

Table 1. Characteristics of the included studies

S. No.	Author, year	Study design	Country	Setting	Population	Sample size, N	Age, years	Duration of DM, years	Adherence measures	Response rate, n (%)	Non-adherence, %
1	Ababio, 2017 ⁵⁶	Cross-sectional	Nigeria, Ghana	Outpatient DM clinic, University College Hospital	T2DM	Ghana 198 Nigeria 203	Ghana Male: 60.69 ± 8.79 Female: 58.16 ± 10.12 Nigeria Male: 60.94 ± 11.81 Female: 59.46 ± 10.76	Ghana Male: 12.05 ± 6.82 Female: 11.07 ± 7.1 Nigeria Male: 9.46 ± 8.6 Female: 9.92 ± 7.18	Diabetes empowerment five scale was used to assess patients' awareness of the importance of adherence to DM (self) care, their attitudes and ability to self-manage diabetes	Ghana: 85.0% Nigeria: 89.8%	NR
2	Abate, 2019 ¹⁵	Cross-sectional	Ethiopia	Hospital	T1DM, T2DM	416	45.4 ± 16.7	6 ± 4.9	MMAS-8	99.05%	68.8%
3	Adisa, 2014 ³⁸	Cross-sectional	Nigeria	University College Hospital	T2DM	176	60.2 ± 10.2	6.3 ± 5.6	Self-reported	NR	NR
4	Alfian, 2016 ⁴⁸	Cross-sectional	Indonesia	Secondary Health Care Facility	T2DM	91	61.1 ± 9.6	>5	MMAS-8	NR	NR
5	Abebaw, 2016 ¹⁶	Cross-sectional	Ethiopia	University Hospital	T2DM	288	55.2 ± 10.96	63.69 ± 54.75 months	MMAS-4	100%	NR
6	Adeniyi, 2016 ⁵³	Cross-sectional	South Africa	Primary healthcare setting	T2DM	327	Uncontrolled T2DM: 58.5 ± 12.7 Controlled T2DM: 59.8 ± 12.0	Uncontrolled T2DM: 7.1 ± 6.1 Controlled T2DM: 3.4 ± 2.9	Self-reported	NR	NR
7	Abebe, 2014 ¹⁷	Cross-sectional	Ethiopia	Diabetes Referral Clinic, University Hospital	T1DM, T2DM	407	50.4 ± 15.2	6.8 ± 5.1	MMAS-8	391 (96.01%)	NR
8	Ali,	Cross-	Ethiopia	Hospital	DM	146	46.5 ± 14.7	NR	MMAS-8	NR	45.2%

	2017 ¹⁸	sectional									
9	Almadhoun, 2018 ⁴²	Cross-sectional	Palestine	Primary health care	T2DM	161	59.4 ± 8.6	≥5	MMAS-8, BMQ	91.9%	52.7%
10	Aminde, 2019 ⁴⁶	Cross-sectional	Cameroon	Hospital	T2DM	195	60.5 ± 13.6	>20	MCQ	NR	54.4%
11	Awodele, 2015 ³⁹	Retrospective and prospective	Nigeria	Hospital	T2DM	152	>70	NR	Self-reported	NR	13.2%
12	Bagonza, 2015 ⁵⁵	Cross-sectional	Uganda	Hospital	DM	521	50.9 ± 14.6	NR	Self-reported	NR	NR
13	Basheti, 2015 ⁴⁹	Cross-sectional	Jordan	Hospital	DM	167	58.9 ± 13.54	NR	MMAS-8, BMQ	NR	46.1%
14	Basu, 2018 ³³	Cross-sectional	India	Tertiary care hospital	DM	375	49.7 ± 10.2	5	SDSCA	NR	17.6%
15	Gelaw, 2014 ²²	Cross-sectional	Ethiopia	DM clinic, Referral Hospital	DM	270	55.11 ± 14.24	>6	Self-reported	98.3%	27.8%
16	Murali, 2016 ³⁴	Prospective interventional study	India	Tertiary care hospital	T2DM	104	30-80	NR	MMAS-4	NR	NR
17	Bonger, 2018 ²⁰	Cross-sectional	Ethiopia	Hospital	T2DM	419	51.1 ± 10.6	NR	Self-reported	95.7%	4.3%
18	Chew, 2018 ⁵⁰	Cross-sectional	Malaysia	Public health clinics	T2DM	752	56.9 ± 10.18	4.0 (3.00-9.00)	MMAS-8	93.1%	NR
19	Shaimol, 2014 ³⁵	Cross-sectional	India	Tertiary care hospital	T2DM	400	Low adherence: 61.9 ± 8.1 Medium adherence: 51.1 ± 8.8 High adherence: 45.4 ± 11.9	NR	MMAS-4	NR	NR

20	Sorato, 2016 ²⁸	Cross-sectional	Ethiopia	Hospital	T2DM	194	50.3 ± 13.2	5.02 ± 3.8	MMAS-8	NR	NR
21	Elsous, 2017 ⁴³	Cross-sectional	Palestine	Primary healthcare setting	T2DM	369	56.38 ± 10.36	10.48 ± 8.12	MMAS-4	NR	NR
22	Fseha, 2017 ²¹	Cross-sectional	Ethiopia	Hospital	T2DM	200	42.2 ± 6.6	≥ 7	MMAS-4	NR	NR
23	Teklay, 2013 ³⁰	Cross-sectional	Ethiopia	Hospital	T2DM	267	52.4 ± 11.9	>5	MMAS-4	NR	24.3%
24	Gerada, 2017 ²³	Cross-sectional	Ethiopia	Tertiary referral teaching and research Hospital	T1DM, T2DM	378	19-78	>10	Self-reported	100%	33.07%
25	Heissam, 2015 ⁴⁷	Cross-sectional	Egypt	Hospital	T2DM	372	51.64 ± 10.76	NR	MTA	NR	NR
26	Iqbal, 2017 ⁵¹	Questionnaire-based descriptive analysis	Pakistan	Public and private hospitals	T2DM	300	51.25 ± 9.59	>5	DAI-10	100%	NR
27	Mariye, 2019 ²⁷	Cross-sectional	Ethiopia	Public hospitals	DM	273	31-55	>10	MMAS-8	100%	NR
28	Rwegerera, 2014 ⁵⁴	Cross-sectional	Tanzania	Diabetic clinic	T2DM	216	55.0 (34-81)	>5	Assessed based on patients' recall on the use of anti-diabetic drugs in the previous one week and three months	NR	38.9%
29	Venkatesan, 2018 ³⁷	Cross-sectional	India	Community-Based, village	T2DM	328	57.3 ± 12.1	NR	MMAS-8	NR	NR
30	Yusuff, 2008 ⁴¹	Cross-sectional	Nigeria	University College Hospital	T2DM	200	56.6 ± 13.4	NR	ASMMT, DMR	NR	36%
31	Olamoy	Cross-	Nigeria	DM clinic	T1DM,	213	58.6 ± 13.1	7.0 ± 6.9	NR	NR	NR

	egun, 2018 ⁴⁰	sectional			T2DM						
32	Nonoga k, 2019 ⁴⁵	Cross- sectional	Cambodi a	Non- governme ntal organizatio n (NGO) Communit y-based "Peer- Educator Network"	DM	773	≥65	NR	MMAS-4	NR	NR
33	Srividya, 2019 ³⁶	Cross- sectional	India	Medical College and Hospital	DM	150	45-59	>5	MMAS-8	NR	NR
34	Jazul, 2018 ⁵²	Cross- sectional	Philippin es	Rural and urban communiti es	DM	64	60	NR	MMAS-8	NR	4.69%
35	Jamous, 2011 ⁴⁴	Cross- sectional	Palestine	Military Medical Services clinic	T2DM	131	56.4 ± 9.8	8.3 ± 5.8	MMAS-8	99.2%	NR
36	Wabe, 2011 ³²	Cross- sectional	Ethiopia	DM clinic	T2DM	384	48.3 ± 11.8	>10	DMR	90.4%	38%
37	Kassahu n, 2016a ²⁵	Cross- sectional	Ethiopia	DM clinic	DM	285	30-60	>5	MMAS-4	NR	31.2%
38	Berhe, 2012 ¹⁹	Cross- sectional	Ethiopia	hospital	T2DM	320	55.03 ± 10.7	12.3 ± 7.6	Administered structured questionnaire	99.1%	3%
39	Jemal, 2017 ²⁴	Cross- sectional	Ethiopia	Specialized University Hospital	T2DM	196	61.11 ± 11.72	>10	MMAS-4	98%	29.6%
40	Tsehay, 2016 ³¹	Cross- sectional	Ethiopia	Specialized University Hospital	T2DM	322	52.68 ± 11.17	NR	MAPS-4	NR	33.2%
41	Kassahu	Cross-	Ethiopia	University	T2DM	309	NR	NR	MMAS-8	NR	NR

n, 2016 ²⁶	sectional		Teaching Hospital								
42	Tewabe, 2018 ¹²	Cross- sectional	Ethiopia	DM clinic	DM	182	NR	NR	Described as taking above 80% of the prescribed treatment and/or agrees between the patient and the health care provider for the last 1 month.	100%	NR
43	Tekaleg n, 2018 ²⁹	Cross- sectional	Ethiopia	Specialized Hospital	T2DM	412	52 (40-60)	10 (5-16)	Participant took all his/her anti-diabetic medication in the last seven days	97.6%	NR

Age (years) & duration of DM (years) are represented as Mean \pm SD & Median (IQR)

DM: Diabetes mellitus; T2DM: Type 2 diabetes mellitus; T1DM: Type 1 diabetes mellitus; ; MMAS-8: Morisky medication adherence scale-8; BMQ: Beliefs about medicines questionnaire; MCQ: Medication compliance questionnaire; SDSCA: Summary of diabetes selfcare activities measure; MMAS-4: Morisky medication adherence scale-4; MTA: Measure treatment adherence scale; DAI-10: Drug attitude inventory; ASMMT: Self-management monitoring tool; DMR: Daily medication reminder; MAPS-4: Morisky adherence predictor scale-4 item

Table 2. The WHO five dimensions of factors affecting adherence/non-adherence

Factors	Number of studies with a factor associated with non-adherence	Number of studies with a factor associated with adherence
1. Patient-related		
BMI, high	1 ²⁶	-
DM, knowledge, poor	5 ^{18,26,32,37,42}	1 ²⁷
Beliefs, low concerns	2 ^{15,42}	-
Self-efficacy, low	2 ^{32,41}	1 ²⁴
Satisfaction with treatment	-	3 ¹⁸
2. Social/economic-related		
Gender, male	-	1 ³⁵
Age, younger	2 ^{15,50}	2 ^{20,35}
Marital status, unmarried	2 ^{15,42}	2 ^{12,35}
Education level, low	4 ^{25,32,34,35}	-
Employment	1 ¹⁵	-
Income, low	3 ^{17,25,41}	1 ³⁵
3. Condition-related		

Comorbidities, more	3 ^{15,30,39}	2 ^{43,44}
Having hypertension	1 ³⁷	2 ^{43,54}
Having depression	3 ^{15,30,50}	-
History of CVD	-	2 ^{23,43}
4. Therapy-related		
Adverse/side effects	3 ^{25,30,41}	1 ²³
Medication regimen, complex	4 ^{18,30-32}	2 ^{16,54}
Dosing regimen, multiple	1 ³⁰	-
5. Health-care system-related		
Dissatisfaction with communication	2 ^{17,37}	-
Patient-provider relationship, poor	1 ³⁷	-

BMI: Body mass index; DM: Diabetes mellitus; CVD: Cardiovascular disease

