focus |
| Alemu (2011) [113] | 2010 | Ethiopia | Survey (interviewer administered) | 1722 | NA | From under 12 to over 48 months | Explore correlates of ART adherence |
| Amankwah (2015)a [68] | Not stated | Ghana | Survey | 120 | NA | Not specified | Explore barriers and facilitators to ART adherence |
| FGD | 16 | NA |
| Amberbir (2008) [84] | 2006-2007 | Ethiopia | Survey (2 time points) (1 and 3 month follow up after measuring adherence at baseline) | 400 (383 at 3 month follow up) | NA | Baseline (3 to 67 months) | Identify predictors of ART adherence |
| Aransiola (2014) [7] | 2011 | Nigeria | IDI | 15 | Not specified but implied all on ART | Not specified | Examine whether stigma still impacts people living with HIV (PLWH) who have secured access to ART |
| Arem (2011) [150] | 2006-2008 | Uganda | IDI & FGD (conducted throughout a RCT trial and 5 months afterwards) | Not specified | NA | Up to 96 weeks or more (naïve at start) | Explore the impact of Peer Health Workers (PHW) on ART care outcomes. |
| Asgary (2014) [71] | Not stated | Ethiopia | FGD (3-4 people) | 18 | Not specified | Not specified | Explore community perceptions and knowledge about HIV treatment, prevention and alternative medicine |
| Aspeling (2008) [36] | Not stated | South Africa | IDI (1, 4 or 5 times) | 11 | NA | Not specified | Explore factors influencing adherence to ART in black women |
| Audu (2014) [37] | Not stated | Nigeria | IDI | 35 | NA | From 3 to 6 months | Explore factors influencing adherence to ART |
| Avong (2015) [124] | Not stated | Nigeria | Survey (interviewer administered) | 502 | NA | From 16 to 70 months | Assess levels of adherence and factors that affect adherence |
| Axelsson (2015) [20] | 2011 | Lesotho | IDI | 28 | NA | From 2 to 72 months | Explore adherence strategies and factors that affect adherence |
| Baghazal (2011)a [18] | 2009 | Kenya | 3 FGD | 27 | NA | From 1 to 9 years | Explore factors influencing ART adherence |
| Bajunirwe (2009) [85] | 2006 | Uganda | Survey | 175 | NA | At least 6 months (mean= 16.6, SD 5.5) months | Examine the relationship between ART adherence and treatment response |
| Balcha (2011) [8] | 2009 | Ethiopia | FGD | 14 | NA | Not specified | Explore barriers to sustained ART treatment |
| Benzekri (2015) [125] | 2015 | Senegal | Survey (interviewer administered) | 109 | 12 | From 0.1 to 16 years | Identify prevalence and associations between food insecurity, malnutrition and HIV outcomes |
| Beyene (2009) [151] | 2007 | Ethiopia | 6 FGD (6-12 participants, single sex FGD) (3 men and 3 women) | Not specified | NA | Not specified | Explore factors affecting ART adherence |
| Bezabhe (2014) [13] | 2013 | Ethiopia | IDI | 24 | 11 non-persistent with ART | At least a month | Explore barriers and facilitators to ART adherence and HIV care retention |
| Bhagwanjee (2011) [53] | 2010 | South Africa | IDI | 19 | NA | Not specified | Explore factors that affect ART adherence and HIV disclosure in men |
| Bhat (2010) [86] | 2009 | South Africa | Survey (interviewer administered) | 168 | NA | Not specified | Identify factors associated with ART adherence |
| Boateng (2013) [54] | Not stated | Ghana | 3 FGD | 23 | Some receiving prophylaxis | At least six months | Explore factors that affect ART and PMTCT adherence in women |
| Bohle (2014) [16] | 2008 | Tanzania | IDI | 59 | NA | From 14 days to 3 years (14 participants estimated time) | Explore reasons for disclosure for women on ART |
| Byakika-Tusiime (2005) [87] | 2002 | Uganda | Survey (interviewer administered) | 304 | NA | At least 1 month (from less than 3 months to more than 2 years) | Explore factors associated with ART adherence |
| Byron (2008) [55] | 2005-2006 | Kenya | 79 IDI & 9 FGD | Unclear | NA | Not specified | Explore the benefits and challenges relating to nutritional interventions of PLWH receiving ART |
| Campbell (2015) [24] | Not stated | Zimbabwe | IDI & FGD | 48 | NA | Not specified | Explore social representation of a “good patient” and how this affects treatment experiences |
| Chabikuli (2010) [88] | Not stated | South Africa | Survey (interviewer administered) | 100 | NA | From 12 to 18 months | Explore factors associated with ART adherence |
| Chileshe (2010) [9] | 2006-2007 | Zambia | IDI (more than one occasion over 8 months) | 7 (co-infected with TB) | 5 | Not specified | Explore barriers to accessing treatment in co-infected TB and HIV patients |
| Crankshaw (2010) [89] | 2007 | South Africa | Survey (interviewer administered) | 300 | 58 | From initation to over 12 months | Examine feasibility of using mobile phones for appointment reminders or adherence messages |
| Daftary (2012) [152] | 2009 | South Africa | IDI | 40 (co-infected with TB) | 9 | From 1 week to 5 years | Exploresocial contexts of TB and HIV co-infection and integrated care |
| Dahab (2008) [153] | 2005 | South Africa | IDI | 6 | NA | At least 8 weeks | Explore barriers and facilitators to ART adherence in the workplace in men |
| Dawson-Rose (2016) [21] | 2010 | Mozambique | IDI | 57 | NA | Mean 29.7 months (SD= 22.7) | Explore adherence as a component of prevention |
| de Sumari-de Boer (2015) [25] | Not stated | Tanzania | IDI | 5 | NA | Not specified | Explore feasibility of using real time medication monitoring |
| Demessie (2014) [123] | 2013 | Ethiopia | Survey (interviewer administered) | 350 | NA | 38 started ART between 1989-2000; 312 started 2001-2013 | Explore factors associated with ART adherence |
| Dewing (2015) [126] | 2012 | South Africa | Survey (Audio computer assisted self-interview) | 600 | NA | At least 1 month. 300 adherent (median 525 days; IQR 227 to 1090 days), 300 non-adherent (median 670 days; IQR 276 to 1156 days) | Assess frequency of barriers and determine predictors of ART adherence |
| Do (2010) [140] | 2005 | Botswana | Survey | 300 | NA | From 1 to over 12 months | Identify factors that influence ART adherence |
| Duwell (2013) [154] | Not stated | South Africa | IDI (exit interview at end of RCT) | 172 | NA | Not specified | Explore patients experience with treatment supporters and how they affect patient behaviour |
| Dyrehave (2015) [149] | 2012-2013 | Guinea-Bissau | Survey (interviewer administered) | 494 | NA | At least 3 months | Explore barriers and facilitators to ART adherence |
| Ebuy (2015) [127] | 2014 | Ethiopia | Survey (interviewer administered) | 227 | NA | More than 2 months | Determine adherence to option B+ PMTCT drugs and factors associated with adherence in HIV positive women |
| Eholie (2007) [141] | 2002 | Cote d’lvoire | Survey | 308 | NA | From 1 to over 12 months | Identify factors that influence ART adherence |
| Elul (2013) [114] | 2008-2009 | Rwanda | Survey (interviewer administered) | 1417 | NA | Initiated 6, 12 or 18 months before study (+/- 2 months) | Explore determinants of ART adherence and viral suppression |
| Elwell (2015) [69] | 2012 | Malawi | IDI & FGD | 78 | 13 | Not specified | Explore factors that affect adherence within PMTCT programs |
| Essomba (2015)c [128] | 2014 | Cameroon | Survey (interviewer administered) | 524 | NA | At least 1 month | Explore factors associated with ART non-adherence |
| Eyassu (2015)a [138] | 2014 | South Africa | Survey (interviewer administered) | 290 | NA | From under 6 to over 36 months | Explore factors that affect ART adherence |
| Foster (2010) [72] | 2005-2008 | Uganda | IDI (4 time points; baseline, 3, 6 and 36 months) | 40 (baseline), 29 (3 months), 36 (6 months) and 33 (36 months) | NA | Initiated at baseline (up to 36 months) | Assess evolving challenges of ART adherence over the first three years of treatment and the impact of medicine companions |
| Frank (2009) [73] | Not stated | South Africa | IDI | 7 | NA | From 6 to 60 months | Explore barriers and facilitators to ART adherence |
| Gachanja (2016)  [22] | 2010-2011 | Kenya | IDI | 16 | Not specified | Not specified | Explore HIV testing, the disclosure process and benefits and consequences of HIV disclosure |
| Garang (2009) [142] | 2008 | Uganda | Survey | 200 (58 were internally displaced persons) (IDPs) | NA | From under 12 to over 24 months | Explore ART adherence differences between IDPs and non IDPs and what factors affect ART adherence |
| Georgette (2016) [129] | 2014 | South Africa | Survey (interviewer  administered) | 100 | NA | At least 6 months (median 3.3 years; IQR 2.5 to 4.8 years) | Explore acceptability and perceived usefulness of a weekly clinical SMS program to promote ART adherence |
| Goar (2015) [130] | Not stated | Nigeria | Survey | 160 | NA | At least 1 month | Explore the effect of substance abuse on adherence |
| Goudge (2011) [10] | 2009 | South Africa | IDI (4 interviews over 4 months) | 22 | 5 | Not specified | Explore factors affecting ART adherence |
| Govender (2015) [67] | Not stated | South Africa | IDI (follow up interviews conducted if necessary) | 17 | NA | Not specified | Explore inequalities to access for disability grant and impact of grant on access to healthcare |
| Grant (2008) [27] | 2005 | Zambia | IDI (2 interviews 12 months apart) & FGD | 40 | Not specified | Not specified | Explore barriers and facilitators to HIV testing, ART uptake and adherence |
| Guiro (2011) [146] | 2008-2009 | Burkina Faso | Survey (interviewer administered) | 412 | 306 | Not specified | Explore attitudes and practices towards highly active ART (HAART) among people with HIV |
| Gusdal (2009) [38] | 2007 | Ethiopia & Uganda | IDI | 79 | NA | From 6 months to 7 years | Explore factors affecting ART adherence |
| Habib (2010) [90] | 2008-2009 | Nigeria | Survey (interviewer administered) | 58 | NA | From 4 to 60 months | Explore ART adherence between pilgrimage travellers and those just travelling to the clinic |
| Hong (2014) [115] | 2011 | Namibia | Survey (interviewer administered) | 390 | NA | At least 30 days (median 2.7 years) | Explore whether food insecurity is associated with ART adherence |
| Hussen (2014) [28] | 2012 | Ethiopia | IDI (3 participants had 2 interviews) | 20 | Not specified | Not specified | Explore factors affecting resilience in expert patients |
| Izugbara (2011) [56] | Not stated | Kenya | IDI | 48 | Not specified | Not specified | Explore beliefs and practices related to ART use |
| Jaquet (2010) [91] | Not specified | Benin, Cote d’lvoire & Mali | Survey (interviewer administered) | 2920 | NA | From 1 month to over 4 years | Explore the association between alcohol and ART non-adherence |
| Jeneke (2011)a [148] | Not specified | South Africa | Survey (self-administered) | 40 | NA | Not specified | Explore the effect of support systems on ART adherence |
| Jones (2011) [57] | 2008-2009 | South Africa | IDI & life history and illness narratives | 35 | 16 | Not specified | Explore factors that cause refusal of ART or ART non-adherence |
| Jones (2009) [39] | 2006-2008 | Zambia | Survey (Baseline)  (interviewer administered) | 160 | NA | Between 6 and 24 months (baseline) | Examine challenges and successful strategies to living with HIV and medication use |
| Intervention group sessions (3 over 3 months) |
| Kamau (2012) [92] | 2009 | Kenya | Survey (self-administered) | 354 | NA | Not specified | Explore the impact of social support on ART adherence |
| Karanja (2013)a [19] | Not stated | Kenya | IDI | 22 | NA | At least 1 month | Explore barriers and facilitators to ART adherence |
| Kekwaletswe (2014) [116] | Not specified | South Africa | Survey (interviewer administered) | 304 | NA | From 4 months to 10.5 years | Explore the association between alcohol and ART non-adherence |
| Ketema (2015) [131] | 2011-2012 | Ethiopia | Survey | 422 | NA | Not specified | Assess prevalence and associated factors of ART adherence |
| Khalid (2012)a [155] | 2008 | Tanzania | 2 FGD (7 to 8 participants each) | 15 | NA | From 6 months to 5 years | Explore barriers to ART adherence |
| Kidia (2015) [46] | 2013-2014 | Zimbabwe | IDI | 47 | NA | Not specified | Explore experiences of patients with mental disorders and poor ART adherence |
| Kingori (2012) [93] | 2011 | Kenya | Survey (interviewer administered) | 370 | 100 | Not specified | Explore impact of stigma on HIV prevention behaviours |
| Kip (2009) [94] | 2007 | Botswana | Survey (interviewer administered) | 400 | NA | Not specified | Identify factors that influence ART adherence |
| Koole (2016) [132] | 2011 | Tanzania, Uganda & Zambia | Survey (interviewer  administered) | 4425 | NA | At least 6 months (median 3.6 years; IQR 2.2 to 5.2 years) | Assess reasons why patients miss taking their medication and explore association between non-adherence and symptoms |
| Kunutsor (2010) [95] | 2008-2009 | Uganda | Survey (every 4 weeks for 28 weeks) | 967 | NA | From under 12 months to over | Identify adherence levels in Uganda |
| Kuteesa (2012) [11] | Not stated | Uganda | IDI & 4 FGD | 40 | Not specified | Not specified | Explore healthcare experiences of older HIV positive patients |
| Kyajja (2010) [96] | 2009 | Uganda | Survey (self-administered)\* | 166 | NA | From under 6 to over 24 months | Explore how participants cope with side effects to ART |
| Lencha (2015) [133] | 2014-2015 | Ethiopia | Survey (interviewer administered) | 239 | NA | From under 3 months to over 1 year | Assess prevalence and factors associated with ART adherence |
| Letta (2015) [134] | Not stated | Ethiopia | Survey (interviewer administered) | 626 | NA | At least 3 months | Assess factors associated with ART adherence |
| Lifson (2013) [40] | Not stated | Ethiopia | 2 FGD (single sex: 1 men, 1 women) | 21 | 4 | From 3 months to 6 years | Explore experiences with and barriers to attending clinic appointments |
| Lyimo (2012) [47] | 2010 | Tanzania | IDI | 61 | NA | At least 6 months (initiated ART 1991-2009) | Explore barriers and facilitators to ART adherence |
| MacLachlan (2016) [75] | 2013 | Namibia | IDI | 10 | NA | All initiated in 2012 | Evaluation of a patient education and empowerment intervention |
| Maixenchs (2015) [35] | 2007-2008 | Mozambique | IDI (2 interviews at 6 month intervals) | 51 | NA | Not specified | Explore how clinical symptoms and other factors may affect ART adherence |
| Makua (2015) [23] | Not stated | South Africa | IDI | 18 | NA | Not specified | Explore factors that affect ART adherence among non-adherent patients |
| Malangu (2008) [97] | 2006 | South Africa | Survey (interviewer administered) | 180 | NA | 12 months or less | Explore barriers and facilitators to ART adherence |
| Markos (2009) [110] | 2006 | Ethiopia | Survey (interviewer administered) | 286 | NA | From 1 to 36 months | Explore factors associated with ART adherence |
| Martin (2013) [12] | Not stated | Uganda | IDI (8 monthly interviews) | 20 (12 competed 8 interviews) | NA | At least a year | Explore self-management strategies utilised by PLWH |
| Masquillier (2015) [32] | Not stated | South Africa | IDI | 32 | 1 | From less than 1 month to more than 6 years | Exploring HIV/AIDS competence in the household |
| Mbonye (2013) [156] | 2011 | Uganda | IDI (six year follow up after a clinical trial) | 24 | NA | 6 years | Explore experiences of adherence after six years on ART |
| Mbopi-Kéou (2012)c [111] | 2010 | Cameroon | Survey (interviewer administered) | 356 | NA | Mean 27 months | Explore factors associated with ART adherence |
| Mbuagbaw (2012) [14] | 2010 | Cameroon | FGD (average 5 participants) | 30 | NA | Not specified | Explore whether text messaging can improve ART adherence |
| Mendelsohn (2014) [58] | 2011 | Kenya | IDI | 12 (3 refugees from Somalia, 3 from Sudan, 1 from Ethiopia, 1 from Burundi, 1 from Eritrea, 2 from Rwanda, 1 from DRC) | NA | At least 30 days (under 6 months to over 36 months) | Explore barriers and facilitators to ART adherence for refugees |
| Mfecane (2011) [157] | 2006-2007 | South Africa | IDI | 25 | Not specified | Not specified | Explore experiences of men who attend support groups |
| Mkandawire-Valhmu (2012) [158] | 2008-2010 | Kenya & Malawi | IDI (Kenya only including 2 follow up interviews at 1 and 3 months) & 3 FGD (Malawi only) | 126 (72 Malawi/54 Kenya) | Not specified | Not specified | Explore how personal faith affects women with HIV |
| Moiloa (2012)a [63] | 2011 | South Africa | IDI | 24 | NA | From 6 months to 11 years | Explore barriers to ART adherence |
| Moremi (2012)a [122] | Not specified | South Africa | Survey | 20 | NA | Not specified | Explore barriers and facilitators to ART adherence |
| Musumari (2013) [59] | 2011 | DRC | IDI | 38 | 6 | Not specified | Explore barriers and facilitators to ART adherence |
| Musumari (2014) [117] | 2012 | DRC | Survey (interviewer administered) | 898 | NA | At least 6 months | Explore whether food insecurity is associated with ART adherence |
| Mutabazi-Mwesigire (2014) [70] | 2012-2013 | Uganda | IDI (3 time points; baseline, 3 and 6 months) | 20 (18 completed all 3 interviews) | 10 at baseline | Not specified | Explore determinants of quality of life of PLWH |
| Nachega (2006) [159] | 2004 | South Africa | 2 FGD (6 patients each) | 12 | NA | From 3 to 24 months | Explore support strategies that would facilitate ART adherence |
| Nagata (2012) [160] | 2009 | Kenya | IDI | 49 | NA | Not specified | Explore experiences of food insecurity of PLWH on ART |
| Nam (2008) [48] | Not stated | Botswana | IDI | 32 | NA | From 8 to 96 months | Identify psycho-social factors related to ART adherence |
| Nduaguba (2015)d [135] | 2012 | Nigeria | Survey (self-administered) | 361 | NA | Not specified | Assess prevalence and factors associated with ART adherence |
| Ngarina (2013) [15] | 2009 | Tanzania | IDI | 23 | NA | At least 2 years | Explore reasons for poor ART adherence for women after PMTCT |
| Nghoshi (2016)a [139] | 2015 | Namibia | Survey (interviewer administered) | 281 | NA | At least 3 months | Assess prevalence and determinants of ART adherence |
| Nozaki (2011) [98] | 2008 | Zambia | Survey (interviewer administered) | 518 | NA | From 1 to 50 months | Explore social factors that affect ART adherence |
| Nsimba (2010) [44] | 2005 | Tanzania | IDI & 8 FGD | 207 | NA | At least 3 months | Explore barriers to ART adherence |
| Nwauche (2006) [112] | Not clear | Nigeria | Survey (interviewer administered) | 187 | NA | At least 6 months | Explore factors associated with ART adherence |
| Nyanzi-Wakholi (2009) [60] | Not stated | Uganda | 12 FGD (8-10 participants each) | Not specified | 6 FGD with patients not on ART | Under 6 months | Exploring role of voluntary counselling and testing (VCT) and treatment in enabling patients to cope with HIV |
| Nyanzi-Wakholi (2012) [161] | 2005 | Uganda | 8 FGD (9-11 participants each) | 82 | NA | At least a year | Exploring experiences, attitudes, knowledge and concerns of patients who have been on ART for at least a year |
| Ohene (2013) [99] | 2008 | Ghana | Survey (interviewer administered) | 683 | NA | From 6 to 59 months | Exploring outcomes in early cohort of patients initiating ART in Ghana |
| Okoror (2013) [29] | Not stated | Nigeria | IDI & 4 FGD (5-8 participants each) | 35 | NA | Not specified | Examine the relationship between stigma and ART adherence |
| Oku (2013) [143] | 2011 | Nigeria | Survey (interviewer administered) | 411 | NA | From 3 to 192 months | Explore determinants of ART adherence |
| Oku (2014) [144] | 2012 | Nigeria | Survey (interviewer administered) | 393 | NA | From 3 to 149 months | Explore determinants of ART adherence in a rural setting |
| Olupot-Olupot (2008)e [162] | 2008 | Uganda | 5 FGD with participants in IDP camps | 40 | NA | From 8 to 25 months | Explore barriers to ART adherence in a conflict-affected population |
| Omole (2012) [118] | 2004-2005 | Nigeria | Survey (interviewer administered) | 305 | NA | Not specified | Explore factors associated with ART adherence |
| Omotala (2015)a [34] | 2013 | Nigeria | FGD | 12 | NA | At least 3 months (8 less than 5 years and 4 over 5 years) | Explore factors that affect ART adherence |
| Onyango (2013)a [121] | Not stated | Kenya | Survey (interviewer administered) | 116 co-infected with TB | NA | Not specified | Explore barriers to ART adherence |
| Oumar (2007)c [147] | 2005-2006 | Mali | Survey (interviewer administered) | 344 | NA | From 1 to 40 months | Explore factors associated with ART adherence |
| Oyore (2013) [119] | 2007-2008 | Kenya | Survey (interviewer administered) | 450 | NA | Not specified | Explore determinants of ART adherence |
| Pefura-Yone (2013) [101] | 2011 | Cameroon | Survey (self- administered) | 899 | NA | From under 1 to over 4 years | Explore determinants of ART adherence |
| Peltzer (2010) [102] | 2007-2008 (recruitment) | South Africa | Survey (6 months after recruitment) (interviewer administered) | 735 | NA | 6 months (all naïve during recruitment) | Explore use of traditional complementary and alternative medicine among PLWH |
| Potchoo (2010) [103] | 2005 | Togo | Survey (interviewer administered) | 99 | NA | At least 1 month | Explore knowledge, adherence and determinants of ART adherence |
| Pyne-Mercier (2011) [163] | 2009 | Kenya | IDI | 13 | NA (all experienced treatment interruption ranging from 2 days to 2 months) | Initiated before December 2007 | The consequences of post-election violence on ART access and adherence |
| Rasschaert (2014) [49] | 2011-2012 | Mozambique | IDI & FGD (3-6 participants each) | 79 (68 in community ART groups [CAG]) | NA | Not specified | Explore the impact of CAG on ART distribution and adherence |
| Ross (2011) [45] | Not stated | South Africa | Free attitude interviews (FAI) & 4 FGD (between 4-7 participants) | 19 | NA | Not specified | Explore facilitators to ART adherence |
| Russell (2016) [65] | 2011-2012 | Uganda | IDI (2 interviews conducted over 3 or 4 visits) | 38 | NA | At least a year | Explore PLWH well-being and self-management on ART |
| Salami (2010) [83] | 2009 | Nigeria | Survey (interviewer administered) | 253 | NA | At least 6 months (up to more than 5 years) | Identify associated factors of ART adherence |
| Salmen (2015) [76] | Not stated | Kenya | FGD | 82 | NA | Not specified | Explore impact of a social network intervention for HIV care |
| Sam (2015)a [137] | 2014 | Ghana | Survey (interviewer administered) | 426 | NA | From 6 months to 15 years | Explore factors that affect ART adherence |
| Sanjobo (2009) [42] | 2006 | Zambia | IDI & 5 FGD (10 participants each) | 60 | NA | 37 under 12 months and 23 over 12 months | Explore barriers and facilitators to ART adherence |
| Sasaki (2012) [104] | 2010-2011 | Zambia | Survey (interviewer administered) (interviewed at ART initiation and six weeks later) | 157 | NA | 6 weeks | Explore effect of demographics and social surroundings on ART adherence |
| Selman (2013) [61] | 2008 | Kenya & Uganda | IDI | 83 | 26 | Not specified | Describe palliative care needs of HIV outpatients and explore the management of their problems |
| Senkomago (2011) [105] | 2008 | Uganda | Survey (interviewer administered) | 140 | NA | At least 6 months | Explore barriers to ART adherence |
| Shalihu (2014) [30] | 2009 | Namibia | IDI | 18 | NA | At least 6 months | Explore barriers to ART adherence among male prisoners |
| Siril (2014) [17] | 2012 | Tanzania | IDI & 10 FGD (each 6-9 participants) | 78 | NA | Not specified | Explore perceptions and meanings of hope among PLWH attending care and treatment clinics |
| Sisay (2013)b [64] | Not stated | Ethiopia | Survey (interviewer administered) | 508 | NA | At least 1 month (Up to more than 5 years) | Explore barriers and facilitators to ART adherence |
| FGD | 10 | NA |
| Siu (2013) [74] | 2009-2010 | Uganda | IDI | 17 (a further 6 had not been tested but thought they may be HIV positive) | 8 | Not specified | Examine factors that influence men’s uptake of HIV treatment |
| Tadesse (2014) [120] | Not specified | Ethiopia | Survey (interviewer administered) | 647 | NA | At least 1 month | Explore factors associated with ART adherence |
| Talam (2008) [106] | 2005 | Kenya | Survey (interviewer administered) | 384 | NA | At least 3 months | Identify factors that influence ART adherence |
| Tessema (2010) [107] | 2008 | Ethiopia | Survey (interviewer administered) | 504 | NA | From 3 to over 25 months | Explore determinants of non-adherence or non-readiness to ART |
| Tilahun (2012) [41] | 2010 | Ethiopia | IDI | 9 | NA | Not specified | Explore the effect of stigma on ART adherence and self-confidence to take medication correctly |
| Tiruneh (2016) [26] | 2008 | Ethiopia | IDI | 105 | NA | From 6 to 76 months | Understand the socio-cultural context in which patients’ relate to their medication regimes |
| Tomori (2014) [52] | 2012 | Tanzania | IDI | 14 | 1 | Not specified | Explore barriers and facilitators of HIV care and treatment |
| Treffry-Goatley (2016) [33] | 2013 | South Africa | Digital Stories | 20 | Not specified | Not specified | Explore factors that affect adherence in a low resourced rural community |
| Treves-Kagan (2016) [77] | 2012-2013 | South Africa | IDI & FGD | Not specified but included PLWH | Not specified | Not specified | Explore how HIV-related stigma impacts engagement to care |
| Tsega (2015) [136] | 2014 | Ethiopia | Survey (interviewer administered) | 351 | NA | At least 2 months (from under 6 months to over 3 years) | Assess prevalence and factors associated with ART non-adherence |
| van Loggerenberg (2015) [51] | Not stated | South Africa | IDI & FGD | 30 | NA | 9 months post treatment initiation | Explore patients’ motivation to take ART |
| Van Oosterhout (2005) [100] | 2003 | Malawi | Survey (interviewer administered) | 176 | NA | From 6 to over 24 months | Explore treatment outcomes when individuals have to pay |
| Vyankandondera (2013) [50] | 2007-2010 | Rwanda | Survey (7 time points: baseline, 2 weeks, 1, 3, 6, 9 and 12 months) | 213 | NA | Initiated at baseline | Explore barriers to ART adherence |
| IDI (7 patients who developed virological failure 12 months after initiation) & 5 FGD | 56 | NA |
| Wakibi (2011) [108] | 2008-2009 | Kenya | Survey (interviewer administered) | 403 | NA | From 3 months to over 3 years | Explore factors associated with ART adherence |
| Walstrom (2013) [164] | Not stated | Rwanda | 4 FGD with trauma survivors | 18 | Not specified | Not specified | Explore how support groups affect women trauma survivors’ mental health and HIV treatment |
| Ware (2009) [165] | Not stated | Nigeria, Tanzania & Uganda | IDI | 158 | NA | Nigeria and Tanzania (over 6 but under 12 months)/ Uganda (not specified) | Exploring factors relating to ART adherence |
| Watt (2009) [31] | 2006-2007 | Tanzania | IDI | 36 | NA | From 1 to 23 months | Explore facilitators to ART adherence |
| Watt (2010) [145] | 2006 | Tanzania | Survey (interviewer-administered) | 340 | NA | From 1 to 62 months | Explore factors associated with ART adherence |
| Weidle (2006) [109] | 2003-2005 | Uganda | Survey (baseline and every 3 months after) (interviewer administered) | 987 | NA | Not specified | Explore factors associated with ART adherence |
| Weiser (2010) [43] | 2007 | Uganda | IDI | 47 | 11 | From 1 month to several years | Explore how food insecurity affects ART adherence |
| Woolgar (2014) [62] | Not stated | South Africa | 3 FGD | 15 | NA | From 6 to 60 months | Explore perceptions and experiences of the disability grant and its effect on ART adherence |
| Zunner (2015) [66] | 2013 | Kenya | IDI & FGD | 25 interviews but did not specify number in FGD | Not specified | Not specified | Assessment of mental health care needs of HIV positive women who have experienced gender based violence |

a Dissertation

b Book chapter

c Published in French

d Conference abstract

e Research letter

\*8 interviewer administered since they could not read questionnaire

## Countries in Sub-Saharan Africa (SSA)

Thirty studies (18.4%) were conducted in South Africa [10,23,32,33,36,45,51,53,57,62,63,67,73,77,86,88,89,97,102,116,122,126,129,138,148,152-154,157,159], 23 (14.1%) in Uganda [11,12,38,43,60,61,65,70,72,74,85,87,95,96,105,109,132,142,150,156,161,162,165], 21 (12.9%) in Ethiopia [8,13,26,28,38,40,41,64,71,84,107,110,113,120,123,127,131,133,134,136,151], 18 (11.0%) in Kenya [18,19,22,55,56,58,61,66,76,92,93,106,108,119,121,158,160,163], 14 (8.6%) in Nigeria [7,29,34,37,83,90,112,118,124,130,135,143,144,165], 12 (7.4%) in Tanzania [15-17,25,31,44,47,52,132,145,155,165], seven (4.3%) in Zambia [9,27,39,42,98,104,132], four (2.5%) in each of Cameroon [14,101,111,128] , Ghana [54,68,99,137] and Namibia [30,75,115,139], three (1.8%) in each of Botswana [48,94,140], Malawi [69,100,158], Mozambique [21,35,49] and Rwanda [50,114,164], two (1.2%) in each of Cote d’lvoire [91,141], Democratic Republic of Congo (DRC) [59,117], Mali [91,147] and Zimbabwe [24,46] and one (0.6%) in each of Benin [91], Burkina-Faso [146], Guinea-Bissau [149], Lesotho [20], Senegal [125] and Togo [103].

Of all the studies; six studies (3.9%) included more than one country in SSA [38,61,91,132,158,165]. Three of these studies (50.0%) [91,132,165] were conducted in two and three (50.0%) [38,61,158] were conducted in three SSA countries. One study (0.6%) [58] was conducted in Malaysia as well as Kenya; however, only the data from Kenya was extracted.

## Study type

Of the 154 included studies, 15 (9.7%) [18,19,34,63,64,68,121,122,135,137-139,148,155,162] were not published journal articles:12 of these (80.0%) [18,19,34,63,68,121,122,137-139,148,155] were Master’s dissertations from online repositories, one (8.3%) [64] was a book chapter, one (8.3%) [162] was a research letter and one (8.3%) [135] was a conference abstract. All the non-journal articles except the conference abstract [135] were found through additional searches.

## Participants

### Age range

All the studies included participants aged 18 and above. Just over half of the qualitative studies (n=51; 58.6%) [7-12,15,18,20,23-29,32,33,36-38,40,42,43,47,48,50,52,53,56,57,60-62,69,70,73-76,150,152,156-164] indicated the exact age range of the participants involved compared to only 27 (38.0%) [50,64,83,86,87,90,92,94,97-100,103-106,108,111,112,123,125,128,130,137,139,146,147] of the quantitative studies. It was difficult to ascertain the age range from two (2.3%) [22,71] qualitative studies. A further nine qualitative studies (10.3%) [16,17,21,30,31,35,54,55,65] gave a rough age range compared to 26 (36.6%) [84,89,91,93,95,96,101,102,107,109,110,113,114,117-122,138,140,142-145,148] of the quantitative studies.

The lower age limit ranged between 18 and 50 across the 154 studies. One study [11] was focused on older adults and the lower age limit without this study ranged between 18 and 33. The upper age limit ranged between 37 and 90. For the qualitative studies, the lower age limit ranged between 18 and 50 whereas the upper aged limit ranged between 37 and 89. For the quantitative studies the lower age limit ranged from 18 to 26 and the upper age limit ranged from 57 to 90.

### Mean and median age

A third of the qualitative studies (n=29; 33.3%) [12,13,15,16,20,24-27,32,33,40,46-48,50,52,55,57,60,61,71,73,75,152,154,158,161,165] indicated a mean age of their HIV positive participants which ranged between 30.3 and 46.0 (Mean=37.2; Median=36.0, SD=3.5). Just over half (n=39; 54.9%) [39,50,64,85-87,90,93-99,103,106-108,110-116,118,120,123,125,126,128,130,134,137,139,141,143,144,147] of the quantitative studies included a mean age of their HIV positive participants which ranged between 33.9 and 44.5 (Mean=38.1, Median=37.9, SD=2.5). Across the 154 studies, the range of the mean age was between 30.3 and 46.0 (Mean=37.7, Median= 37.2, SD= 3.0).

Fifteen qualitative studies (17.2%) [15,18,25,28,33,38,43,55,58,59,61,73,75,156,163] indicated a median age of their HIV positive participants which ranged between 28.5 and 46.0 (Mean=36.7, Median=35.5, SD =4.8). Nineteen quantitative studies (26.8%) [84,86,91,95,100,101,104,111,113,115,117,123,124,127,129,131-133,139] included a median age of their HIV positive participants which ranged between 28.0 and 44.0 (Mean=37.4, Median=38.0, SD=3.9). Across the 154 studies, the range of the median age was between 28.0 and 46.0 (Mean=37.1 Median= 37.0, SD= 4.3). Only six qualitative (6.9%) [15,25,33,61,73,75] and seven quantitative studies (9.9%) [86,95,111,113,115,123,139] provided both a mean and median age.

### Gender

Seven qualitative studies (8.0%) [15,16,36,54,69,158,164] and one quantitative study (1.4%) [127] included only HIV positive female participants and five qualitative studies (5.7%) [30,53,74,153,157] only included male participants. Just over 90% (n=63, 88.7%) [50,64,68,83-88,90-109,111-123,125,126,128-133,136-147,149] of quantitative and just under half of the qualitative (n=42; 48.3%) [7,8,10,14,18,20,21,23-28,31-35,38,41,43,44,46-48,56-59,61-63,65,70,73,75,76,152,154,159,163,165] studies included more HIV positive female participants. Six qualitative studies (6.9%) [9,37,40,42,50,155] had more male participants. Eleven qualitative (12.6%) [11-13,29,39,52,68,72,156,161,162] and five quantitative (7.0%) [39,110,124,134,148] studies had roughly equal numbers of female and male HIV positive participants (50% +/- 2%). Sixteen qualitative (18.4%) [17,19,22,45,49,51,55,60,64,66,67,71,77,150,151,160] and two quantitative (2.8%) [89,135] studies did not indicate the exact gender breakdown.

### HIV and ART

All studies included HIV positive participants; however, eight qualitative studies (5.1%) [33,51,55,60,66,77,150,151] did not indicate the exact number. Of the remaining total studies, the number of HIV positive participants ranged between 5 and 4425 (Mean=247.6, Median=82.5, SD=487.2). The qualitative studies ranged between 5 and 207 (Mean=40.7, Median=27.0, SD=39.4) and the quantitative studies ranged between 20 and 4425 (Mean=477.9, Median=350.0, SD=633.5) HIV positive participants.

All the studies also included some HIV positive participants on treatment; however, 17 qualitative studies (19.5%) [11,22,27,28,33,51,52,55,60,66,71,77,150,151,157,158,164] did not give an exact number. Ten qualitative studies (6.3%) [7,11,22,27,28,33,66,71,77,164] also did not specify if all their HIV participants were on treatment and 17 (10.8%; 13 qualitative, 4 quantitative) [9,10,32,43,52,57,60,61,69,74,89,93,125,146,152,157,158] studies also included HIV participants not on treatment. For all the studies, the number of participants on ART ranged from 2 to 4425 (Mean=258.5, Median=100.0, SD=499.5). The qualitative studies ranged from 2 to 207 participants on ART (Mean=39.91, Median=27.0, SD=40.0). For the quantitative studies the number of participants ranged from 20 to 4425 (Mean=474.0, Median=340.0, SD=634.5).

### Length of time taking ART

Thirty-two qualitative (36.8%) [10,12,15,16,18,20,21,26,31,32,34,37-40,42,47,48,58,62,63,65,72,73,150,152,155,156,159,161-163] and 41 quantitative studies (57.7%) [39,64,83,84,87-91,95,96,98-101,105,108,110,111,113-117,123-126,129,132,133,136-138,140-145,147] specified they included participants with over a year’s experience taking ART. Two qualitative studies (2.3%) [32,152] stated they included participants with under a month’s experience taking ART. Six qualitative (6.9%) [13,19,31,43,58,64] and 14 quantitative studies (19.7%) [64,91,98,103,110,115,120,126,128,130,140,141,145,147] stated they only included participants who had been taking ART at least a month. Only one quantitative study (1.4%) [136] stated they only included participants with at least two months taking ART. Six qualitative (6.9%) [34,37,40,44,72,159] and 10 quantitative studies (14.1%) [84,106-108,123,134,139,143,144,149] stated they only included participants with at least three month’s experience taking ART. Two quantitative studies (2.8%) [90,116] stated they only included participants with at least four months taking ART. Fifteen qualitative (17.2%) [17,25,26,30,38,39,47,54,55,59,62,63,73,155,165] and 13 quantitative studies (18.3%) [39,83,85,99,100,102,105,112,114,117,129,132,137] stated they only included participants with at least six months taking ART. Ten qualitative (11.5%) [10,12,15,16,18,65,150,156,161,163] and two quantitative studies (2.8%) [88,124] stated they only included participants with at least a year’s experience taking ART.

## Adherence

### Adherence methods

Out of the 71 quantitative studies, five (7.0%) did not assess level of adherence using any method [89,96,118,122,129]. Of the remaining 66 studies, the majority (53; 80.3%) [39,64,68,83,84,86-88,90-94,97-108,112-114,116,119-121,124,125,127,128,130-137,141-149] used a self-report measure of adherence whereas six studies (9.1%) [50,85,95,110,111,138] used self-report and pill count, two (3.0%) [117,123] used self-report and pharmacy refill, one (1.5%) [140] used self-report and pharmacy attendance, one (1.5%) [109] used pill count and medication possession ratio (MPR), one (1.5%) [115] used MPR only, one (1.5%) [126] used pill count and clinic attendance and one (1.5%) [139] used self-report, pill count and pharmacy refill.

### Adherence classification

Of the 66 studies that assessed adherence, 30 studies (45.5%) [39,68,85,86,90,92,94,98-100,104,106,107,110,113,114,119,125,127,130,132,134-137,139,140,146,148,149] classified participants as adherent if they took 100% of their HIV medication as required. Two of these studies (6.7%) [85,139] included multiple adherence methods and classified adherent participants if they took 100% of their medication on their self-report [85,139] or pharmacy refill measure [139]. Thirty-three (50.0%) [50,64,83-85,87,88,91,95,97,101-103,105,108,109,111,112,116,117,120,123,124,126,128,131,133,139,142-145,147] studies classified participants as adherent if they took 95% of their HIV medication as required. Five of these studies (15.2%) [85,101,102,108,139] included multiple adherence methods and classified adherent participants if they took 95% of their medication on the following measures: pill count [85,139], Visual Analogue Scale (VAS) [102], 7-day recall measure [101] and one question assessing on average how many doses are missed per week [108]. One study (1.5%) [141] classified participants as adherent if they took 90% of their HIV medication whereas another study (1.5%) [115] classified participants if they took 80% of their HIV medication. Three studies (4.5%) [101,108,121] included a self-report measure (Centre for Adherence Support Evaluation (CASE) Adherence Index) [166] which classifies participants as adherent if they score 10 or above with the composite score ranging from 3 to 16 [166]. One study (1.5%) [102] classified participants as dose adherent if they had not missed one full day of medication in the past 4 days. Two studies (3.0%) [93,138] did not specify a cut-off for adherence or it was not clear.

### Pooled adherence

The percentage of adherent participants ranged from 23.7% to 99.6% (Mean=77.0, Median=82.0, SD=17.2) across the 66 studies (combing multi-methods and time points for each study if applicable). For only the self-report measure, the percentage of adherent participants ranged from 23.7% to 99.6% (Mean=78.0, Median=82.8, SD=16.9). For only the pill count method, the percentage of adherent participants ranged from 51.5% to 98.6% (Mean=78.8, Median=76.5, SD=14.7). For the studies that used MPR or refill methods, the percentage of adherent participants ranged from 72.9% to 93.9% (Mean =82.8, Median=82.2, SD=8.6).

### Adherence self-report measures

A variety of self-report measures were used in the 63 quantitative studies. Twenty-three studies (32.4%) [39,68,85,87,91,92,98,100,102,104,105,107,110,114,116,120,124,127,140-142,145,149] included a measure or a question that assessed ART adherence behaviour over a short time period (less than a week). Three of those studies (13.0%) [100,107,110] assessed whether any participant had skipped medication the previous day, ten studies (43.5%) [68,85,87,105,110,114,120,124,127,141] assessed adherence in the past three days and 11 studies (47.8%) [39,91,92,98,102,104,116,140,142,145,149] assessed adherence in the past four days. Seven studies (30.4%) [39,91,92,102,104,116,149] used the Adults AIDS Care Trials Group (AACTG) four-day measure [167], one study (4.3%) [145] used an adapted version of the AACTG four-day measure, one study (4.3%) [114] used the AACTG three-day measure [167] and one study (4.3%) [127] used four questions from a multi-method measure [168] in which one question assessed whether any doses were missed in the last three days. The other three questions did not cover a specific time period and assessed whether the participant had any difficulty remembering to take their medication, whether if they felt better they took a break from their medication and if they felt worse did they stop taking their medication [168]. All AACTG measures assess dose adherence by asking for the number of prescribed doses per day for each HIV medication and the number of doses missed over the specified time-frame, schedule adherence by assessing how closely participants followed their specific medication schedule over the specified time-frame on a 5-likert scale from never to all of the time and adherence to special instructions by asking the participant if their medication did have special instructions e.g. take with food and if so how closely did they follow these instructions over the specified time-frame on a 5-likert scale from never to all of the time. The last time a medication was missed is also assessed with never, within the past week, 1-2 weeks ago, 3-4 weeks ago, about 1-3 months ago and more than 3 months ago as possible answer options [167].

Twenty-two studies (31.0%) [64,68,84,88,97,100,101,103,105,110,111,117,125,128,130,133-135,137,143,144,146] used a self-report adherence measure or question which assessed ART adherence behaviour over a period of time from a week to less than a month. Twenty-one of these studies (95.5%) [64,68,84,88,97,100,101,103,105,110,111,117,125,128,130,133,134,137,143,144,146] assessed adherence over seven days and one study (4.5%) [135] assessed adherence over a period of two weeks. Two studies (9.1%) [143,144] assessed adherence using an adapted version of the Brief Medication Questionnaire (BMQ) which includes a five item regime screen which collects data on how the patient took their medication in the past week [169]. For each medication the participant is asked how many days they took it, how many times per day did they take it, how many pills did they take each time, how many times they missed a pill and if so what was the reason, as well as how well did the medication work for them [169]. One study (4.5%) [101] used the Terry Beirn Community Programs for Clinical Research on AIDS (CPCRA) antiretroviral medication self-report [170] measure which assesses for each medication prescribed how many pills a participant took during the past week on a 5-likert scale from all to none [170]. One study (4.5%) [117] used a measure developed and validated by Godin and colleagues [171] which assessed how many times, in total, participants missed taking one or more of their pills in the past seven days and how many pills did this represent [171].

Fifteen studies (21.1%) [83,90,95,99,100,102,105,114,123,131,136,138,140,145,147] used a self-report adherence measure or question that assessed adherence over a period of time of a month or longer. Fourteen of these studies (93.3%) [83,90,95,100,102,105,114,123,131,136,138,140,145,147] assessed adherence over a period of a month whereas one (6.7%) [99] assessed adherence over three months. One study (6.7%) [102] used a 30-day VAS, one study (6.7%) [145] used an adapted one-month VAS [172] and one (6.7%) [114] used a one-month VAS that was modelled on numerical [173] and pictorial [174] versions. The VAS ask participants to put a cross on the line indicating how much of their medications have they taken in the past four weeks from 0% (none) to 100% (all) [175].

Sixteen studies (22.5%) [50,86,93,94,101,106-108,112,113,119,121,129,135,139,148] either did not specify the period over which adherence was assessed or used a measure or question that assessed adherence generally. Three of these studies (13.6%) [101,108,121] assessed adherence using the CASE [166] which assesses adherence through three questions: one question assesses how often the participant has difficultly taking their mediation on time, another assess on average how many days a week the participant misses at least one dose of their HIV medication and the third assesses when the last time the participant missed a dose of their HIV medication was [166]. Two studies (12.5%) [113,135] used the Morisky Medication Adherence Scale (MMAS) [176] and one study (6.3%) [93] used an adapted version of the MMAS. The MMAS does not specify a time period but asks participants if they ever forget to take their medication, if they are careless about taking their medication, if they stop taking their medication when they feel better or when they feel worse [176]. Two studies (12.5%) [107,119] assessed how often participants missed a dose, one study (6.3%) [86] assessed the time interval since a participant last missed a dose, one study (6.3%) [148] assessed barriers for not taking their HIV medication, one study (6.3%) [129] assessed if text messages helped participants take their medication, one study (6.3%) [94] assessed whether alcohol influenced participants to miss taking their medication, one study (6.3%) [139] assessed whether a participant had ever delayed or missed their pills and three studies (18.8%) [50,106,112] did not include details on their adherence measure.

Three quantitative studies (4.2%) [114,132,146] used an adherence measure or question that assessed interruptions in medication taking. One of these studies (33.3%) [146] assessed whether any participant had ever stopped their medication for three days or more, one study (33.3%) [114] assessed the number of times each participant had stopped their medication for three days or more since initiation and one study (33.3%) [132] assessed whether any participant had missed their medication for at least 48 hours during the past three months.

# Barriers and facilitators

Nearly 80% of the qualitative studies (n=68; 78.2%) [8-15,18-20,25-28,30-33,35-39,41-56,58-63,65,68,69,71,73,74,76,150-161,163-165] identified both at least one patient-reported barrier and facilitator to ART adherence, whereas 11 (12.6%) [7,21,23,24,34,40,57,64,66,77,162] only identified one or more barriers and 8 (9.2 %) [16,17,22,29,67,70,72,75] only identified one or more facilitators. The majority of the quantitative studies (n=50; 70.4%) [39,50,83-86,88,90-93,95-97,99-102,104-108,110-112,115,116,118,119,121,125-128,130-132,134-136,140-147,149] only identified at least one barrier whereas 18 (25.4%) [64,68,87,94,98,103,109,113,117,120,122-124,133,137-139,148] identified both one or more barriers and facilitators and only 3 (4.2%) [89,114,129] only identified at least one facilitator.

Tables 4 and 5 show the range and frequency of each barrier and facilitator.

## Table 4 Patient-reported barriers

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Barriers | | | Qualitative | Quantitative | Frequency within non-adherent participants in each study N (%) |
| Financial | Lack of money for HIV care | | [8,27,36,38,43,52,56,59]  (8 studies) | [68,83,87,95,100,103,112,115,117,118,141]  (11 studies) | 97 (72.4%) [87];  49 (66.2%) [83];  6 (13.9%) [103]  (3 studies) |
| Lack of money for transport to ART clinic | | [7-9,13,18,23,36,38,43,44,46,49,50,52,55,59,61,63,64,151,158,159,163,165]  (24 studies) | [68,85,95,115,117-119,148]  (8 studies) | 3 (6%) [148]  (1 study) |
| Do not want to lose disability grant | | [32,57,62]  (3 studies) | [116,122,126]  (3 studies) | (0 studies) |
|  | | | | |  |
| Health provider | Dissatisfaction with HIV/ART information provided | | [20,26,30,36,39,42,44,47,150]  (9 studies) | [83,85,87,97,101,109,139,146]  (8 studies) | 11 (8.2%) [87];  9 (7.0%) [139]  (2 studies) |
| Experienced negative treatment from clinic staff | | [12,13,18,24,35,36,63,69]  (8 studies) | [121,143]  (2 studies) | (0 studies) |
| Poor relationship with health provider | | [10,18,38,42,156]  (5 studies) | (0 studies) | (0 studies) |
| Unable to gain attention from staff | | [8,13,18,42,44,49,61,162]  (8 studies) | [68]  (1 study) | (0 studies) |
|  | | | | |  |
| Medication Collection | Long clinic waiting timesa | | [13,15,18,37,40,49,61,68,153,162]  (10 studies) | [39,68,121,143]  (4 studies) | (0 studies) |
| Erratic clinic drug supply | | [37,38,47,52,58,68]  (6 studies) | [50,64,91,100,103,107,111,112,116,121,123,128,139,141,146,147]  (16 studies) | 4 (21.1%) [146];  18 (18.9%) [112];  13 (6.4%) [147];  4 (4.6%) [107];  1 (2.3%) [103]  (5 studies) |
| Long distance to clinic | | [42,49,52]  (3 studies) | [83,104,120,121,146]  (5 studies) | 21 (28.4%) [83];  18 (19.0%) [120];  3 (15.8%) [146]  (3 studies) |
| Unable to get to clinic due to work constraints | | [8,15,18,32,35]  (5 studies) | [139,140]  (2 studies) | 1 (0.8%) [139]  (1 study) |
|  | | | | | |
| Medication Taking | Stigma and discriminationa | | [7-10,12-15,18,19,23,26,30,32,33,35-37,39,41,42,44,46-53,56,58,59,61,63,64,69,71,77,150-153,155]  (44 studies) | [64,68,84,86,90,92,95,98,101,102,106,108,110,113,115,116,119,123,128,130,134,138,143,144,148]  (25 studies) | 15 (28.8%) [98];  12 (19.0%) [86];  54 (14.6%) [101];  3 (6.0%) [148];  4 (5.7%) [92];  3 (3.2%) [134];  1 (0.8%) [68];  2 (0.7%) [138]  (8 studies) |
| No access to liquidsa | | [12,20,50,161]  (4 studies) | [50,85,105]  (3 studies) | 1 (2.0%) [105]  (1 study) |
| Lack of access to adequate foodc | | [8-15,18-21,23,27,30,32,35,38-47,50,52,55,57-65,73,151,152,155,158-162,164,165]  (50 studies) | [39,50,64,85,99,101,104,105,111,115-120,124-126,132,137,139,143,144,148,149]  (25 studies) | 19 (20.0%) [120];  6 (11.7%) [105];  4 (8.0%) [148];  1 (5.0%) [124];  7 (4.8%) [99];    (5 studies) |
| Being busy | | [12,13,20,26,31,43,53]  (7 studies) | [68,84,86-88,91,92,102,104-106,108,113,115,124,128,130,133-135,137,143,144]  (23 studies) | 31 (49.2%) [86];  4 (18.2%) [133];  3 (13.0%) [124];  9 (11.3%) [92];  9 (9.7%) [134];  8 (6.0%) [87];  3 (5.9%) [105];  7 (5.8%) [68]  (8 studies) |
| Sleeping | | [12,20,31,156]  (4 studies) | [68,84,86,88,92,97,102,104,110,111,116-118,128,130,133,135,145]  (18 studies) | 19 (30.2%) [86];  2 (9.1%) [133];  3 (3.8%) [92];  3 (2.5%) [68]  (4 studies) |
| Forgettinga | | [12,14,15,18-20,25,26,31,34,39,42-44,46,51,59,63,68,73,155,156]  (22 studies) | [50,64,68,84-88,90-93,95,97,99-106,108-111,113,115-118,120,123,124,127,128,130-137,139-145,147-149,159]  (55 studies) | 96 (47.5%) [147];  66 (45.2%) [99];  57 (44.2%) [139];  29 (43.3%) [136];  11 (43.0%) [124];  26 (41.3%) [86];  150 (40.4%) [101];  37 (39.8%) [134];  8 (36.4%) [133];  15 (34.9%) [103];  13 (27.5%) [105];  25 (26.3%) [120];  26 (19.4%) [87];  67 (15.8%) [137];  10 (8.3%) [68];  6 (7.5%) [92];  2 (4.0%) [148]  (17 studies) |
| Difficultly taking ART in privatea | | [13,15,18,19,23,30,39,41,46,50,56,63,77,152,153,155]  (16 studies) | [50,84]  (2 studies) | (0 studies) |
| Outside house or travellingb | | [12-15,19,20,26,32,35,43,50,53,59,64,68,150,153,155,156,161]  (20 studies) | [50,68,84-88,90,91,97,99,101-103,105,106,109-111,113,117,118,120,123,124,128,130-135,137-139,141-146,149]  (42 studies) | 36 (57.1%) [86];  142 (38.3%) [101];  29 (30.5%) [120];  15 (29.4%) [105];  11 (25.6%) [103];  32 (24.9%) [139];  5 (22.7%) [133];  20 (21.5%) [134];  31 (21.2%) [99];  5 (21.0%) [124];  15 (11.2%) [87];  3 (10.1%) [137];  7 (2.4%) [138]  (13 studies) |
| Change in daily routine | | [19,20,35,50,156,161]  (6 studies) | [84,86,102,104,106,110,116,130,148]  (9 studies) | (0 studies) |
| Run out of ART | | [14,20,155]  (3 studies) | [84-86,90-92,99,102,104-106,117,118,123,124,131,134-137,139,145,149]  (23 studies) | 19 (30.2%) [86];  27 (18.4%) [99];  4 (16.0%) [124];  3 (15.0%) [90];  9 (13.4%) [136];  5 (9.8%) [105];  8 (8.6%) [134];  1 (1.0%) [92]  (8 studies) |
|  | | | | | |
| Inter-personal Relationships | HIV non-disclosure | | [11,12,15,18,19,32,45,47,50,51,53,56,59,63,64,77,152,155]  (18 studies) | [84,95,126]  (3 studies) | (0 studies) |
| Lack of social support | | [8,18,23,30,33,40-42,44,49,52,53,58,77,152,154,162]  (17 studies) | [39,119,120,123,132]  (5 studies) | 23 (24.2%) [120]  (1 study) |
| Gender (wives have lack of autonomy) | | [15,36,43,46,66,69]  (6 studies) | (0 studies) | (0 studies) |
| Sharing or selling ART | | [47,64]  (2 studies) | [50,98,104,116,120]  (5 studies) | 17 (30.8%) [98];  5 (5.3%) [120];  (2 studies) |
|  | | | | | |
| Mental health and wellbeing | Low mood or stressa | | [12,19,32,46,53,55,58,64]  (8 studies) | [64,88,91,102,104,116-118,128,130,136,142-144,146]  (15 studies) | 2 (10.5%) [146];  4 (6.0%) [136]  (2 studies) |
| Using alcohol or other substancesa | | [8,18,20,23,32,40,42,47,50,53,59,64,65,73,153,155,156]  (17 studies) | [64,94,113,116-118,120,126,135,139,148]  (11 studies) | 26 (20.2%) [139];  15 (15.8%) [120];  3 (6.0%) [148]  (3 studies) |
| Feeling sick or ill | | [19,31,63,162]  (4 studies) | [64,84,85,92,93,95,97,102,104,110,113,115,116,120,123,130,132-134,137,138,140,144-146,149]  (26 studies) | 12 (12.6%) [120];  2 (9.1%) [133];  8 (8.6%) [134];  1 (5.3%) [146];  4 (4.7%) [92];  6 (2.1%) [138]  (6 studies) |
| Feeling hopeless | | [15,41,48,59,66]  (5 studies) | [104,148]  (2 studies) | 2 (4.0%) [148]  (1 study) |
| Feeling lonely | | [41,42,61,77]  (4 studies) | (0 studies) | (0 studies) |
| Feeling better or healthier | | [15,18,42,47,53,56-58,73,150,152,153,155]  (13 studies) | [64,68,86,92,93,102,110,113,116,131,132,138,140]  (13 studies) | 6 (9.5%) [86];  4 (4.8%) [92];  8 (2.8%) [138]  (3 studies) |
|  | | | | |  |
| Treatment-related factors | Side effectsb | | [9,10,13,14,18,19,27,32,35,36,38-42,44,48,50,51,53,55,56,59,60,63,64,73,74,150,151,153]  (31 studies) | [50,64,86-88,95,96,99,101-103,105-107,112,115-120,123,127,128,130,131,135,136,138,139,141,143-145,147-149]  (38 studies) | 32 (50.8%) [86];  27 (31.0%) [107];  17 (17.9%) [112];  5 (11.6%) [103];  15 (11.2%) [87];  15 (7.4%) [147];  3 (6.0%) [148];  8 (5.5%) [99];  2 (3.9%) [105];  2 (3.0%) [136];  5 (1.7%) [138]  (11 studies) |
| Pill burden | | [12,41,42,50,73,155,161]  (7 studies) | [85,86,101,102,106,110,120,123,128,130,137,138,143]  (13 studies) | 15 (23.8%) [86];  20 (21.1%) [120];  24 (8.3%) [138]  (3 studies) |
| Problems with physical characteristics of pills | | [50,60]  (2 studies) | [94,106]  (2 studies) | (0 studies) |
|  | | | | | |
| Beliefs about HIV and treatment | Religious beliefs or treatmentsa | | [8,13,18,28,33,37,39,41,42,47,48,52,54,56,59,64,71,76]  (18 studies) | [64,84,90,91,94,103,110,120,143,144]  (10 studies) | 20 (21.1%) [120];  3 (6.9%) [103];  1 (5.0%) [90]  (3 studies) |
| Traditional beliefs or medicines | | [18,33,35,36,42,48,52,56,58,59,63,153,157]  (13 studies) | [91,94,116,126,131,139,141]  (7 studies) | (0 studies) |
| Fear of cause of HIV | | [15,37,44,54,59,61]  (6 studies) | (0 studies) | (0 studies) |
| Denial of HIV status | | [30,45,48,153]  (4 studies) | (0 studies) | (0 studies) |
|  | | | | | |
| Beliefs about ART | | ART will not work | [44,48,56,59]  (4 studies) | [132,136,148]  (3 studies) | 2 (3.0%) [136]  (1 study) |
| ART is harmful | [12,39,59]  (3 studies) | [102,110,116,130]  (4 studies) | (0 studies) |
| Should not mix ART with other treatments | [34,71,153]  (3 studies) | [131]  (1 study) | (0 studies) |
| Negative attitude towards treatment regime | [10,12,19,27,35,51,53,56,60,150,155]  (11 studies) | [103,107,109,117,118,123,137,139]  (8 studies) | 5 (5.8%) [107];  1 (2.3%) [103]  (2 studies) |
| Lack of motivation to take ART | [10,12,15,19]  (4 studies) | [123,141,148]  (3 studies) | (0 studies) |
|  | | | | | |

a One mixed study identified the barrier in both the qualitative and quantitative components

b Two mixed studies identified the barriers in both the qualitative and quantitative components

c Three mixed studies identified the barrier in both the qualitative and quantitative components

## Table 5 Patient-reported facilitators

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Facilitators | | Qualitative | Quantitative | Reporting frequency within adherent participants N (%) |
| Financial | Grant or livelihood support | [10,56,62,67,74]  (5 studies) | (0 studies) | (0 studies) |
| Free ART treatment | [35,42,52,65]  (4 studies) | (0 studies) | (0 studies) |
|  | | | |  |
| Health Provider | Good relationship with health provider | [11,18,31,36,38,42,45,48,51,53,56,65,68,75,150,151,159,163]  (18 studies) | [94,107,120,148]  (4 studies) | (0 studies) |
| Receiving counselling and/or teaching | [8,12,13,18,31,45,51,63,73,75,151,155,159,164]  (14 studies) | [109,138,139]  (3 studies) | (0 studies) |
|  | | | | |
| Medication Taking | ART packaging | [29,31,51,60,63,155,161]  (7 studies) | (0 studies) | (0 studies) |
| Access to food and/or water | [12,42,48,55,60,161]  (6 studies) | (0 studies) | (0 studies) |
| Having a routine | [12,19,31,36,50,51,56,60,161]  (9 studies) | (0 studies) | (0 studies) |
| Carrying ART whilst out of house | [12,29,31,63,155]  (5 studies) | (0 studies) | (0 studies) |
| Reminders | [10-14,18-20,25-27,31,33,35,36,39,42,44-47,51,53,56,58,63,64,68,72,73,75,76,151-155,159,161,165]  (40 studies) | [89,94,98,103,108,109,114,120,122,123,129,133,137,139,148]  (15 studies) | (0 studies) |
|  | | | | |
| Health and well-being | Feeling better or healthier after ART treatment | [8,9,12,13,17,18,27,29,31,35,39,41-43,45,47,48,51,52,56,60,62,65,70,73,151,153,155,157,161,165]  (31 studies) | [64,122,124,148]  (4 studies) | 179 (40.0%) [124]  (1 study) |
| Being able to work again | [9,13,29,31,35,41,43,56,70,155,156,165]  (12 studies) | [64]  (1 study) | (0 studies) |
| “Normalisation”- feeling the same as others or same as before HIV | [17,18,29,45,47,65,70,157]  (8 studies) | (0 studies) | (0 studies) |
| Less HIV/AIDS related illnesses | [8,17,19,27,62,70,72,152]  (8 studies) | [94]  (1 study) | (0 studies) |
| Being hopeful | [14,17,27,41,48,65]  (6 studies) | (0 studies) | (0 studies) |
| Prayers or faith in God | [18,36,37,42,48,54,61,158]  (8 studies) | (0 studies) | (0 studies) |
|  | | | |  |
| Inter-personal relationships | Want to live and take care of family and children | [8,13-15,19,27,29,31,32,35,36,38,45-48,62,74,153,155,161]  (21 studies) | (0 studies) | (0 studies) |
| Social supporta | [10-13,16,18-22,26-28,30-33,35,36,39,42,44-49,51-53,56,58,63,64,68,72-74,76,151,153-155,159,161,163-165]  (48 studies) | [64,94,98,103,108,109,118,123,124,137-139,148]  (13 studies) | 241 (86.0%) [108]  98 (22.0%) [124]  (2 studies) |
| Having disclosed HIV status | [10,13,16,18-20,22,32,35,42,44,45,47,51,53,58,64,73,76,151,153,155,159,164]  (24 studies) | [68,108]  (2 studies) | 271 (82.0%) [108];  1 (1.1%) [68]  (2 studies) |
| Staying away from negative relationships | [29,48]  (2 studies) | (0 studies) | (0 studies) |
| See others health improve on ART | [12,17,35,73,150,161]  (6 studies) | (0 studies) | (0 studies) |
| Want to look healthy to others | [48,50,51,152,155]  (5 studies) | (0 studies) | (0 studies) |
| Attending a support group | [19,39,42,48,49,56,157,164]  (8 studies) | [64,114,124]  (3 studies) | 36 (8.0%) [124]  (1 study) |
|  | | | |  |
| Beliefs about HIV and treatment | Improved knowledge and understanding of HIV/ART | [12,18,19,42,45,73,75,157,159,164]  (10 studies) | (0 studies) | (0 studies) |
| Want to take control of their health | [10,12,19,38,42,45,47,53,65,74,161]  (11 studies) | [64,124]  (2 studies) | 134 (30.0%) [124]  (1 study) |
| Accept own HIV Status | [18,29,36,45,48,50,53]  (7 studies) | (0 studies) | (0 studies) |
|  | | | | |
| Beliefs about ART | ART helps you look healthy to others | [12,32,48,56,152]  (5 studies) | (0 studies) | (0 studies) |
| Adherence self-efficacy | [18,26,33,53,65]  (5 studies) | [94,107,141]  (3 studies) | (0 studies) |
| Do not want to be ill again | [14,19-22,26,27,29,31,32,51,68,161]  (13 studies) | [87]  (1 study) | (0 studies) |
| Belief in ART benefit | [8,12,17,19,33,36,37,39,43,45,51,52,63,65,68,73,153,160]  (18 studies) | [107,148]  (2 studies) | (0 studies) |
| God provided ART | [28,48,59,158]  (4 studies) | (0 studies) | (0 studies) |
|  | | | | |

a One mixed study identified the facilitator in both the qualitative and quantitative components

### Barriers measures

Of the 68 quantitative studies that identified at least one barrier, 17 (25.0%) [39,88,92,93,101,102,113,116,126,127,130,132,135,140,143,144,149] used one or more barriers measures. It was not clear if a measure had been used in two studies (2.9%) [91,104] and two studies (2.9%) [101,105] did not use a developed or validated measure but indicated in the method a partial or full list of barriers used in the study. To our knowledge there is no similar measure to assess facilitators to ART adherence; however, one study (1.5%) [124] specified they used a list of 16 facilitators as well as a list of 16 barriers without specifying the individual factors.

Of the 17 studies that used a measure, one (5.9%) [39] used the Barriers to Adherence Checklist (BAC) which assesses environmental, physical and social barriers [177]. The measure includes 56 items such as: hard to travel to the clinic, confusion about how to take the HIV medication, do not think the treatment will help, reminds the patient they have HIV, feeling sick, do not want others to know they are HIV positive and no one to help remind them to take their medication [177]. The measure is assessed using a four item response scale ranging from definitely true to definitely false [177] and higher scores on the scale indicates higher barriers to adherence [178]. Four studies (23.5%) [92,102,130,149] used the AACTG reasons for non-adherence scale [167]. This measure originally included 12 reasons why patients may miss taking their medication such as away from home, busy with other things and simply forgot [167]; although this measure has been adapted to include more items [179]. This measure is assessed using a four-item response scale ranging from never to often [167] and a higher score means a participant reports that they often miss their medication [180]. One study (5.9%) [92] indicated the version of the AACTG scale used contained 13 items and another (5.9%) [102] indicated the scale had 14 items. Three studies (17.6%) [88,116,132] used an adapted or an abridged version of the AACTG reasons scale. One of these (33.3%) [116] adapted the measure by retaining nine of the original items and adding nine context-relevant items including did not have food to take the pills with, the pharmacy did not have the pills, using alcohol or drugs, decided to use traditional medicine, was worried would lose disability grant and gave pills to someone else [116]. Another of these (33.3%) [132] studies used a list of 16 reasons why patients ever miss their medication which was based on the AACTG reasons scale. Two studies (11.7%) [113,135] used the MMAS [176] which is a four item self-report scale measuring medication taking behaviour which includes barriers such as forgetting, feeling better, feeling worse and being careless about taking the medication [176]. The measure is assessed using a dichotomous response scale (yes or no) [176] and a higher score indicates greater levels of adherence [181]. One of these [135] also indicated other patient-reported barriers to adherence so must have included other barriers in the study as well as the MMAS. Two studies (11.7%) [93,140] used an adapted version of the MMAS. One of these (50.0%) [140] study used a culturally sensitive and modified version of the MMAS [140] and one study (5.0%) [93] adapted the MMAS by changing the scale to a five-point scale response ranging from never to always [93]. Two studies (11.7%) [143,144] used an adapted version of the BMQ [169] which is a measure that includes a two item belief screen which includes questions regarding patients concerns about medication efficacy, side effects, short-term and long-term risks and a two-item recall screen which asks about potential difficulty remembering the doses. All scales are assessed using a dichotomous response scale (yes or no). Higher scores on the regime screen indicate the presence of non-adherence indicators. Higher scores on the beliefs screen indicate the presence of one or more beliefs barriers. Higher scores on the recall screen indicate barriers are present [169]. One of these studies (50.0%) [143] adopted items from the BMQ whereas the other study (50.0%) [144] used questions adapted from the BMQ. One study (5.9%) [101] used the CPCRA antiretroviral medication self-report measure which includes a checklist of 10 barriers such as being away from home, difficulties with dietary requirements, side effects and forgetfulness [170]. One study (5.9%) [126] used the Structural Barriers to Medication-Taking scale (SBMT) [182] and the LifeWindows Informational-Motivation-Behavioural Skills ART Adherence Questionnaire (LW-IMB-AAQ) [183]. The SBMT utilised consisted of 17 items asking the participant if their mediation-taking behaviour was affected by the structural barriers listed which included food insecurity, non-disclosure, church leaders, traditional healers, alcohol use, disability grant and no reminders [126]. The SBMT has since been reduced to 13 items and is assessed using a five point Likert scale ranging from never to always [182]. A higher score indicates more structural barriers were experienced [182]. The LW-IMB-AAQ includes 33 items which assess ART adherence based upon information, motivation and behaviour. The information sub-scale includes items assessing knowledge about impact of ART, traditional medicine and alcohol usage on treatment efficacy. The motivation sub-scale include items assessing attitudes regarding the impact of adherence on daily life, social support and the patient-health provider relationship. The behavioural sub-scale include items assessing self-efficacy in spite of side effects, daily life and health status [126]. Scores for each of the sub-scales can be created with higher scores indicating greater information regarding HIV and ART, greater motivation to take ART and greater ART medication-taking behaviour [183]. One study (5.9%) [127] used an adapted version of the LW-IMB-AAQ.

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