

Annex 1: detailed extraction sheet

	Study ID	Country in which study conducted	Study design	Number of participants		Study ID	Country in which study conducted	Study design	Number of participants
1	Yussif 2017	Ghana	Cross-sectional study	143	23	Siakwa 2020	Ghana	Case-control study	505 (teenagers)
2	Wowolo 2022	Ghana	Cross-sectional study	70	24	Sensoy Bahar 2020	Ghana	Randomized controlled trial	100)
3	Wilson 2017	Ghana	Other: Secondary analysis	difficult to say	25	Seidu 2020	Ghana	Cross-sectional study;	1266
4	Verma 2014	Multiple Countries Including Ghana	Cross-sectional study	897	26	Schomaker 2017	Multiple Countries Including Ghana	Other: Retrospective study	20576 total
5	vanderGeugten 2013	Ghana	Qualitative research	33	27	Sallar 2009	Ghana	Cross-sectional study;	483
6	Stephenson 2014	Multiple Countries Including Ghana	Other: Secondary data analysis	2695	28	Rheinländer 2019	Ghana	Qualitative research	33
7	Stephenson 2009	Multiple Countries Including Ghana	Other: Secondary analysis	990	29	Quarshie 2020	Ghana	Qualitative research	11
8	Smith 2021	Multiple Countries Including Ghana	Cross-sectional study	162,994	30	Osei 2018	Ghana	Cross-sectional study; Other: Survey	410
9	Sirikyi 2021	Ghana	Cross-sectional study	196	31	Quarshie 2021	Ghana	Cross-sectional study; Other: Survey	2107
10	Quarshie 2021	Ghana	Cross-sectional study;	1692	32	Quarshie 2015	Ghana	Qualitative research	44
11	Peltzer 2011	Multiple Countries Including Ghana	Cross-sectional study	5613	33	Oppong Asante 2015	Ghana	Cross-sectional study; Other: Survey	227 total, 173 adolescents
12	Parimah 2022	Ghana	Cross-sectional study;	329	34	Oppong Asante 2017	Ghana	Cross-sectional study	227
13	Owusu-Sarpong 2019	Ghana	Cross-sectional study	700	35	Oppong Asante 2015	Ghana	Qualitative research	16
14	Owusu-Ansah 2020	Ghana	Cross-sectional study	1003	36	Oppong Asante 2017	Ghana	Cross-sectional study; Other: Secondary data analysis	1065

15	Owusu-Addo 2016	Ghana	Qualitative research	28	37	Oppong Asante 2019	Ghana	Cross-sectional study; Other: secondary data analysis	3632
16	Owusu 2011	Ghana	Cross-sectional study; Other: Survey	7137	38	Opoku 2022	Ghana	Cross-sectional study	342 (160 aged 16-20)
17	Owolabi 2017	Multiple Countries Including Ghana	Cross-sectional study	309)	39	Ohene 2011	Ghana	Other: Secondary data analysis	882
18	Nwaozuru 2021	Ghana	Other: Secondary data analysis	3325	40	Ohene 2015	Ghana	Cross-sectional study; Other: Survey	1984
19	Otchere 2021	Ghana	Cross-sectional study; Other: Survey	372	41	Ohene 2008	Ghana	Cross-sectional study	1280
20	Oppong 2021	Ghana	Cross-sectional study; Other: Survey	809	42	Ocansey 2014	Ghana	Other: expert opinion	n/a
21	OppongAsante 2022	Ghana	Cross-sectional study	193	43	Nyundo 2020	Multiple Countries Including Ghana	Cross-sectional study	625
22	Nii-BoyeQuarshie 2022	Ghana	Cross-sectional study	1437	44	Nyarko 2020	Ghana	Cross-sectional study	415
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1	Masa 2019	Multiple Countries Including Ghana	Cross-sectional study	773 from Ghana, 1596 total	23	Keogh 2018	Multiple Countries Including Ghana	Qualitative research	Key informant interviews
2	Manu 2015	Ghana	Cross-sectional study	395	24	Kenu 2014	Ghana	Cross-sectional study	34
3	Mamudu 2015	Multiple Countries Including Ghana	Cross-sectional study; Other: Survey	3154 in Ghana	25	Kenu 2020	Ghana	Cross-sectional study	101
4	Loll 2020	Ghana	Cross-sectional study	380	26	Karim 2003	Ghana	Cross-sectional study	3739
5	Loll 2019	Ghana	Cross-sectional study	325	27	Kardefelt-Winther 2020	Multiple Countries Including Ghana	Cross-sectional study	2060
6	Logo 2020	Ghana	Other: secondary data analysis	5664	28	Kananura 2021	Multiple Countries Including Ghana	Cross-sectional study	
7	Kushitor 2020	Ghana	Cross-sectional study; Other: Survey	1570 aged 15-24	29	Kabiru 2010	Multiple Countries Including Ghana	Cross-sectional study; Other: Survey	9819 total, 4430 from Ghana
8	Kumi-Kyereme 2007	Ghana	Qualitative research;	4692	30	Kabir 2021	Ghana	Policy review; Other: Programmatic and policy evaluation	723
9	Kugbey 2018	Ghana	Cross-sectional study	1648	31	Natala 2018	Ghana	Text and opinion	NA

10	Kotoh 2022	Ghana	Qualitative research	16	32	Mutua 2021	Multiple Countries Including Ghana	Other: Survey , longitudinal study	815 from Ghana
11	Klu 2022	Ghana	Cross-sectional study; Other: Survey	221	33	Michels 2017	Ghana	Cross-sectional study	370
12	Irinyenikan 2022	Multiple Countries Including Ghana	Cross-sectional study; Other: Survey	862 total,	34	Melesse 2021	Multiple Countries Including Ghana	Cross-sectional study	
13	Intiful 2016	Ghana	Cross-sectional study	265	35	McQuestion 2012	Ghana	Cross-sectional study	3116
14	Hormenu 2018	Ghana	Cross-sectional study	1400	36	Masa 2014	Ghana	Other: secondary data analysis	6252
15	Hormenu 2022	Ghana	Cross-sectional study	1311	37	Gyesaw 2013	Ghana	Qualitative research	54
16	Hindin 2014	Other: sub Saharan Africa	Other: secondary data analysis	3875	38	Gyan 2021	Ghana	Cross-sectional study	79
17	Henderson 2022	Ghana	Cross-sectional study	331	39	Gyamfi 2015	Ghana	Cross-sectional study	118
18	Hayfron-Benjamin 2020	Ghana	Qualitative research	28	40	Gyamfi 2019	Ghana	Cross-sectional study	302
19	Hampshire 2015	Multiple Countries Including Ghana	Cross-sectional study; Qualitative research;	1568 from Ghana	41	Gumanga 2012	Ghana	Cross-sectional study	456
20	Hall 2018	Ghana	Cross-sectional study;	1063	42	Gray 2001	Ghana	Other: secondary data analysis	239
21	Hall 2018	Ghana	Qualitative research;	63	43	Gosdin 2020	Ghana	Cross-sectional study	2948
22	Owusu 2018	Ghana	Cross-sectional study	13,784	44	Gosdin 2020	Ghana	Cohort study; Cross-sectional study	1387 girls
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1	Glozah 2017	Ghana	Cross-sectional study	770	24	Darteh 2016	Ghana	Cross-sectional study	902
2	Glozah 2015	Ghana	Cross-sectional study	770	25	Darteh 2020	Multiple Countries Including Ghana	Cross-sectional study; Other: Survey	3982 from Ghana
3	Glozah 2015	Ghana	Cross-sectional study	770	26	Darteh 2014	Ghana	Other: Secondary Data Analysis	3124
4	Glozah 2014	Ghana	Cross-sectional study	770	27	Darteh 2020	Ghana	Cross-sectional study; Other: Survey	1407
5	Glozah 2018	Ghana	Cross-sectional study	1984	28	Darling 2020	Multiple Countries Including Ghana	Cross-sectional study; Other: Survey	625 from Ghana
6	Glozah 2015	Ghana	Qualitative research	11	29	Dankyi 2021		Cross-sectional study; Other: Survey	207

7	Glover 2003	Ghana	Qualitative research; Other	704	30	Chandora 2016	Multiple Countries Including Ghana	Cross-sectional study	
8	Gbagbo 2020	Ghana	Cross-sectional study; Other: Mixed method	401	31	Borzekowski 2006	Ghana	Cross-sectional study; Other: Survey	778
9	Ganle 2019	Ghana	Cross-sectional study	164	32	Boamah-Kaali 2021	Ghana	Qualitative research	38
10	Ganle 2019	Ghana	Cross-sectional study; Other: Survey	242	33	Boachie 2022	Ghana	Other: Longitudinal study	6250
11	Ganle 2016	Ghana	Mixed methods	208	34	Blay 2000	Ghana	Cross-sectional study	583
12	Fondjo 2018	Ghana	Cross-sectional study; Other: Survey	1036	35	Bingenheimer 2016	Ghana	Cross-sectional study; Other: Survey	298
13	Fernandes 2017	Ghana	Other: Mixed-methods	1531 aged 11-17	36	Bingenheimer 2015	Ghana	Cohort study	1275
14	Essuman 2022	Ghana	Cross-sectional study	58	37	Biney 2017	Ghana	Cross-sectional study	1124
15	Enimil 2016	Ghana	Cross-sectional study; Qualitative research	40	38	Biney 2016	Ghana	Cross-sectional study; Other: Survey	196
16	EngelbertBain 2019	Ghana	Cross-sectional study; Qualitative research	53 (30 adolescents,	39	Biddlecom 2009	Multiple Countries Including Ghana	Cross-sectional study; Other: Survey	9762 total, 2426 from Ghana
17	EngelbertBain 2020	Ghana	Cross-sectional study; Other: Survey	331	40	Berhane 2020	Multiple Countries Including Ghana	Cross-sectional study	8075 total, 625 from Ghana
18	Dubik 2019	Ghana	Cross-sectional study	424	41	Bankole 2007	Multiple Countries Including Ghana	Cross-sectional study	2605 1903 1849 2480
19	Doku 2013	Ghana	Cross-sectional study; Other: Survey	1195	42	Bankole 2007	Multiple Countries Including Ghana	Other: secondary data analysis	4078
20	Doku 2012	Ghana	Cross-sectional study; Other: Survey	1165	43	Azupogo 2019	Ghana	Cross-sectional study; Other: Survey	319 adolescents
21	Doku 2012	Ghana	Cross-sectional study; Other: Survey	1195	44	Azupogo 2021	Ghana	Mixed-methods	1131
22	Der 2021	Ghana	Cross-sectional study; Other: Survey	270	45	Azupogo 2020	Ghana	Cross-sectional study; Other: Survey	1727
23	Tabong 2018	Ghana	Qualitative research	154:	46	Azupogo 2021	Ghana	Cross-sectional study; Other: Survey	2795

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1	Aziato 2016	Ghana	Qualitative research	92	24	Alicke 2017	Ghana	Cross-sectional study	188
2	Aziato 2015	Ghana	Qualitative research	16	25	Ali 2018	Ghana	Cohort study	366
3	Atorkey 2021	Ghana	Cross-sectional study; Other: Survey	1763	26	Alhassan 2019	Ghana	Cross-sectional study	250
4	Atorkey 2021	Ghana	Cross-sectional study	1756	27	Alhassan 2020	Ghana	Cross-sectional study	235
5	Atiglo 2018	Ghana	Cross-sectional study; Other: Survey	1532	28	Akumiah 2020	Ghana	Cross-sectional study	360
6	Asumah 2022	Ghana	Cross-sectional study	13	29	Ahinkorah 2020	Ghana	Cross-sectional study	5664
7	Astrøm 2002	Ghana	Cross-sectional study; Other: Survey	504	30	Ahinkorah 2021	Multiple Countries Including Ghana	Cross-sectional study	not stated
8	Asare 2015	Ghana	Cross-sectional study; Other: Survey	296	31	Ahinkorah 2021	Ghana	Cross-sectional study	1342
9	Asampong 2013	Ghana	Qualitative research	Not listed	32	Agyemang 2019	Ghana	Cross-sectional study	200
10	Asamoah 2017	Ghana	Cross-sectional study; Other: Survey	3573	33	Agyemang 2020	Ghana	Cross-sectional study	139
11	Arhin 2019	Ghana	Cross-sectional study; Other: Survey	198	34	Afrifa-Anane 2015	Ghana	Cross-sectional study	201
12	Appiah-Agyekum 2013	Ghana	Cross-sectional study	260	35	Adotey 2011	Ghana	Cohort study	134
13	Appiah 2021	Ghana	Cross-sectional study	423	36	Adjorlolo 2022	Ghana	Cross-sectional study	553
14	Appiah 2020	Ghana	Cross-sectional study	426	37	Adjei 2017	Multiple Countries Including Ghana	Other: Population based survey	1314
15	Anyan 2016	Ghana	Cross-sectional study; Other: Survey	533	38	Ankrah 2016	Ghana	Cross-sectional study; Other: Semi-structured interview	19
16	Anyan 2018	Ghana	Cross-sectional study; Other: Survey	628	39	Anaba 2022	Ghana	Cross-sectional study; Other: secondary data analysis	2697
17	Anum 2019	Ghana	Cross-sectional study; Other: Survey	553	40	Anaba 2021	Ghana	Cross-sectional study; Other: Survey	4573

18	Annan 2021	Ghana	Cohort study	416	41	Amponsem-Boateng 2022	Ghana	Cross-sectional study	3165
19	Amo-Adjei 2021	Ghana	Qualitative research	298	42	Ampiah 2019	Ghana	Cross-sectional study	122
20	Amenyah 2016	Ghana	Cross-sectional study	370	43	Amo-Adjei 2018	Multiple Countries Including Ghana	Cross-sectional study	244832
21	Ameme 2020	Ghana	Qualitative research;	3160	44	Amo-Adjei 2013	Ghana	Cross-sectional study; Other: Survey results	3517
22	Addae 2020	Ghana	Cross-sectional study	2068	45	Amo-Adjei 2021	Ghana	Qualitative research	~280
23	Ackah 2021	Ghana	Cross-sectional study	3592	46	Addae 2021	Ghana	Qualitative research	56
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1	Aboagye 2021	Ghana	Cross-sectional study	3632	22	Nkyekyer 2004	Ghana	Case series; Other: Retrospective observational study	245
2	Abiuro 2022	Ghana	Qualitative research	25	23	Edwin 2010	Ghana	Cohort study; Other: Retrospective cohort study	135
3	AbdulKarimu 2018	Ghana	Text and opinion; Policy review	n/a	24	Krugu 2017	Ghana	Qualitative research	21
4	Thatte 2016	Ghana	Cross-sectional study; Other: Survey	1203	25	OppongAsante 2013	Ghana	Cross-sectional study	324
5	Hall 2018	Ghana	Qualitative research	63	26	Munro-Kramer 2020	Ghana	Qualitative research	76 in beta testing during Administration
6	Ameyaw 2018	Ghana	Cross-sectional study; Other: Survey	9396 (923 between the ages of 15-24)	27	Doku 2015	Ghana	Cross-sectional study; Other: Survey	291
7	Ahinkorah 2019	Ghana	Case-control study	400	28	Abdul-Rahman 2011	Ghana	Cohort study	354
8	Formentos 2021	Ghana	Cross-sectional study; Qualitative research		29	Wolf 2002	Ghana	Cross-sectional study	106 peer educators 526 contacts
9	Esia-Donkoh 2015	Ghana	Qualitative research	21	30	Bain 2020	Ghana	Other: Letter to editors	N/A
10	Asare 2020	Ghana	Cross-sectional study	200	31	Hampshire 2011	Ghana	Cross-sectional study; Qualitative research; Other: Survey	not stated
11	Challa 2018	Ghana	Qualitative research	63	32	Manyanga 2014	Multiple Countries Including Ghana		23496

12	Amoah 2021	Ghana	Randomized controlled trial	732	33	Quaidoo 2018	Ghana	Cross-sectional study	
13	Boonstra 2007	Multiple Countries Including Ghana	Cross-sectional study; Qualitative research; Other: Survey	Not listed	34	Seidu 2020	Ghana	Cross-sectional study	
14	Chandora 2016	Multiple Countries Including Ghana	Cross-sectional study; Other: Survey	4171 from Ghana	35	Doku 2012	Ghana	Cross-sectional study; Other: Survey	
15	Yakubu 2019	Ghana	Randomized controlled trial	363	36	Marrone 2014	Ghana	Other: Secondary Data Analysis	
16	Ahinkorah 2021	Ghana	Cross-sectional study	971	37	Asare 2020	Ghana	Cross-sectional study	
17	Wolf 2003	Ghana	Cross-sectional study; Other: Survey	490	38	vanderGeugten 2015	Ghana	Other: Quasi-experimental	272
18	Krugu 2016	Ghana	Cross-sectional study	20	39	Keogh 2021	Ghana	Cross-sectional study	1039
19	Biddlecom 2007	Multiple Countries Including Ghana	Cross-sectional study	3457	40	Hainsworth 2014	Multiple Countries Including Ghana	Other: Retrospective Scale-Up Analysis	5 programs, not analyzed at individual level
20	Riley 2012	Ghana		238	41	Aninanya 2015	Ghana	Randomized controlled trial	2664
21	Gyamfi 2017	Ghana	Cross-sectional study	118	42	Karletsos 2021	Ghana	Cross-sectional study; Other: Longitudinal study	7072
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1	Baku 2017	Ghana	Randomized controlled trial	145	14	Aviisah 2018	Ghana	Cross-sectional study; Other: Survey	9054
2	Kyilleh 2018	Ghana	Qualitative research	80	15	Bain 2021	Ghana	Qualitative research	30
3	Rokicki 2017	Ghana	Randomized controlled trial	498	16	Annor 2021	Ghana	Cross-sectional study	392
4	Kumi-Kyereme 2014	Ghana	Qualitative research	60	17	Hutchinson 2020	Ghana	Other: Quasi-Experimental Design with pre/post longitudinal data	2625
5	Obasi 2019	Ghana	Cross-sectional study; Other: Survey	280	18	Amoako-Agyeman 2012	Ghana	Cross-sectional study; Other: Survey	448
6	Rokicki 2017	Ghana	Randomized controlled trial	756	19	Senayah 2019	Ghana	Cross-sectional study	67
7	Habib 2020	Ghana	Qualitative research; Other:	392	20	Daniels 2007	Multiple Countries Including Ghana	Case-control study	Different n for different

			Quasi-experiment, research proposal						components (~160,000)
8	Pradeilles 2019	Ghana	Qualitative research	24	21	Krugu 2018	Ghana	Randomized controlled trial	1822
9	Nyarko 2015	Ghana	Other: Secondary data analysis	1037	22	Kleintjes 2010	Multiple Countries Including Ghana	Qualitative research; Policy review	Key informant interviews and policy analysis
10	Ocansey 2016	Ghana	Other: expert opinion	n/a	23	Adam 2020	Ghana	Cross-sectional study	423
11	Hackett 2019	Multiple Countries Including Ghana	Cross-sectional study; Qualitative research	112	24	Aviisah 2018	Ghana	Cross-sectional study; Other: Survey	9054
12	Quarshie 2021	Multiple Countries Including Ghana	Cross-sectional study	297					
13	Addy 2021	Ghana	Mixed Methods	440					