



Review article

A Systematic Global Review of Condom Availability Programs in High Schools

 Eda Algur^{a,*}, Elin Wang, M.P.H.^b, Howard S. Friedman, Ph.D.^c, and Bidia Deperthes, Ph.D.^b
^a Department of Economics, Harvard University, Cambridge, Massachusetts

^b Department of Global Health, Yale University, New Haven, Connecticut

^c United Nations Population Fund, New York, New York

Article history: Received July 12, 2018; Accepted November 6, 2018

Keywords: Condom availability program; Condom use; Sexual behaviors; Adolescents; High school students; HIV; STIs; Teenage pregnancy; Sexuality



 A B S T R A C T

Purpose: High levels of HIV, sexually transmitted infections (STIs), and pregnancy among adolescents has motivated some countries to consider the implementation of condom availability programs (CAPs) in high schools. In this present study, we analyzed the impact of CAP on students' sexual behaviors and health outcomes.

Methods: We conducted a systematic literature review of peer-reviewed articles published between 1990 and 2017.

Results: Twenty-nine articles from six countries were included in this review. We found that CAP does not increase sexual activity nor lead to a greater number of sexual partners. It also does not lower the age of sexual initiation. A majority of the studies reported an increase in condom uptake and use at last sex among students with CAP. All the studies that examined STI found a decrease of STI symptoms and rates for students with CAP compared with the control group. The data on HIV rates was inconclusive. There was no difference in pregnancy rates associated with participation in CAP programs.

Conclusion: This global literature review showed that the fears surrounding CAP and promiscuity are unfounded. Once CAP is in place, students utilize it, and condom use increases, which translates to improved sexual health outcomes.

© 2018 Society for Adolescent Health and Medicine. All rights reserved.

IMPLICATIONS AND CONTRIBUTION

This global literature review of condom availability programs (CAPs) at the high school level investigates the arguments of the opponents of CAPs. Students access condoms more easily when CAP is in place in schools, and CAPs do not increase sexual activity among these adolescents.

Adolescents and young people aged 15–19 years represent a growing share of people living with HIV worldwide [1]. AIDS-related deaths have decreased among all age groups over the

Conflicts of interest: The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

* Address correspondence to current address: Eda Algur, Harvard T.H. Chan School of Public Health, Harvard University, Cambridge, MA 02115.

E-mail address: ealgur@hsph.harvard.edu (E. Algur).

past decade—except in adolescents. In 2016 alone, 260,000 young people aged 15–19 years were newly infected with HIV [1]. In sub-Saharan Africa, the region most affected by HIV, only 13% of adolescent girls and 9% of adolescent boys aged 15–19 years have been tested for HIV in the past 12 months and received the result of the last test [1].

More than 1 million sexually transmitted infections (STIs) are acquired every day worldwide adding to the one billion individuals living with an STI [2], with the second highest rate occurring among 15- to 19-year-olds [3]. A majority of adolescents do not have access to any adequate and affordable STI services [3].

According to the World Health Organization, about 16 million girls aged 15 to 19 years give birth every year, mostly in low- and middle-income countries [4]. Although there has been a marked decrease in birth rates among adolescent girls since 1990, 11% of all births worldwide are still to girls aged 15–19 years. Ninety-five percent of these births occur in low- and middle-income countries, and adolescent pregnancy remains a major contributor to maternal and infant mortality in these countries [4]. Complications during pregnancy and childbirth are the second-leading cause of death for adolescent girls worldwide, and some 3 million girls aged 15 to 19 years undergo unsafe abortions every year. Babies born to adolescent mothers face a substantially higher risk of dying than those born to women aged 20 to 24 years [4].

When used correctly and consistently, male and female condoms are effective barrier methods against HIV, STIs, and unintended pregnancies [5,6]. Male condom is the most preferred contraceptive method by sexually active adolescent girls [7].

In their review of programs in low- and middle-income countries among in or out of school young people, Hindin et al. [8] (2016) found that direct provision of contraceptives to young people was the most likely way to increase contraceptive use and reduce unintended pregnancies. The authors concluded that making condoms available in schools, anonymously and free of charge, may take away the barriers adolescents face when attempting to obtain condoms elsewhere [8].

Condom availability programs (CAPs) refer to any intervention at any level (school, city, state, or federal) that provides adolescents access to condoms. In this study, we examine solely CAP conducted at high schools; we use CAP to mean CAPs in which high school students can obtain condoms at their schools.

CAP is implemented in a variety of forms throughout the studies we reviewed. In several studies, CAP is part of a larger comprehensive sexuality education (CSE) program in which students are given information on STIs, HIV, pregnancy, and other birth control methods as well as instruction on correct and consistent condom use. In other studies, CAP is provided through the school health clinic. The school nurses may provide condom use instruction on distribution of condoms, or students may be given informational pamphlets rather than in-person condom use instruction. Other forms of birth control, which may be confounding factors for condom use, may also be available in the school clinic. In yet other studies, CAP is provided by a trusted teacher, with whom students may feel comfortable discussing sexual health issues. Finally, condoms may be made available through vending machines in school bathrooms, with no instruction regarding correct and consistent use.

In New York City, a school-based CAP has been implemented in public high schools since the early 1990s. During that time, the New York City (NYC) Board of Education decided to expand its HIV/AIDS curriculum to include condom provision in all NYC public high schools [14,23]. They conducted a survey of parents before implementing CAP and found that 69% of parents randomly chosen across NYC public high schools supported making condoms available to students as a component of an HIV/AIDS prevention program [14]. The result of CAP in NYC public high schools has been shown to increase condom use among students, with no effect on the rate of sexual activity [23]. Other reviews have also demonstrated that sexuality education is most impactful when school-based programs are complemented with community elements, including condom distribution, providing

training for health providers to deliver youth-friendly services, and involving parents and teachers [9–11].

Without making the United States the only focus of our study, we wanted to take advantage of a recent study from the National Health Statistics Reports on sexual activity and contraception use among teenagers between 2011 and 2015 [6]. These data from over 8 million teenagers in the United States showed that 42.4% of teenage girls (4.0 million) and 44.2% of teenage boys (4.4 million) in the United States had sexual intercourse at least once (were sexually experienced). About 30% reported having had sex in the past 3 months (sexually active group). Among those who had sexual intercourse in the 3 months before the interview (were “sexually active”), condom was the most commonly used birth control method. During the time of the study period, 81.0% of female teenagers used a method of contraception at first sex and 76.8% of male teenagers used a condom at first sex.

Facing the high levels of HIV, STIs, and pregnancy among adolescents, countries such as the Philippines and South Africa have recently considered implementing CAP in their secondary schools. They have, however, been met with significant backlash from key stakeholders including parents, religious leaders, and community members. Opponents of CAP argue that making condoms available in schools will incite students to initiate sex. They believe that such programs will increase promiscuity among students (in other words, increase the number of sexual partners), increase sexual activity, lead students to start sex earlier, and adopt other risky sexual behaviors. This stems from a view of condoms as a device for sex, rather than for protection during sex.

Proponents of CAP claim that such programs would diminish the critical barriers young people face while accessing condoms and lead to positive sexual health outcomes among students including the reduction of unintended pregnancy, STIs, and HIV rates.

We conducted a global literature review to understand the impact of CAP in high schools and its association with HIV, STIs, and pregnancy rates as well as students' behavior toward condoms.

There have been individual evaluations of CAP conducted at the community and country level but not a global systematic review. We decided to carry out this comprehensive global review of the published literature to respond to the requests of several countries to the United Nations Population Fund regarding data on the impact of CAP in high schools. The Philippines and South Africa, two countries that have recently considered implementing CAP in their high schools, for example, are two very different countries with varying regional and contextual barriers to condom access among adolescents. An existing country-specific review of CAP would not address the needs of both countries. A global review provides a wider lens through which to view CAP and its impact in many countries and regions of the world and will be useful for all countries wishing to implement such a program.

Methods

We included in our review all peer-reviewed articles, published in English, from January 1990 to June 2017, using the UNFPA and Harvard library systems. We queried the PubMed, Proquest, and Google Scholar databases using the following search terms: (“condom availability” OR “condom availability programs” OR

“condoms”) AND (“school” OR “high school” OR “adolescent” OR “school-based health center”). Criteria for inclusion in the full-text review were condom distribution, availability, provision at schools, and those related to male condoms only (as most of the articles did not address female condom). Articles were excluded from review if they addressed contraceptive provision in high schools but did not specifically mention “condom.” Literature reviews, legal briefs, and opinion pieces were also not included. Figure 1 presents a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram for the article screening and selection process used in this systematic review.

Information was organized based on the following definitions:

- Attitudes toward CAP: student and parent views toward condom provision in their schools.
- Sexual activity: sexual intercourse including vaginal, oral, and rectal sex.
- Sex acts: vaginal, oral, and rectal sex, and masturbation.
- Number of sexual partners: number of lifetime partners reported by students.
- Initiation of sex: first sexual intercourse or sexual debut.
- Condom access and uptake: students’ ability to obtain condoms; students’ perceptions of how easily they may obtain condoms; students’ uptake of condoms from their school programs.
- Condom use: students’ reported condom use at last sex.
- HIV infection rates: reported HIV incidence by school clinic or health worker.
- STI rates and symptoms: reported STI incidence by school clinic or health worker and diagnosis of clinical symptoms by school clinic or health worker.
- Pregnancy rates: teenage pregnancy rates reported by schools.

Each study conducted its own statistical analysis using odds ratios, adjusted odds ratios, adjusted prevalence ratios, risk ratios, and chi-square tests. Statistical significance or lack thereof is reported in the tables as found by each study using its own methods of analysis.

Results

Twenty-nine articles representing six countries met the criteria for inclusion. All the studies reviewed reported students’ attitudes toward condoms or how CAPs influenced their behavior. The data are grouped into four categories: attitudes toward CAP, impact on students’ sexual behaviors, impact on condom acquisition and condom utilization, and corresponding health outcomes. The findings from this review address many of the concerns surrounding CAP, namely whether making condoms available in schools will increase promiscuity, whether CAP will be utilized once made available in schools, and whether CAP will have the intended effects on students’ sexual health.

Attitudes toward CAP before implementation

Table 1 presents findings from 10 studies that examined the beliefs students and parents had regarding the effects of CAP. These studies present survey data that was collected before CAP implementation in their surveyed locations. They demonstrated data regarding opinions and attitudes toward CAP. In the United States, a majority of students (76%) [12] and parents (58% in Minnesota and 85% in New York City) [13,14] believed CAP would not increase sexual activity among students. In one U.S. study, 62% of parents believed that CAP would reduce the risk of teen pregnancy, and 60% of parents thought that condoms should be made available in high schools [13]. Indiana was near neutral in

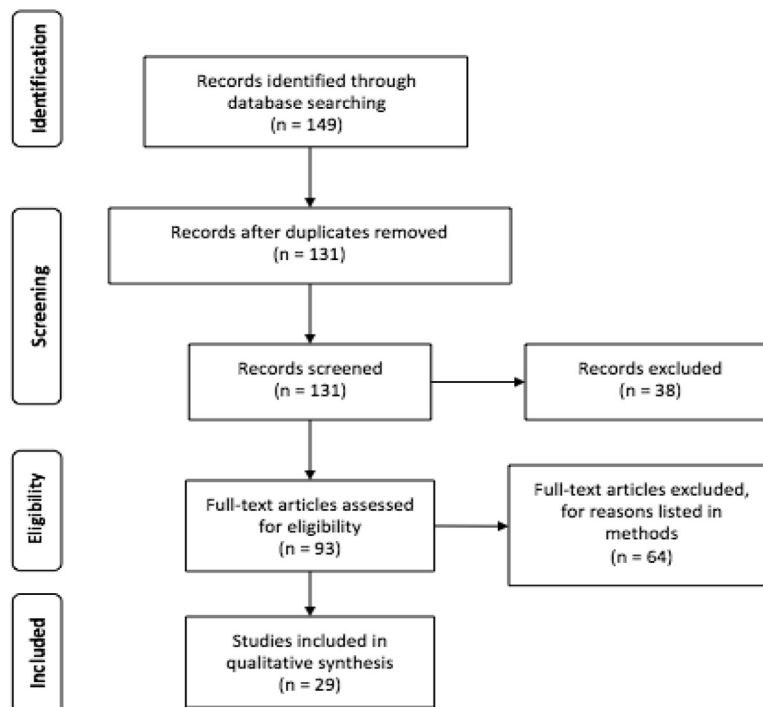


Figure 1. PRISMA flow diagram.

Table 1
Students' and parents' attitudes toward CAP

Outcomes	Population	N	Country	Year	Comments	Ref. #
76% of students surveyed responded there would be no change in the frequency of sex	Public HS students in Denver, CO	931	USA (Denver, CO)	1995		[12]
62% of parents surveyed responded that CAP would reduce the risk of pregnancy; 58% responded that making condoms available in schools would not cause more students to become sexually active; 60% believed that condoms should be made available in high schools	Parents of Minnesota HS students	1,605	USA (Minnesota)	2009		[13]
85% of parents believed that CAP would not cause their child to have more sex	Parents of children in NYC public HS	716	USA (NYC)	1995		[14]
48% of community members surveyed agreed that condoms should be made available to teenagers in public high schools without parental permission	Community members in Indiana	517	USA (Indiana)	2005	This study conducted a telephone survey of adult Indiana residents regarding their views on condoms for HIV/STI prevention in schools.	[15]
63% of parents surveyed endorsed prescribing and dispensing contraceptives at school clinics; 75% supported providing birth control pills or condoms to students who were already sexually active	Parents of public HS students in Baltimore, MD	262	USA (Baltimore, MD)	1992		[16]
63% of parents/community members surveyed supported the provision of condoms at high schools	Parents and community members in Florida, US	311	USA (Florida)	2016	This study examined views of parent, guardians, and community members who were not parents/guardians	[17]
74%–93% of residents surveyed favored condom distribution in high schools. Residents of communities with higher HIV incidence were more likely to favor CAP	Residents/community members in Chicago	1,699	USA (Chicago)	2009	This study surveyed residents in six different communities in Chicago.	[18]
Students surveyed supported CAP and did not feel it would increase sexual activity. Half of community members surveyed believed CAP would increase sexual activity, and half believed it was an effective solution to HIV, STI, pregnancy	Students and community members in Malawi	7	Malawi	2011	This study conducted individual interviews with 2 students and 5 community members on their views of CAP. No statistical analysis is presented.	[19],*
A majority of parents felt condom availability would promote sexual activity and undermine traditional values	General survey of students and parents	206 parents	South Africa	2009	This study consisted of a series of focus group discussions, and no statistical analysis is presented	[20],*
A majority of students reported a negative attitude toward condom provision in schools due to fears that it would increase sexual activity and harm academic performance	Public secondary school students in South Africa	116	South Africa	2017	This study consisted of a series of focus group discussions, and no statistical analysis is presented	[21],*

CAP = condom availability programs; HS = high school; NYC = New York City; STI = sexually transmitted infection.

* Studies 19, 20, and 21 are based on focus group discussions and do not present any statistical data or analyses.

Table 2
Impact of CAP on students' sexual behaviors

Outcomes	Population	N	Country	Year	Comments	Ref. #
No statistically significant change over time in lifetime vaginal intercourse. ($p > .05$)	Public HS students in Los Angeles school district	1,945 surveyed before implementation of CAP, 1,110 surveyed after 1 year	USA (Los Angeles, CA)	1998	Males (percent reporting having ever had vaginal intercourse): baseline 55.8%, follow-up 55.0%. Females: baseline 45.4%, follow-up 46.1%	[22]
No difference in lifetime sexual activity between students in NYC (with the intervention) and in Chicago (without the intervention). (OR among new students: 1.11, continuing students: 1.01)	Public HS students in NYC (intervention) and Chicago (control)	7,119 NYC, 5,738 Chicago	USA	1997	Percent of new students who were sexually active: NYC: 47.2%, Chicago: 46.9% (OR: 1.11). Percent of continuing students who were sexually active: NYC: 59.7%, Chicago: 60.1% (OR: 1.01)	[23]
No difference in sexual activity over time	Public HS students in Seattle	7,179 before CAP, 7,893 two years after CAP began	USA (Seattle, WA)	1999	46% of students reported ever having had sex in 1993 survey, 42% in 1995 survey ($p = .126$)	[24]
No difference in sexual activity b/w CAP and non-CAP schools. ($p < .05$)	Public HS students in six different US districts	6,900 (total student enrollment at the six schools studied)	USA	1991	No significant difference in lifetime sexual activity among males or females at CAP versus non-CAP schools at five sites	[25]
No significant difference in sexual activity over time	Public HS students in Philadelphia	490 before CAP (in 1991), and 945 after CAP (in 1993)	USA (PA)	1997	Percent of students who ever had sex in CAP school in 1991 was 64% and in 1993 was 58% (difference not statistically significant)	[26]
Students in schools with CAP were less likely to report lifetime sexual intercourse. (OR: .728; 95% CI: .60, .89; $p \leq .001$). No statistically significant difference with respect to age at first intercourse between students in CAP and non-CAP schools	MA public HS students	4,166	USA (MA)	2003	This is the finding after controlling for condom use instruction (because students in CAP schools were more likely to have instructions on condom use). For age at first intercourse, p value and odds ratio not specified (simply stated that the p value is "nonsignificant")	[27]
Males in the intervention city were less likely to become sexually active than males in the comparison city (OR: .08, $p = .011$). No difference in chances of becoming sexually active for females (OR: 1.24, $p = .692$). Females in the CAP group less likely to have multiple partners (OR = .06, $p = .005$), no difference for males (OR = .902, $p = .790$)	Latino youth aged 14–20 years (community-based program including intervention at high schools)	536	USA (Boston, MA)	1994	This conclusion is after adjustment for covariates	[28]
Fewer males in intervention communities reported >4 lifetime sexual partners (aPR: .87, 95% CI .78–.97). No difference in the number of sexual partners for females	Youth aged 15–30 years in community in Tanzania	13,814	Tanzania	2010	37% of males in intervention communities reported >4 lifetime sexual partners compared with 44% males in comparison communities (no statistically significant difference for females)	[29]

Table 2

Continued

Outcomes	Population	N	Country	Year	Comments	Ref. #
Proportion of young men who reported sexual debut lower in intervention (60% intervention, 72% comparison, adjusted risk ratio: .84, CI .71, 1.01)	Youth aged 15–30 years in community in Tanzania	13,814	Tanzania	2007	This is the same population as in Ref. [29]	[30]
Students in CAP less likely to have initiated first sex (HR = .12, $p < .001$); students in CAP plus HIV prevention workshop also less likely to have initiated first sex (HR = .14, $p < .001$)	Youth in public high schools in Tijuana	320	Mexico (Tijuana)	2004	This study looks at the impact of CAP only and of CAP with an HIV prevention workshop	[31]

aPR = adjusted prevalence ratio; CAP = condom availability programs; CI = confidence interval; HS = high school; HR = hazard ratio; NYC = New York City; OR = odds ratio.

its opinion with 48% of community members supporting CAP [15]. In Baltimore, 75% of parents supported providing condoms to students who were already sexually active [16]. In both Florida and Chicago, over 60% of community members supported the provision of condoms in high schools [17,18]. In Malawi, students backed CAP and did not feel it would increase sexual activity. Half of community members surveyed in Malawi believed CAP would increase sexual activity and half believed it was an effective solution to HIV, STI, and unintended pregnancy [19]. South Africans had an opposite view: a majority (more than 50%) of both parents [20] and students [21] believed that condom availability in schools would promote sexual activity. The South Africa and Malawi studies were conducted in focus group format and do not present statistical data for their findings.

Impact on students' sexual behaviors

Table 2 presents data for the associations between CAP and sexual activity, students' numbers of lifetime sexual partners, and initiation of sex (please refer to the definition mentioned previously). Seven studies compared students' reported sexual activity with and without CAP. Five of the seven studies reported no statistical difference in sexual activity among students in schools with or without CAP [22–26]. Two studies demonstrated statistically lower levels of sexual activity among students with CAP [27,28]. Of these seven studies, three compared sexual activity among students before and after CAP [22,24,26]; and four compared sexual activity among students in a school with CAP against a school without CAP [23,25,27,28].

The association between CAP and the number of lifetime sexual partners of students was also evaluated. A U.S. study found a statistically significant difference with females in the CAP group being less likely to have multiple sexual partners [28]. A Tanzanian study showed with statistical significance that males in the CAP group were less likely to have had more than four lifetime sexual partners [29].

Three trials looked at initiation of sex, defined as first sexual intercourse or sexual debut or age at first sex. All showed with statistical significance that CAP is not associated with greater proportions of sexual initiation among students: no difference was found in the United States [27], while in Tanzania [30] and Mexico [31], students with CAP were less likely to have initiated first sex or reported sexual debut.

Impact on condom acquisition and use

Table 3 presents data from eight studies [27,28,31–36] on access and uptake of condoms. While some students did not see any difference in access to condoms with CAP [27], others were up to three times more likely to acquire condoms with CAP than without [32]. In two studies, students with CAP were more likely to acquire condoms [31] and have condoms in their possession [28]. In all eight studies, a majority of students acquiring condoms from their school's CAP were male.

On the question of condom use at last sex (Table 4), six of 11 studies that researched this pattern found that students in CAP schools were more likely to report condom use at last sex [22,23,25,27,29,30], four found no difference in condom use between CAP and non-CAP students [26,32,37,38], and one study reported lower levels of condom use at last sex among CAP students [24]. This latter study reported an increased use of other contraceptive methods made available through the school clinic

Table 3
Impact of CAP on condom uptake/acquisition

Outcomes	Population	N	Country	Year	Comments	Ref. #
Sexually active adolescents in schools with condom availability programs were no more likely than others to report that condoms were easy to obtain (OR 1.3, 95% CI .8, 2.1) and no more likely to report obtaining condoms from school (OR 1.1, 95% CI .8, 1.4)	MA public HS students	4,166	USA (MA)	2003		[27]
The HIV prevention program (including CAP) increased the likelihood that a teen would have a condom in his or her possession	Latino youth aged 14–20 years (community-based program including intervention at high schools)	536	USA (Boston, MA)	1994	The odds of possessing a condom at the time of the follow-up interview were 2.3 ($p < .01$) and 2.0 ($p = .07$) times greater for boys and girls, respectively, in the intervention city	[28]
(1) Students in the combined (education and CAP) program were significantly more likely to acquire condoms (OR 20.28, $p < .001$); (2) students in combined group reported statistically significant less difficulty obtaining condoms than the control group ($p = .054$)	Youth in public high schools in Tijuana	320	Mexico (Tijuana)	2004		[31]
For sexually active students, the odds of intervention students reporting condom acquisition at the end of the intervention were more than three times that of control students (aOR: 1.69, 95% CI: 1.23, 2.32)	Los Angeles public HS students	29,823	USA (Los Angeles, CA)	2012		[32]
Females less likely to request condoms and more likely to request other contraceptive methods/testing compared with males	Students in Tijuana, Mexico high schools (2 high schools)	570	Mexico (Tijuana)	2006	Percent of kiosk visitors who requested condoms: males: 96.6%, females: 84.6% (chi square: 25.68, $p < .001$); other contraceptives: males: 39.4% females: 76.3% (chi square: 63.9, $p < .001$)	[33]
26% of students surveyed had received condoms from their CAP; males accounted for 72% of those receiving condoms	Students in Adams City High School, Colorado	152	USA (Colorado)	1995		[34]
48% of students who had engaged in sexual intercourse in the 2 years condoms were available had obtained condoms from school	Public high school students in Seattle	Survey: 7,830 students; focus groups: 130 students	USA (Seattle, WA)	1997	Only 3% of sexually active students reported obtaining their last condom from a vending machine (students perceived the location of the machines and the 25 cent cost as barriers)	[35]
During the first 4–5 months of operation, students made more than 3,000 visits and obtained condoms on 2/3 of visits (data from 8 schools)	Public high school students in Philadelphia	N/A	USA (Philadelphia, PA)	1993	Number of students not stated in article	[36]

aOR = adjusted odds ratio; aPR = adjusted prevalence ratio; CAP = condom availability programs; CI = confidence interval; HS = high school; OR = odds ratio.

Table 4
Impact of CAP on condom use

Outcomes	Population	N	Country	Year	Comments	Ref. #
Significant increase in percentage of sexually active males who reported using condoms every time during vaginal intercourse (37% at baseline to 50% at follow-up, $p = .005$)	Public HS students in Los Angeles school district	1,945 before CAP, 1,110 after 1 year with CAP	USA (Los Angeles, CA)	1998		[22]
Higher percentages of students reported condom use at last intercourse in CAP schools (OR: 1.36, 95% CI 1.18, 1.56). Greater condom use among high-risk students with CAP (OR: 1.85, 95% CI 1.33, 2.58)	Public HS students in NYC (intervention) and Chicago (control)	7,119 NYC, 5,738 Chicago	USA	1997	High-risk students defined as those with three or more sexual partners in the past 6 months	[23]
Decrease in reported condom use at last sex in CAP schools relative to national rates ($p = .04$)	Public HS students in Seattle	7,179 before, 7,893 after	USA (Seattle, WA)	1999	CAP was part of a school clinic that distributed other contraceptive methods too: significant increase in use of birth control pills in clinic schools relative to nonclinic schools ($p = .000$)	[24]
Higher condom use at last sex reported in two of the six schools studied ($p < .001$)	Public HS students in 6 different US districts	6,900 (total student enrollment at the six schools studied)	USA	1991		[25]
Increase in the proportion of students using condoms was higher in the schools with health resource centers, but the difference was not statistically significant	Public HS students in Philadelphia	490 before, 945 after	USA (PA)	1997	The proportion of students who used a condom at last intercourse increased from 52% to 58% in schools that had CAP, and from 62% to 65% in non-CAP schools	[26]
Sexually active adolescents in CAP schools were more likely to use condoms during their most recent sexual encounter (OR 2.1, 95% CI: 1.5, 2.9, $p < .0001$)	MA public HS students	4,166	USA (MA)	2003		[27]
Condom use with the most recent nonregular partner was higher among females in intervention communities (aPR: 1.34, 95% CI 1.07, 1.69)	Youth aged 15–30 years in community in Tanzania	13,814	Tanzania	2010	This is the same population as in [30]	[29]
Condom use at last sex higher in the intervention group for both males and females, but the difference is only significant for males (adjusted RR: 1.47, 95% CI 1.12, 1.93)	Youth aged 15–30 years in community in Tanzania	13,814	Tanzania	2007		[30]
No statistically significant difference in reported condom use at last sex between CAP and non-CAP schools	Los Angeles public HS students	29,823	USA (Los Angeles, CA)	2012		[32]

(continued on next page)

Table 4
Continued

Outcomes	Population	N	Country	Year	Comments	Ref. #
53% of students obtained school condoms, and 54% of students who had obtained condoms used them for sex. 34% of students who had used a condom for vaginal intercourse in the past year had obtained the condom they last used from school. No change in condom use (condom use remained at 30% of students reporting that they consistently used condoms)	Public HS students in Los Angeles	1,112	USA (Los Angeles, CA)	1997		[37]
	Young women from public middle and high schools in Baltimore, MD	143	USA (Baltimore, MD)	1995	CAP implemented as part of a larger program that also provided oral contraceptives. Oral contraceptive use increased from 11% to 61% reporting use over the program period	[38]

aPR = adjusted prevalence ratio; CI = confidence interval; HS = high school; NYC = New York City; OR = odds ratio; RR = risk ratio.

(which, according to the authors of the study, may explain the decrease in condom use) [24].

Health outcomes

Table 5 presents the data on health outcomes related to CAP. Two studies evaluated HIV infection rates in CAP versus control groups. The study in the United States [28] found that students in the CAP group did have lower risk of HIV infection, but the difference was not statistically significant compared with the control group. The other study, in Tanzania, found no difference between control and intervention communities [29].

Three studies examined the impact of CAP on STI rates. A study in the United States [39] found statistically significantly lower rates of gonorrhea and chlamydia among males in CAP schools as compared with the control group. A study of the same population of young people at two different time points in Tanzania [29,30] found a significant decrease in STI symptoms (including genital ulcers) reported in the CAP group but no statistically significant difference between CAP and control groups in diagnosed STI rates.

On the question of teenage pregnancy rates (4 studies), no statistically significant difference was found with the introduction of CAP [25,27,29,40].

Discussion

In countries where comprehensive sexuality education in schools is either not implemented or controversial, parents and society often shy away from conversations about sexuality [5,9,11]. This talk is even more taboo when confronted with adolescents' and young people's sexuality. The allies of sexuality education have created websites and written articles to call on parents and other influencers to lift the ban on sexuality education in schools [41–43]. The arguments of those who oppose CAP include fear that sexuality education including access to contraceptives and condoms will bring adolescents to initiate sex earlier and have a greater number of sexual partners or encounters. In the opposite camp are health professionals, advocates, and researchers as well as parents and politicians who attest that many adolescents and young people are sexually active and have the right to information that can help them remain free from unintended pregnancy, HIV, and STIs.

Against this background, we decided to examine existing publications on CAP in high schools to analyze its impact on the sexual behavior of adolescents and the pattern of condom acquisition and utilization.

First, we wanted to examine the literature to clarify how students, parents, and community members around the world feel about CAP before its implementation in their communities. We found that a majority (over 50%) of students and parents in several states in the United States held positive views of CAP, claiming that CAP would not increase sexual activity among students but would reduce the rates of HIV, STIs, and teenage pregnancies. Survey results from Malawi and South Africa yielded less support for CAP. Most students surveyed in Malawi supported CAP, whereas only half of community members did. In South Africa, a majority of both students and parents had negative views of CAP.

The results of these surveys are not surprising, given that CAP has been implemented in several U.S. cities including New York City and Boston since the early 1990s. Parents, students, and

Table 5
Impact of CAP on health outcomes (HIV, STI, and pregnancy rates)

Outcomes	Population	N	Country	Year	Comments	Ref. #
No statistically significant difference in reported pregnancy rates in schools with CAP compared with schools without CAP	Public HS students in 6 different US districts	6,900 (total student enrollment at the six schools studied)	USA	1991	This finding can be explained by the finding that there were no significant differences in the use of birth control in CAP schools	[25]
No statistically significant difference in reported pregnancy involvement in students with CAP compared with students without CAP (OR: 1.0, 95% CI: .7, 1.6)	Data from 1995 Massachusetts Youth Risk Behavior Survey	4,166	USA (MA)	2003		[27]
Lowered the risk of HIV infection in males and females by 9% and 15%, respectively, after adjustment for baseline risk and other covariates, but the differences did not achieve statistical significance ($p = .20, .15$, respectively)	Latino youth aged 14–20 years (community-based program including intervention at high schools)	536	USA (Boston, MA)	1994		[28]
HIV: no difference between intervention and control communities in HIV rates STI: (1) genital ulcers reported less frequently by both sexes in intervention communities, (2) no statistically significant difference between intervention and control communities in HSV-2/other STI rates Pregnancy: no statistically significant difference between intervention and control communities in pregnancy rates	Youth aged 15–30 years in community in Tanzania	13,814	Tanzania	2010	HIV: 95% CI for males aPR: .50, 1.65; 95% CI for females aPR: .68, 1.67 STI: genital ulcer difference between CAP and control group is statistically significant. For males, aPR = .76 (95% CI: .59, .99). For females, aPR = .69 (95% CI: .47, 1.01)	[29]
(1) Proportion of participants reporting STI symptoms lower in intervention group 2. No significant differences in HIV, STI, pregnancy (gonorrhea higher in the intervention group, but only among women who had received just 1 year of in-school intervention)	Youth aged 15–30 years in community in Tanzania	13,814	Tanzania	2007	Same population as in [29]	[30]
Statistically significant decrease in gonorrhea and chlamydia rates among males who attended school with CAP ($p < .01$); no statistically significant difference for females	Public HS students in Massachusetts	Number of males and females aged 15–19 years reported in the 2000 U.S. census for Holyoke and Springfield	USA (MA)	2011		[39]
Schools with CAP did not have a statistically significant difference in pregnancy rates than schools without CAP	Public HS students in British Columbia	N/A	Canada	2000	Teenage pregnancy rates varied tremendously from year to year with no clear trend, regardless of whether condoms were made available. Number of students in survey not stated	[40]

aPR = adjusted prevalence ratio; CI = confidence interval; CAP = condom availability programs; HS = high school; OR = odds ratio; STI = sexually transmitted infection.

community members tended to be more supportive of CAP if it had been present in their schools for an extended period, as was the case in the U.S. programs, rather than being a short experimental trial program, as was CAP in Malawi and South Africa. In addition, the surveys from the U.S. took place not long after the HIV epidemic in the United States of the 1980s and 1990s, when fear of contracting HIV and stigma and discrimination against HIV-positive individuals were rampant in the society. Thus, a solution to protect young people from contracting HIV may have been viewed as more urgent and more welcome. All these factors may have led to a more positive view of CAP in the U.S. populations that were surveyed. It would have been interesting to compare views in the U.S. today toward condom placement in high schools with those of the population in the 1990s. Unfortunately, we could not identify any such study.

In both Malawi and South Africa, a combination of cultural pressures and the novelty of CAP may contribute to the more negative views of the program. In addition, the Malawi and South Africa studies examined here were conducted as focus groups and do not present any statistical analysis or a large sample size from which to draw broader conclusions. In this literature review, we found published data on surveys regarding students' and parents' views of CAP from only three countries. However, there are many more countries that have implemented or are considering implementing CAP in their secondary schools. This lack of published data on the subject points to a large gap in the research on CAP and an opportunity for countries considering CAP to conduct studies to see what parents and students truly think about the program.

For opponents of CAP, the main concern is that providing condoms to students would increase sexual activity and lead to promiscuity (defined as having a greater number of sexual partners). In this study, we divided the concern into three components: sexual activity, number of sexual partners, and age of sexual initiation. We examined evaluations of CAP to see if any of these concerns are justified by published data. Data from studies examining these three parameters overwhelmingly show that CAP does not increase promiscuity: two studies show that students with CAP have fewer sexual partners. CAP does not lead students to have more sex: seven studies show that CAP does not increase sexual activity among students. CAP does not lead students to start having sex at an earlier age: three studies confirm this. This review, thus, shows that there is no published evidence to support the main concerns against CAP. The opponents of CAP may rely on anecdotal evidence to support their concerns, but this review presents 10 rigorous scientific evaluations of CAP that disprove the claim that CAP leads to more sex. Making condoms available in schools does not propel students to have sex, and studies of different student populations from communities around the world presented here prove this.

The next question that students, parents, policymakers, and community members have regarding CAP is whether students actually utilize the program once it is in place. We find in several studies that condom acquisition increased with CAP. One study finds no difference in condom acquisition with or without CAP but does find increased condom use [27]. This may be due to students having easy access to condoms in their communities before CAP implementation. It would be interesting to evaluate CAP in communities with greater barriers to condom access and compare.

In two studies [11,26], combining condom availability with a sexuality education program yielded the greatest uptake of

condoms. This provides evidence supporting CSE programs with a CAP component and may show that CAP alone is not enough, but rather CSE with CAP is necessary to achieve the best outcomes. A majority (more than 50%) of the studies that evaluated changes in condom use associated with CAP found that condom use at last sex increased in CAP groups relative to the control group. An implication from these findings may be that future CAPs should be modeled after the programs which yielded increased condom acquisition and use among students, namely the programs that utilized CSE with CAP. For stakeholders wondering if CAP is used once implemented at schools, the studies examined here show that it is: several studies show that students are more likely to acquire condoms when their school implements CAP, and more than half of the studies that examine condom use report that students with CAP are more likely to have used a condom at last sex.

Finally, stakeholders are concerned with the health outcomes of CAP. Most settings implement CAP as a solution for rising levels of HIV, STI, and unintended pregnancy among adolescents. There are two studies that examine HIV infection rates among students with and without CAP. The U.S. study found a decrease in risk of HIV infection with CAP, but the decrease was not statistically significant [28]. The Tanzania study found no difference in risk of HIV infection between CAP and control populations [29]. There are two factors to consider when analyzing these results. The first is initial HIV prevalence in the population studied. For the U.S. study [28], HIV prevalence among students may have been low to begin with (the researchers did not specify the prevalence in the specific study population), which is why there was no statistical significance in the decrease. For the Tanzania study [29], only youth who had reached year five of primary school were eligible for the study; thus, the study population was overall more educated and was likely to have been at lower risk of HIV compared with other rural populations to begin with (the HIV prevalence in the study population was 1.8% for males and 4.0% for females). According to the authors, this may have affected the outcomes [29]. The ambiguity of the impact of CAP on HIV can be explained through the low initial HIV risk among study participants, hence making it more challenging to identify statistically significant results because of limitations of statistical power. More evaluations examining the impact of CAP on HIV rates need to be conducted to elucidate these findings.

The results for the impact of CAP on STI rates are more clear, with three studies showing with statistical significance, decreased STI symptoms and decreased STI rates in CAP groups compared with the control group [29,30,39]. This is consistent with findings from previous studies that show the effectiveness of male condoms in preventing STI acquisition [44].

Finally, the results for impact of CAP on pregnancy rates include four studies that all show no change in teen pregnancy rates associated with CAP [25,27,29,40]. Low initial teenage pregnancy rates in the populations studied may explain the lack of statistically significant changes associated with CAP. In addition, adolescents may be using forms of birth control other than the male condom (pill, implant, intrauterine device, and so forth) that reduce their probability of becoming pregnant.

The STI results are indicative of the effectiveness of CAP as an intervention. The ambiguity of the impact of CAP on HIV can be explained through the low initial HIV risk among study participants, hence making it more challenging to identify statistically significant results because of limitations of statistical power. Similarly, low initial rates of teenage pregnancy, as well as the

possible use of contraceptives other than condoms, can explain the lack of statistically significant change with CAP in pregnancy rates.

There are also many confounding factors that could have contributed to health outcomes that these studies may not have accounted for. In some schools, adolescents could access other forms of birth control (pill, implant, IUD, and so forth. The section in parentheses should be amended to: [pill, implant, intrauterine device, etc]), that reduce their probability of becoming pregnant. It is not uncommon for adolescents to use double methods for protection (condoms plus another birth control method). This was, for instance, the case of youth in several European countries where condom and contraceptive pill use at the last intercourse lie above 100%, which indicates that the adolescents are using both methods at the same time [45]. Furthermore, some students may be in monogamous sexual relationships, which would decrease the risk of STI acquisition but may also be related to lower levels of condom use. In addition, correctness and consistency in condom use are necessary for condom to be an effective barrier method [5] but is a factor often not captured in survey data, as surveys ask primarily about condom use at last sex. Finally, the presence of school-based health clinics may impact students' access to testing and treatment of sexual health conditions, which may lead to differences in recorded rates and outcomes of STI, HIV, and pregnancy.

Male condoms are the most preferred method of contraception by adolescents, and barriers of access to condoms exist in many communities for young adults [5]. The studies examined here show that CAP is effective in increasing students' condom use. Increased condom use translates to positive sexual health outcomes in the form of decreased HIV, STI, and unintended pregnancy rates. Here, we see the health outcomes most clearly in the reduction of STI rates in communities with CAP. Implementing CAP makes it easier for students to obtain condoms and protect themselves during sex, and there is no evidence for the claim that CAP increases sex among students.

The main limitation of this review is that most of the studies on CAP are from the 1990s and early 2000s and are from the United States. This may present an issue in how translatable these findings are to modern, non-U.S. contexts. This review was limited to published, English-language papers. We did not include papers published in other languages, internal country or regional reports, or gray literature. This may have excluded a significant amount of data on CAP from this review.

We find that CAP in school has proven effective in increasing condom use among adolescents in many communities where it has been implemented. When combined with some form of sexuality education, CAP is even more effective. Given the large variation in the form of sexuality education that accompanies CAP in different schools, and the diversity in the methods by which condoms are made available in each program, further implementation and evaluation of CAP in different contexts would enable us to determine which version of CAP is most effective for which context. It is unlikely that one iteration of the program will be effective across the globe. CAP may be an effective solution to rising adolescent HIV, STIs, and pregnancy, but we may never know with certainty unless it is introduced in modern-day high schools and evaluated in different contexts and geographic locations. This is precisely what future studies should aim to do.

The main takeaways from this literature review are that the fears surrounding CAP are unfounded in the global evidence. Students do utilize the programs once they are in place, and a

majority of CAPs lead to increased condom use among students. These safe sex practices translate to improved sexual health outcomes, particularly in terms of STI rates in the study populations. More evaluations are needed to determine with certainty the impact of CAP on HIV and teenage pregnancy rates. Overall, we have found that CAP does not have a negative impact on students' sexual health. In a majority of programs that have been implemented globally, it has had a significant protective effect.

Acknowledgments

The authors would like to thank Mr. Bobby Olarte, Knowledge Management Adviser at United Nations Population Fund, for his helpful suggestions in identifying relevant articles for this review paper.

References

- [1] UNICEF. Adolescents and young people. UNICEF 2018. Available at <https://data.unicef.org/topic/hiv/aids/adolescents-young-people/>. Accessed January 4, 2019.
- [2] WHO. Sexually transmitted infections (STIs). Available at: <http://www.who.int/mediacentre/factsheets/fs110/en/>. Accessed December 28, 2017.
- [3] WHO. Sexually transmitted infections among adolescents. Available at: http://www.who.int/maternal_child_adolescent/documents/9241562889/en/. Accessed November 5, 2017.
- [4] WHO. Adolescent pregnancy. Available at: <http://www.who.int/mediacentre/factsheets/fs364/en/>. Accessed November 5, 2017.
- [5] Universal access to reproductive health: Progress and challenges. UNFPA - United Nations Population Fund. Available at: <http://www.unfpa.org/publications/universal-access-reproductive-health-progress-and-challenges>. Accessed November 5, 2017.
- [6] Prevention gap report. Available at: <http://www.unaids.org/en/resources/documents/2016/prevention-gap>. Accessed November 5, 2017.
- [7] Abma J, Martinez G. Sexual activity and contraceptive use among teenagers in the United States, 2011–2015. Washington, DC: U.S. Department of Health and Human Services; 2017.
- [8] Hindin MJ, Kalamar AM, Thompson T-A, et al. Interventions to prevent unintended and repeat pregnancy among young people in low- and middle-income countries: A systematic review of the published and gray literature. *J Adolesc Health* 2016;59:S8–15.
- [9] Chandra-Mouli V, Lane C, Wong S. What does not work in adolescent sexual and reproductive health: A review of evidence on interventions commonly accepted as best practices. *Glob Health Sci Pract* 2015;3:333–40.
- [10] Fonner VA, Armstrong KS, Kennedy CE, et al. School based sex education and HIV prevention in low- and middle-income countries: A systematic review and meta-analysis. *PLoS One* 2014;9:e89692.
- [11] UNESCO, 2015. Emerging evidence, lessons and practice in comprehensive sexuality education: a global review. 2015. Available at: https://www.unfpa.org/sites/default/files/pub-pdf/CSE_Global_Review_2015.pdf. Accessed January 3, 2019.
- [12] Fanburg JT, Kaplan DW, Naylor KE. Student opinions of condom distribution at a Denver, Colorado, high school. *J Sch Health* 1995;65:181–5.
- [13] Eisenberg ME, Bernat DH, Bearinger LH, et al. Condom provision and education in Minnesota public schools: A telephone survey of parents*. *J Sch Health* 2009;79:416–24.
- [14] Guttmacher S, Lieberman L, Ward D, et al. Parents' attitudes and beliefs about HIV/AIDS prevention with condom availability in New York City public high schools. *J Sch Health* 1995;65:101–6.
- [15] Yarber WL, Milhausen RR, Crosby RA, et al. Public opinion about condoms for HIV and STD prevention: A Midwestern state telephone survey. *Perspect Sex Reprod Health* 2005;37:148–54.
- [16] Santelli J, Alexander M, Farmer M, et al. Bringing parents into school clinics: Parent attitudes toward school clinics and contraception. *J Adolesc Health* 1992;13:269–74.
- [17] Moore MJ, Barr E, Wilson K, et al. Support for offering sexual health services through school-based health clinics. *J Sch Health* 2016;86:660–8.
- [18] Allgood KL, Silva A, Shah A, et al. HIV testing practices and attitudes on prevention efforts in six diverse Chicago communities. *J Community Health* 2009;34:514.
- [19] Kavinya T. Opinions on distribution of condoms in primary and secondary schools. *Malawi Med J* 2011;23:25.

- [20] Han J, Bennish ML. Condom access in South African schools: Law, policy, and practice. *PLoS Med* 2009;6:e1000006.
- [21] de Bruin WE, Panday-Soobrayan S. Learners' perspectives on the provision of condoms in South African public schools. *AIDS Care* 2017;29:1529–32.
- [22] Schuster M, Bell MR, Berry S, et al. Impact of a high school condom availability program on sexual attitudes and behaviors. *Fam Plann Perspect* 1998;30:67–72.
- [23] Guttmacher S, Lieberman L, Ward D, et al. Condom availability in New York city public high schools: Relationships to condom use and sexual behavior. *Am J Public Health* 1997;87:1427–33.
- [24] Kirby D, Brener ND, Brown NL, et al. The impact of condom availability [correction of distribution] in Seattle schools on sexual behavior and condom use. *Am J Public Health* 1999;89:182–7.
- [25] Kirby D, Geary C, Ziegler J. Six school-based clinics: Their reproductive health services and impact on sexual behavior. *Fam Plann Perspect* 1991;23:6–16.
- [26] Furstenberg FF, Geitz LM, Teitler JO, et al. Does condom availability make a difference? An evaluation of Philadelphia's health resource centers. *Fam Plann Perspect* 1997;29:123–7.
- [27] Blake SM, Ledsky R, Goodenow C, et al. Condom availability programs in Massachusetts high schools: Relationships with condom use and sexual behavior. *Am J Public Health* 2003;93:955–62.
- [28] Sellers DE, McGraw SA, McKinlay JB. Does the promotion and distribution of condoms increase teen sexual activity? Evidence from an HIV prevention program for Latino youth. *Am J Public Health* 1994;84:1952–9.
- [29] Doyle AM, Ross DA, Maganja K, et al. Long-term biological and behavioural impact of an adolescent sexual health intervention in Tanzania: Follow-up survey of the community-based MEMA kwa Vijana trial. *PLoS Med* 2010;7:e1000287.
- [30] Ross DA, Changalucha J, Obasi AI, et al. Biological and behavioural impact of an adolescent sexual health intervention in Tanzania: A community-randomized trial. *AIDS* 2007;21:1943–55.
- [31] Martinez-Donate AP, Hovell MF, Zellner J, et al. Evaluation of two school-based HIV prevention interventions in the border city of Tijuana, Mexico. *J Sex Res* 2004;41:267–78.
- [32] De Rosa CJ, Jeffries RA, Afifi AA, et al. Improving the implementation of a condom availability program in urban high schools. *J Adolesc Health* 2012;51:572–9.
- [33] Zellner JA, Martinez-Donate AP, Hovell MF, et al. Feasibility and use of school-based condom availability programs in Tijuana, Mexico. *AIDS Behav* 2006;10:649–57.
- [34] Wolk LI, Rosenbaum R. The benefits of school-based condom availability: Cross-sectional analysis of a comprehensive high school-based program. *J Adolesc Health* 1995;17:184–8.
- [35] Brown NL, Pennylegion MT, Hillard P. A process evaluation of condom availability in the Seattle, Washington public schools. *J Sch Health* 1997;67:336–40.
- [36] Project offers counseling and condoms to Philadelphia students. *Fam Plann Perspect* 1993;25:180.
- [37] Schuster MA, Bell RM, Berry SH, et al. Students' acquisition and use of school condoms in a high school condom availability program. *Pediatrics* 1997;100:689–94.
- [38] Bearss N, Santelli JS, Papa P. A pilot program of contraceptive continuation in six school-based clinics. *J Adolesc Health* 1995;17:178–83.
- [39] Wretzel SR, Visintainer PF, Pinkston Koenigs LM. Condom availability program in an inner city public school: Effect on the rates of gonorrhoea and Chlamydia infection. *J Adolesc Health* 2011;49:324–6.
- [40] MacGregor AC. Do condoms in public schools affect the pregnancy rate? *Can J Public Health* 2000;91:33.
- [41] Fallon A. NGOs turn to courts to unravel Uganda's ban on sexual education. Available at: <https://www.devex.com/news/sponsored/ngos-turn-to-courts-to-unravel-uganda-s-ban-on-sexual-education-89979>. Accessed December 28, 2017.
- [42] Ferreira L. Let's really talk about sex, baby: Improving sexuality education for children. Available at: <https://mg.co.za/article/2017-04-29-lets-really-talk-about-sex-baby-improving-sexuality-education-for-children/>. Accessed December 28, 2017.
- [43] Santos A. Learning sex education in school. Available at: <https://www.rappler.com/corruption/101547-learning-sex-education-school>. Accessed December 28, 2017.
- [44] Holmes KK, Levine R, Weaver M. Effectiveness of condoms in preventing sexually transmitted infections. *Bull World Health Organ* 2004;82:454–61.
- [45] Ketting E, Ivanova O. Sexuality education in Europe and Central Asia - state of the art and recent developments. An overview of 25 countries. 2018:232. Available at: https://www.bzga-whocc.de/fileadmin/user_upload/Dokumente/BZgA_Comprehensive%20Country%20Report_online_EN.pdf. Accessed January 3, 2019.