

The impacts of community-based HIV testing and counselling on testing uptake

A systematic review

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Abstract

Purpose – Community-based HIV testing and counselling (HTC) has been recommended for improving access to prevention, care, and treatment services in at-risk populations. Earlier systematic reviews and meta-analyses have been undertaken, but due to some methodological limitations, their findings do not yet provide a practical significance. The purpose of this paper is to re-examine the recent evidence of the efficacy of community-based HTC approaches on the uptake of HTC in at-risk populations.

Design/methodology/approach – The database of PubMed online, Science Direct, the Lancet Global Health, the Cochrane Central Register of Controlled Trials, and Google Scholar were systematically searched using Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines to obtain empirical papers published between March 2013 and December 2015.

Findings – Of 600 collected papers, there were 6 cluster randomized trials papers which met the inclusion criteria. Compared to the health facilities-based HTC, community-based HTC approaches have been shown to improve the uptake of HIV testing from 5.8 to 37 per cent, and improve HIV testing in men and their partners together from 6.8 to 34 per cent. The community approaches also detected lower HIV-positive cases (0.29 per cent as compared to 4 per cent), improved access to treatment services from 0.3 to 25 per cent,

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Competing interests: the authors declare that they have no competing interests.

The authors would like to thank Ngesti Gandini (librarian at Medical Faculty Universitas Gadjah Mada) who helped develop the search strategy of the review, Erik Christopher (Office of Research and Publication, Medical Faculty Universitas Gadjah Mada), and Panca Desristanto for assistance in language editing before submission.



demonstrated higher cluster differentiation 4 count in newly diagnosed patients (median of 400-438 cells/ μ l), and increased the rate of first-time HIV testing from 9 to 11.8 per cent. With respect to social and behavioural outcomes, community-based HTC increased social norms for HIV testing by 6 per cent (95 per cent CI 3-9), decreased multiple sex partners by 55 per cent (95 per cent CI 42-73), lowered casual sex by 45 per cent (95 per cent CI 33-62), increased knowledge about HIV (83.2 vs 28.9 per cent), improved positive attitudes towards HIV patients (73.0 vs 34.3 per cent), and increased the use of condoms (28.0 vs 12.3 per cent).

Originality/value – Community-based HTC combined with behavioural interventions have been found to be more effective in increasing the uptake of HIV testing as well as other outcomes as compared to the conventional health facilities-based testing and counselling approaches.

Keywords Systematic review, Community-based HIV testing and counselling, Uptake of HIV testing, Cluster randomized trials

Paper type General review

Background

The 90-90-90 target set by UNAIDS for achieving the vision of “Ending the AIDS Endemic by 2030” provides a new perspective in the control of transmission of human immunodeficiency virus (HIV) with a main key strategy being early diagnosis[1]. HIV testing and counselling (HTC) are the only entry points to HIV prevention, care, support, and treatment[2, 3]. Facility-based HTC (i.e. standard HTC carried out in a permanent health facility) services are considered to be insufficient to meet the national and global targets, and furthermore, they are not suitable for marginalised populations[3-5]. Fear of stigma, lack of knowledge about HIV, low perceived risk of HIV infection, misperception of benefits, and lack of social support have been identified as possible factors preventing the populations at risk to utilise facility-based HTC services[6].

Despite the low evidence, the World Health Organization (WHO) has issued a strong recommendation for community-based HTC (i.e. HTC conducted outside of health facilities) approaches to improve access to HIV prevention, care, and treatment services for populations at risk[7, 8]. The effectiveness and efficacy of community-based HTC has been piloted through various studies around the world. It is considered as an effective HTC approach with high acceptance and utilisation, helping reduce stigma and discrimination, especially for hard to reach populations, and contributing to the removal of the structural, logistical, and social barriers to HTC[9].

An earlier published systematic and meta-analytical study revealed that the community-based HTC approach had been shown to increase the coverage of HIV testing utilisation, to increase the proportion of first-time testers, and to increase the proportion of patients with a number of cluster differentiation 4 (CD4) by over 350 cells/ μ l compared with facility-based HTC. Community-based HTC also increased the proportion of participants who undertook follow-up CD4 tests after diagnosis, detected patients at an earlier stage, increased the number of new diagnoses of HIV, and potentially reduced the stigma and discrimination. However, the study identified some methodological limitations that included the use of observational designs in most studies, the risk of bias (selection, performance, and/or detection bias), lack of expert validity in developing a rational conceptual framework, and lack of practical significance[10].

This systematic review was undertaken to obtain stronger evidence on the efficacy of the community-based HTC approaches to the uptake of HTC and the achievement of other secondary outcomes.

Methods

This systematic review was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines in accordance with the current guides in systematic review and meta-analysis of randomized trials[11]. Relevant papers were searched from the online database, including PubMed, Science Direct, Lancet Global Health,

the Cochrane Central Register of Controlled Trials, and Google Scholar. A combination of keywords was used for searching, including: community-based HTC, HTC, voluntary counselling and testing, uptake of HIV testing, intervention, and randomized controlled trials. Searches were also done on the bibliographical list of searched papers to obtain additional articles.

The inclusion criteria were determined based on the key characteristics of the study: population, intervention, comparator, outcome, and design[11]. Studies were included when: the study population included general populations in generalised HIV epidemics or populations at risk in concentrated or low-level HIV epidemics; the intervention was community-based HTC services offered in combination with a facility-based HTC as background; the comparator was facility-based HTC or other types of community-based HTC services; the outcome(s) included either uptake of HIV testing, CD4 count at diagnosis, access to treatment services, HIV-positive rate, or coverage of HIV testing; the study design was randomized controlled trials or observational cohort study; and English or Indonesian empirical papers published after the latest systematic review and meta-analysis publication[10], i.e. between March 2013 and December 2015.

The search was done separately by two researchers from 9 to 20 January 2016. The results were then matched and identified to remove duplicating papers. Screening was done by reviewing the title and abstract of the remaining empirical papers to select the papers relevant to the purpose. Furthermore, two researchers reviewed the full text for assessing eligibility and removed unqualified papers based on the exclusion criteria. Differences in assessment results were resolved by discussion to gain agreement. Eligible papers were reviewed critically to assess their validity and risk of bias, and then analysed narratively.

Results

Search results

The search resulted of 595 papers comprised 108 from PubMed, 65 from Science Direct, 40 from The Lancet Global Health, and 382 from The Cochrane Central Register of Controlled Trials. The search from Google Scholar and the bibliography search resulted in five additional papers. Screening by titles and abstracts found 96 doubles and 411 irrelevant articles. A total of 93 full text papers were reviewed separately based on the inclusion criteria by two reviewers with the results: 11 papers were not community-based HTC, 26 papers having irrelevant data, 23 papers were not randomized controlled trials or observational cohort studies, 19 papers were published before March 2013, 7 full text papers were inaccessible, and 1 paper was a research protocol (Figure 1).

All papers which met inclusion criteria ($n = 6$) were cluster randomized trials conducted in China, Lesotho, Zambia, Nigeria, and South Africa, and one study each was conducted in Thailand, Tanzania, Zimbabwe, Soweto, and KwaZulu-Natal. Four studies were conducted amongst the general population[12-15], one study involved pregnant women[16], and one study involved a rural migrant population[17]. According to the intervention, five studies compared community-based HTC with facility-based HTC[12-15, 17]. One study compared home-based HTC with mobile-clinic HTC[16] (Table I).

Risk of bias

Assessment of risk of bias used the Cochrane risk of bias tool[18]. Four studies reported an adequate sequence of randomisation[12-15]. All studies were at risk of selection bias because of the allocation concealment of participants at the cluster level. Four studies did not perform blinding on measurement of the result so that it was at risk of detection bias[13, 15-17]. The risk of attrition bias was found in two studies[16, 17], and five studies were at risk of reporting bias[12-15, 17]. Two studies were at risk of other biases (cluster effect) for not stratifying and/or matching before randomisation[12, 17] (Table II).

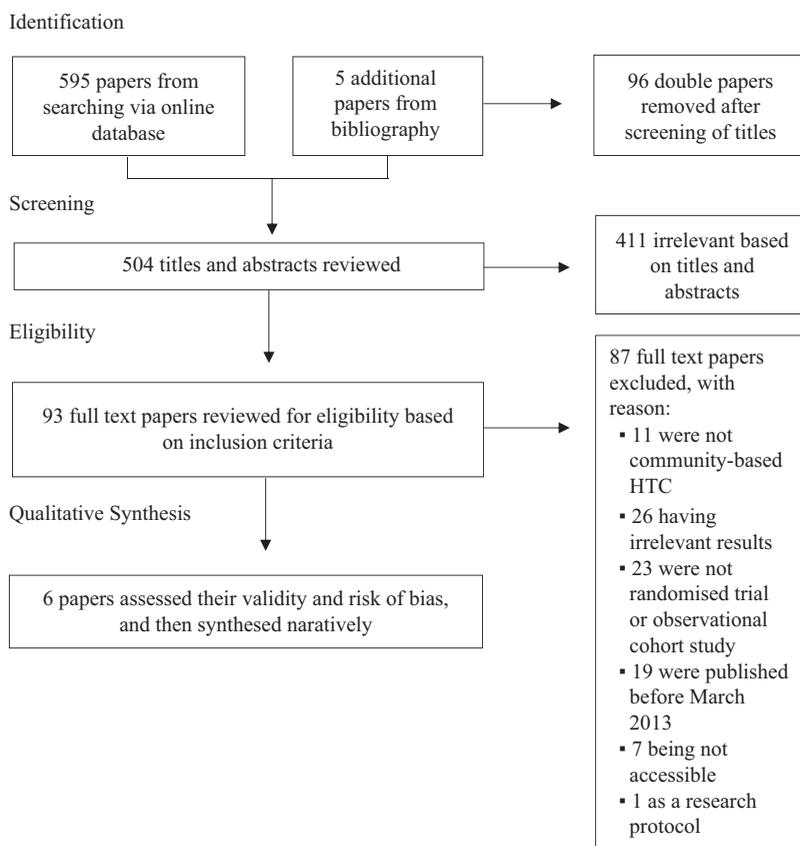


Figure 1.
Flow chart of the articles search and study selection process

Study validity

The validity of the study was assessed according to the conceptual framework, research design, and research implementation. All papers indicated empirical validity in the formulation of a research conceptual framework. Only one paper[14] showed expert validity with the use of the tipping point theory for social change, diffusion of the innovation model, and the social action theory. All papers used a cluster randomized trials design; four of them used a pre-test control group design[12-14, 17] and the other two were post-test only control group designs[15, 16]. Three studies performed a measurement in repeated cross-sectional surveys using sample quotas[17], random samples[14], and total population[12]. One study performed measurement in a longitudinal follow-up manner[13].

Forms of intervention

The four forms of the community-based HTC approach in this study included: mobile-clinic HTC[14, 16, 17]; home-based HTC[12, 13]; congregation-based HTC[15]; and establishing a new clinic for HTC in the community[17]. The approach was combined with HTC promotion campaigns[17], educational meetings[15, 16], community mobilisation[14, 17], door-to-door outreach[12, 17], post-test support services[14], or integration into other health services, i.e. family planning, special clinics, or integrated laboratory tests[15, 17].

Table I.
Overview of papers in
the review: 2013-2015

Authors	Population	Intervention	Control	Outcome	Design	Period	Country
Zhang <i>et al.</i> [17]	Rural migrants (15-65 years old) Gender: male and female	1. Traditional model of HIV testing and counselling (HTC) promotion: 1 cluster; 839 participants 2. Mobile-clinic HTC with community mobilisation, outreach, establishing a new HTC clinic in the community, and integration of HTC into family planning and specific clinics): 1 cluster; 434 participants	Facility-based HTC with no intervention for HTC promotion: 1 cluster; 577 participants	HTC acceptance, knowledge and attitude about HIV/AIDS, sexual behaviours	Cluster randomized trial	2 years	China
Coates <i>et al.</i> [14]	General population (18-32 years old) Gender: male and female	Community-based rapid HTC with four component: community mobilisation, easy access to HTC, post-test support services, and real-time performance feedback: 25 cluster; 63,000 participants	Standard (facility-based) HTC: 25 clusters; 52,900 participants	HIV incidence, HTC uptake, social norms, HIV behaviour risk, number of sexual partner, negative life events, discussions about HIV, disclosure of HIV status, HIV stigma	Cluster randomized trial	36 months	Tanzania, Zimbabwe, Thailand, South Africa
Doherty <i>et al.</i> [12]	General population: adults and adolescence (14-17 years old) Gender: male and female	Door-to-door outreach and home-based HTC by local lay counsellor: 8 clusters; 2,025 participants	Standard (facility-based) HTC: 8 clusters; 2,129 participants	Prevalence of HTC, HIV awareness, stigma, sexual behaviour, vulnerability to violence, and access to care	Cluster randomized trial	1 year	South Africa
Ezeanolue <i>et al.</i> [15]	Pregnant woman who attended churches in resource-limited settings (aged 18 years and older)	Health education and on-site integrated laboratory tests (haemoglobin, malaria, sickle cell genotype, HIV, Hepatitis B, and syphilis) during the baby shower: 20 clusters; 1,309 participants	Standard (facility-based) HTC: 20 clusters; 1,080 participants	Confirmed HIV testing during pregnancy, rate of PMTCT completion, and rate of HTC in male partners	Cluster randomized trial	1 year, 7 months	Nigeria

(continued)

Authors	Population	Intervention	Control	Outcome	Design	Period	Country
Fylkesnes <i>et al.</i> [13]	General populations (all adult household members) Gender: male and female	Home-based HTC by local lay counsellors: 18 clusters; 836 participants	Standard (facility-based) HTC: 18 clusters; 858 participants	Acceptance of HTC, equity in uptake, negative life events, acceptance of couple counselling	Cluster randomized trial	1 year	Zambia
Labhardt <i>et al.</i> [16]	General population in rural catchment areas	Mobile-clinic HTC and multi-disease campaigns: 6 clusters; 1,764 participants	Home-based HTC and multi-disease campaigns: 6 clusters; 1,433 participants	HTC uptake, rate of positive tests and linkage to care, first-time testers, male participation, stage of disease and CD4 cell count among participants newly diagnosed HIV-positive	Cluster randomized trial	1 month	Lesotho

Note: $n = 6$

Table I.

Table II.
Results of assessment
risk of bias

Author	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants, personnel, and outcome assessment (performance and detection bias)	Incomplete outcome data addressed (attrition bias)	Selective reporting (reporting bias)	Other bias (cluster effect)
(12)	Low risk	High risk	Low risk	Low risk	High risk	High risk
(13)	Low risk	High risk	High risk	Low risk	High risk	Low risk
(14)	Low risk	High risk	Low risk	Low risk	High risk	Low risk
(15)	Low risk	High risk	High risk	Low risk	High risk	Low risk
(16)	High risk	High risk	High risk	High risk	Low risk	Low risk
(17)	High risk	High risk	High risk	High risk	High risk	High risk

Effect on outcome

Uptake of HIV testing. Five studies with the facility-based HTC control groups showed that the uptake of HIV testing (the number of participants who receive complete HTC including pre-test counselling, HIV testing, and post-test counselling) in the community-based HTC groups was significantly higher than facility-based HTC groups with a range between 6 and 37 per cent[12-15, 17]. In one study comparing the home-based HCT with the mobile-clinic HTC, both showed the high rates of test utilisation above 85 per cent (92.5 vs 86.7 per cent; OR 1.89; 95 per cent CI 1.44-2.46; $p < 0.001$)[16]. Community-based HTC increased overall rates of HIV testing by 25 per cent (95 per cent CI 12-39; $p = 0.0003$), in males by 45 per cent (95 per cent CI 25-69; $p < 0.0001$), and in females by 15 per cent (95 per cent CI 3-18; $p = 0.013$)[14].

Community-based HTC interventions increased the HTC utilisation in men and their partners, simultaneously. Three studies reported that the proportion of HIV testing in men in the intervention groups was higher than that in the control groups, i.e. 76 vs 42 per cent (RR 1.8, 95 per cent CI 1.4-2.3)[13], 30.3 vs 23.5 per cent (aOR 1.41, 95 per cent CI 0.98-2.03; $p = 0.062$)[16], and 24 vs 16 per cent (IE 1.45; 95 per cent CI 1.25-1.69; $p < 0.0001$)[14]. Community-based HTC interventions also had a positive effect on the couples' HIV testing utilisation with a two-fold higher prevalence ratio in the intervention groups than in the control groups (21 vs 10 per cent, PR 2.24, 95 per cent CI 1.49-3.03, intra-cluster correlation coefficient (ICC) 0.02)[12]. Another study reported that in couples living in the same house, there were 62 per cent (361/582) receiving counselling together and 70 per cent (315/450) being tested together with their partners[13] (Table III).

HIV-positive rate. Four studies reported the results of HIV testing. The participants with an HIV-positive diagnosis in the intervention groups were lower than those in the control

Table III.
Uptake of HIV testing
and counselling

Study	Intervention			Control			RR/OR/aOR (95% CI); p -value
	n	N	%	n	N	%	
(12)	1,392	2,025	69	997	2,129	47	PR 1.54 (1.32-1.81)
(13)	461	565	81.6	287	554	51.8	RR 1.6 (1.4-1.8)
(14)	13,305	27,153	49	10,469	26,844	39	OR 1.27 (1.15-1.41); < 0.0001
(15)	1,514	1,647	92	740	1,355	55	aOR 11.2 (8.77-14.25) < 0.0001
(16)	1,083	1,171	92.5	1,207	1,392	86.7	OR 1.89 (1.44-2.46); < 0.001
(17)	412	434	94.9	398	577	69	OR 2.91 (1.69-4.97); < 0.001

Notes: n , number of participants receiving HIV testing and counselling; N , number of participants who were offered HIV testing and counselling

groups, i.e. 3.6 per cent (39/1,083) vs 6.2 per cent (75/1,207); aOR = 0.64; 95 per cent CI 0.48-0.86; $p = 0.02$ [2] and 6 per cent (76/1,276) vs 10 per cent (85/841); PR = 0.65; 95 per cent CI 0.47-0.90; ICC = 0.02[3]. HIV incidences in the intervention groups were estimated at 1.52 vs 1.81 per cent in the control group with an estimated decrease by 13.9 per cent (RR = 0.86; 95 per cent CI 0.73-1.02; $p = 0.082$)[14]. One study reported that there was no significant difference in HIV-positive cases found in the intervention groups and the control groups, i.e. 2.5 per cent (41/1,647) vs 2.4 per cent (32/1,355)[15].

Access to treatment. Three studies reported the coverage of access to treatment after obtaining results of HIV tests that were quite high. Two studies reported no significant differences between the intervention groups and the control groups, i.e. 25.6 per cent (10/39) vs 25.3 per cent (19/75) (aOR = 0.99, 95 per cent CI 0.35-2.79; $p = 0.978$) and 88 per cent (67/76) vs 87 per cent (74/85)[12, 16]. Another study found participants who were associated with prenatal care at 83 per cent (34/41) vs 44 per cent (14/32) (aOR = 6.2; 95 per cent CI 2.14-18.25) received antiretroviral therapy during pregnancy at 65 per cent (24/41) vs 40 per cent (12/32) (aOR = 2.8, 95 per cent CI 1.02-4.79), and accessed the services until the last follow-up at 81 per cent (33/41) vs 88 per cent (28/32) (aOR = 0.39; 95 per cent CI 0.04-3.99)[15].

CD4 count at diagnosis. One study reported the CD4 count found a median in the new patients by 438 cells/ μ l (265-650) in the home-based HTC groups and 400 cells/ μ l (207-629) in the mobile-clinic HTC groups. The proportion of patients with CD4 count less than 350 cells/ μ l was 39 and 35 per cent, respectively[16].

Proportion of first-time testers. Two studies reported the first-time testers (participants who undertook HIV tests for the first time) showed that the proportion of participants who received the first-time HIV testing in community-based HTC was higher than that in the control groups, i.e. 56.2 vs 44.4 per cent; AOR = 1.57; 95 per cent CI 1.03-2.39; $p = 0.035$ [16]; and 46 vs 37 per cent; PR = 1.20; 95 per cent CI 0.97-1.49; ICC = 0.03[12].

Effect on social and behavioural outcomes. Social and behavioural outcomes which are the impact of community-based HTC include changes in social norms, risky sexual behaviour, discussions about HIV, disclosure of HIV status, HIV-related stigma, or negative life events. Community-based HTC was reported to increase social norms related to HIV testing by 6 per cent (95 per cent CI 3-9; $p = 0.0001$) in the intervention groups while the effect on risky sexual behaviour, discussions about HIV, disclosure of HIV status, HIV-related stigma, and negative life events as a whole were reported to be not significant[13, 14]. Other studies reported that community-based HTC had a significant effect on sexual behaviour, which decreased multiple partners' sexual behaviour at 55 per cent (95 per cent CI 42-73) and 45 per cent casual sex (95 per cent CI 33-62), and increased knowledge about HIV/AIDS (83.2 vs 28.9 per cent), positive attitudes towards people living with HIV (73.0 vs 34.3 per cent), and condom use (28.0 vs 12.3 per cent) compared with facility-based HTC[12, 17].

Discussion

This systematic review provides stronger evidence about the efficacy of community-based HTC approaches in comparison with facility-based HTC utilisation. All papers were reviewed using a cluster randomized trials design, which is particularly suitable for the application of community-based HTC interventions that are open, wider-scaled, and carries high-risk contamination, thus having higher external validity[19]. The risk of bias due to the cluster effect which threatened internal validity had been anticipated by considering the ICC and cluster size in determining the sample size. In addition, most studies performed stratification and/or matching before randomisation, thus helping to increase the power to detect differences in the interventions[19-21].

All studies combined community-based HTC interventions with various components of behavioural interventions either at individual or community levels. The combination of behavioural change approaches has the potential for enormous epidemic impact in HIV prevention[22]. Interventions at the individual level using door-to-door outreach methods, provision of accessible HTC services, and provision of post-test support services would increase knowledge and awareness about the risk of contracting HIV, improve the perception of benefits of HIV testing, and eliminate logistical barriers to HIV testing[14, 23]. Community-level interventions using community mobilisation methods could normalise HIV testing, reduce stigma, and improve social support, thus potentially increasing the utilisation of HIV testing[14, 22, 24].

In all forms of interventions, community-based HTC was able to reach all target groups with higher coverage of HIV testing than facility-based HTC. Acceptance of the utilisation of HIV testing outside the health facility would increase the chances of finding the patients at the earlier stage and, at the same time, linking them to care, support, and treatment services[6]. Increasing the community-based HTC scale was assumed to have more potential in supporting the achievement of the 90-90-90 target in 2020. Modelling suggests that achieving these targets by 2020 will enable to end the AIDS endemic by 2030[1, 8, 25, 26].

The findings showed that community-based HTC increased the utilisation of HIV testing in men and their partners simultaneously, and this was also consistent with previous systematic review findings[3, 6, 10]. Community-based HTC primarily through home-based and mobile-clinics services was an effective strategy for reaching out to men and their partners. This approach was important, considering that men often missed almost every stage of HIV treatment and examination. They were less likely to have tests, more likely to be late to start ARV treatment, and more likely to be lost to follow-up on ARV treatment[3, 27]. Couple's HTC helped address status disclosure issues, enable planning of risk reduction based on couple's serostatus, and decreased high-risk behaviours[28].

Another interesting point was that community-based HTC found a lower number of HIV-positive patients, but in earlier stages with higher CD4 values compared to facility-based HTC groups. There was no significant difference in access to post-test treatment services between community-based HTC and facility-based HTC groups. These findings reinforced the WHO's recommendations for increasing the scale-up of community-based HTC interventions with linkage to care, support, and treatment services in order to reduce the rates of morbidity, mortality, and transmission associated with delayed initiation of antiretroviral treatment[8].

The high percentage of participants who were diagnosed with HIV negative in community-based HTC groups indicated that the intervention was effective enough to raise awareness of the population at risk for perceiving HIV transmission and the benefits of HIV testing, as well as lowering the barriers to HIV testing. Community-based HTC interventions had also been proven to increase social and behavioural outcomes, such as increased knowledge of HIV, social norms for HIV testing, positive attitudes towards people living with HIV, condom use, and decreased multiple partner and casual sex behaviour compared to facility-based HTC. These findings reinforced previous findings indicating that HTC was an evidence-based strategy that, in addition to raising serostatus awareness, also lowered high-risk behaviour and HIV transmission[3, 28, 29].

This systematic review had some methodological limitations so that it could not reach more relevant pieces of information. Eligible papers were mostly from Sub-Saharan Africa and only one was from the Asia-Pacific region. In addition to the risk of publication bias, this systematic review could not describe the acceptance of community-based HTC interventions in other regions. We did not conduct meta-analysis due to heterogeneity of operational definitions, target populations, and treatment forms. The findings in this review were limited to narrative analysis.

The CRT design used by all papers had the risk of selection and detection bias because of the difficulty of subject allocation and the measurement of results done closely. Most papers did not show expert validity, whereas there was only one study that explained the use of a rational theoretical-based approach in the formulation of a conceptual framework of the research[14]. The use of measurement methods of repeated cross-sectional surveys in two different sample groups also posed a risk of internal invalidity.

Conclusion

This study reveals that community-based HTC interventions are effective in improving the uptake of HTC and some other secondary outcomes including social and behavioural outcomes. Implementation of community-based HTC with linkage to prevention, care, and treatment services is the primary choice to stop HIV transmission at individual and community levels. Some of the methodological limitations of the reviewed papers provide input to improve subsequent studies.

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