Condom Promotion for AIDS Prevention in the Developing World:

Is it Working?

Running Head: Condoms for AIDS Prevention

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Abstract

Objective: Two decades of experience give new insights into the role of condoms for AIDS prevention in the developing world. This article reviews available evidence and gives recommendations for condom promotion and research.

Design: Literature review and synthesis

Methods: Computerized searches of scientific literature and review of conference presentations, publications of national and international organizations, and lay media

Results: Condoms are about 90% effective for preventing HIV transmission, and condom use has grown rapidly in many countries. Condoms have produced substantial benefit in countries like Thailand, where both transmission and condom promotion are concentrated in commercial sex, but the public health benefit of condom promotion in settings with widespread heterosexual transmission remains unclear. In countries like Uganda that have curbed generalized epidemics, reducing numbers of partners appears to have been more important than condoms. Other countries continue with high HIV transmission despite high condom use. Impact of condoms may be limited by inconsistent use, which provides little protection, low use among those at highest risk, and negative interactions with other strategies, such as partner reduction.

Conclusions: Recommendations include more condom promotion for groups at high risk, more rigorous measurement of the impact of condom promotion, and more research on how best to integrate condom promotion with other prevention strategies.

Key words: AIDS, condoms, developing countries, HIV, prevention, transmission

As HIV prevention enters its third decade, it is appropriate to reassess what we have learned. This is especially true regarding condoms, the controversial mainstay of many AIDS prevention programs. Opinions about condoms are often based on ideology rather than evidence, but evidence has accumulated steadily.

For condoms to work, they must be effective and people must use them. Many other factors, including who uses them with what partners how consistently and correctly, determine public health impact, as does the effect of condom promotion on other behaviors. Fortunately, we can now move beyond debating how well condom promotion might work to examining how well it has. Countries with successful AIDS control efforts and the role of condoms are especially instructive, as are some less successful examples.

Methods

This article is based on a review conducted for the Joint United Nations Program on AIDS (UNAIDS) of condom promotion for AIDS prevention in the developing world. Sources include computerized searches of peer-reviewed scientific literature, publications of UNAIDS and other international organizations, conference presentations, and national AIDS control program documents. Where appropriate, we also reviewed information from the lay press and internet. Data presented were selected based on reliability and relevance. Interpretations and recommendations are the authors' and do not necessarily reflect the views of UNAIDS.

How effective are condoms?

Efficacy (also called "theoretical effectiveness" or "method effectiveness") is how well an intervention treats or prevents a condition when used perfectly. *Effectiveness* (or "use effectiveness") is how well it works in practice [1,2]. It is nearly impossible to measure condom efficacy. In theory, one could constantly monitor discordant couples (one HIV-positive and one HIV-negative) to assure correct condom use, randomly allocate a control group not to use condoms, and compare transmission rates. For practical and ethical reasons, such a study will never be done. Real studies measure effectiveness, usually by comparing discordant couples who report using condoms to couples who don't despite being urged to do so. These two groups differ: couples who don't use condoms use more drugs and alcohol [3,4], have more additional partners [4], and may be younger or engage more in practices like anal sex that facilitate HIV transmission [5,6].

Estimates of effectiveness from individual studies vary widely [3,7,8]. Differences may be due to random variation, how correctly condoms were used and their use ascertained, the populations studied, and other confounders. Several meta-analyses have attempted to combine the available data into a summary estimate of condom effectiveness. The earliest gave a low estimate of 69% because it counted couples who inconsistently used condoms as "condom users," thus diluting the effect [9]. Two other meta-analyses yielded estimates of 87% and 80% but improperly lumped all couples together rather than stratifying by study [1,3,7,10,11].

Pinkerton and Abramson probably did the most rigorous meta-analysis, resulting in an estimate of 94% for condom effectiveness [12]. Because other meta-analyses gave lower estimates and because of uncertainty introduced by imperfect ascertainment of condom use and self-selection of couples who use them, a reasonable estimate might be that condoms are roughly 90% effective. This closely matches condom effectiveness for contraception [3,13]. Although condoms may occasionally be permeable to virus-size particles [14-19], most condom failure results not from leakage through latex but "flow" factors, such as breakage, slippage, and improper use [20]. These should be similar whether condoms are used to prevent HIV infection or pregnancy.

Can people be convinced to use condoms?

The earliest evidence for people using condoms in numbers sufficient to stop the spread of HIV came from men who have sex with men (MSM). In many places, condom use quickly became the norm among MSM, dramatically cutting incidence of HIV and other STIs [21,22]. Condom promotion also has succeeded is commercial sex; studies have demonstrated high rates of condom use in several settings of Asia, Africa, and Latin America [23-26].

Promoting condoms for the general public is more difficult. Many governments, non governmental organizations, and donors have tackled this challenge energetically. Measuring success is not simple. Numbers of condoms indicate scope of effort but not how many people at high risk are using them. The Demographic and Health Surveys conducted in many countries ask respondents if they had a non cohabiting sexual partner

in the past year and whether they used a condom at last intercourse. The resulting indicator approximates condom use in high-risk sex. Figure 1 shows results for young men and women in 19 African countries. Other studies confirm high condom use with casual partners in various developing countries [27-29].

(Place Figure 1 about here.)

Condom promotion strategies include encouraging demand, augmenting distribution channels, and lowering prices [31]. Distributing free condoms is most effective for high-risk groups, like sex workers. Condoms given to the general public often go unused [32]. One of the most successful strategies is condom social marketing [33-38]. Subsidized condoms are sold at affordable prices and promoted under brand names using the same advertising strategies as other consumer products.

During the 1990's, condom distribution increased by 10 to 100 fold in many developing countries [25,39-41]. But even current numbers are only enough to cover a small proportion of sexual encounters. Few people use condoms in steady relationships. In Nigeria, for example, 2% of respondents report always using condoms with a spouse or "concubine," compared to 33% for boyfriends and girlfriends and 67% for casual partners [42]. While limited condoms are best used in casual sex, which carries the highest risk, much transmission also takes place between steady partners.

If condoms are effective and people will use them, they might seem the strategy of choice for AIDS prevention. Unfortunately, it is not so simple. Even without condoms, only a tiny fraction of sexual encounters transmit HIV. Condom use might be high in general but low when it counts if people at highest risk (such as the poor, the uneducated, or drug users) use condoms less. Conversely, even modest condom use can have substantial impact if concentrated in settings like commercial sex or MSM.

Consistency is another problem. Large numbers of condoms can produce minimal benefit if people don't use them consistently. Many studies find inconsistent users at higher risk than never users [14,43-47], perhaps because they are riskier in other ways. Consistent use requires not only long-term individual commitment but a reliable distribution system to provide condoms to people who often lack other basic needs [31]. As stated by President Museveni of Uganda, "In countries like ours, where a mother often has to walk twenty miles to get an aspirin for her sick child or five miles to get any water at all, the question of getting a constant supply of condoms may never be resolved" [48]. In many sub-Saharan African countries, high condom use has yet to produce demonstrable benefit [49]. While HIV might have spread even faster without condoms, sad experience shows that high HIV transmission can coexist with high condom use.

Learning from success

In contrast to the discouraging global trend, countries like Thailand, Uganda, and some of their neighbors have achieved notable success in AIDS prevention [50]. In Thailand, HIV began with a burst of transmission among injecting drug users, but 90% of transmission

soon became heterosexual [23,51]. Public health officials realized that Thailand's large sex industry was playing a central role and responded with a "100% Condom Program" that mandates brothel owners to enforce condom use in every paid sex act. Uncooperative owners receive sanctions and are identified through STI surveillance among sex workers and clients.

Condom use soon reached over 90% [23], and the proportion of Thai men visiting sex workers fell by about half [52-55]. The government did not directly discourage commercial sex, but mandatory condom use and awareness of risk caused many men to give up the practice. Thai men also reduced their unpaid casual partners [55]. Rates of STIs fell rapidly in Thailand [56], and HIV incidence and prevalence are declining among both young men and pregnant women [56-59].

Cambodia has the highest HIV rate in the Asia-Pacific region [60,61], with a high proportion of transmission through commercial sex [62]. But Cambodia has a 100% Condom Program of its own, and condom distribution rose from 99,000 in 1994 to 16 million in 2001 [41]. STI rates among sex workers fell substantially [60,63], and HIV prevalence in the general population is down [64].

Uganda had among the world's highest AIDS rates in the 1980's and responded with a determined approach involving all sectors of society. Over 700 agencies work on AIDS prevention, ranging from churches to NGOs to the military [65]. An active support group for persons with HIV encourages many Ugandans to come forward with their HIV status.

Consequently, more Ugandans know someone with HIV than do other Africans [65], a strong predictor of changing one's behavior [66]. Since peaking in the late 1980's, HIV incidence has fallen substantially [65,67], as demonstrated by surveillance among military recruits [68], pregnant women [69], and the general population [68].

(Place Figure 2 about here.)

Unlike in Thailand, condoms were not central to the initial response in Uganda. Messages focused on delaying sexual debut, abstinence, being faithful to a single partner (called "zero grazing"), and condoms, roughly in that order [54,65]. Large-scale condom social marketing did not begin until the mid-1990's [70]. By 1995, only 6% of Ugandan women and 16% of Ugandan men had ever used a condom, with consistent use much lower [65]. Ugandans now use more condoms, particularly with casual partners, but this can't be given credit for what happened earlier [69]. Instead, the main cause of falling incidence was a substantial drop in numbers of casual partners, going from rates typical of the region to rates that are now much lower [60,65,71-74]. More recently, parts of Tanzania and Zambia are showing similar changes [69,75-79].

While the Thai and Ugandan examples have important differences, they also have much in common. Both countries responded to AIDS early and decisively. Both national programs had leadership from the highest levels, were multisectorial, achieved broad public support, avoided stigmatization, and included care for the infected. While efforts in Thailand emphasized condoms, particularly in commercial sex, they also encouraged

partner reduction. Efforts in Uganda emphasized partner reduction, but also encouraged condoms. Differences reflected appropriate responses to different circumstances more than different philosophy.

Interactions with other prevention strategies

Examining condom promotion in isolation gives, at best, a narrow view of prevention. Different strategies can interact additively or multiplicatively. For example, a certain level of partner reduction might cut HIV transmission in half, and a certain level of condom use might do the same. Both together would reduce transmission even more. This argues for using multiple strategies to achieve maximum impact. In conflict is the economic law of opportunity cost: a dollar spent on one intervention cannot be spent on another. This argues for placing most resources behind the one with the best cost-benefit ratio.

Interactions are even stronger when interventions designed to change one behavior also change others. Such interactions can be positive or negative and have received far less attention than deserved. The 100% Condom Program in Thailand promoted condoms in commercial sex but also caused many men to give up the practice [69]. Condom promotion for port workers in Brazil unexpectedly reduced the proportion reporting casual partners [80]. Studies find female condoms useful mainly because they encourage thought and discussion about risk, thereby facilitating other strategies [81].

Interactions also can be negative. A recent rise in STIs (including HIV) among MSM in many communities may have resulted, in part, from decreased perceived severity of HIV infection [82]. In theory, antiretroviral treatment should prevent HIV transmission by reducing viral load and infectivity [83]. Unfortunately, this benefit may have been outweighed by a negative interaction between treatment and sexual behavior.

The negative interaction causing greatest concern is that condom promotion might increase sexual activity [84-86]. This is a major source of opposition to condom promotion, especially when targeting young people. It could certainly do more harm than good if young people choose condoms over abstinence, especially if condom use is inconsistent and especially in settings with widespread transmission. Little is known about how different approaches to condom promotion affect sexual behavior, largely because evaluations seldom report outcomes other than condom use. Research on the impact of sex education for young people is reassuring, but these programs tend to be conservative, encouraging delayed sexual onset and fewer partners, rather than "eroticizing safer sex," an approach more common in higher risk settings [87]. Condom promotion for commercial sex, no matter how explicit or sex-positive, seems unlikely to encourage the practice. But the possibility that presenting casual sex with a condom as socially acceptable, enjoyable, and safe might increase sexual risk in the general public cannot be dismissed.

Recommendations

Consistent condom use is effective for reducing HIV transmission. Condom use has increased substantially in many places. Condom promotion played an important though variable role in successful AIDS control programs around the world. But questions remain. How consistent must condom use be to protect the individual? How high must rates of condom use be to protect society? Can a generalized HIV epidemic be overcome primarily through condoms? How can condom promotion best be integrated into multifaceted prevention?

These questions, especially the last, require much practical research. What messages for condom promotion also encourage fewer partners? How can delayed sexual onset and "zero grazing" be presented to encourage condoms when people don't meet these ideals? Although we must learn from each other's experience, the answers are not necessarily universal. They must be examined many times over on the local level.

AIDS prevention might learn from efforts to reduce traffic deaths. Strategies include safer roads and cars, driver education, seat belts, speed laws, and discouraging driving under the influence of alcohol and drugs. Proponents of different strategies may argue about resources but seldom undercut each other. An advertising campaign for seat belts would never imply that it's safe to drive drunk so long as you wear one. The experience with traffic safety also provides other, less encouraging lessons. While wearing a seat belts clearly provides protection, widespread seat belt use has not produced the

anticipated public health benefit, perhaps because of a process of "risk compensation": drivers who wear seat belts feel safer and may drive more carelessly [88].

Condom promotion should be part of every national AIDS control program. Every country includes people for whom condoms are the best option to reduce risk. An obvious example is commercial sex. The world should follow Thailand with a global 100% Condom Program. Another example is persons with HIV. Consistent condom use is essential for HIV-positive persons who remain sexually active. Condom promotion is a proven strategy for MSM and should also target others at high risk, including drug users and STI patients.

Many countries have gone beyond targeted condom promotion and invested substantial resources in promotion for the general public. Unless this were to produce less abstinence and partner reduction, there are strong theoretical reasons to believe it should help. It can promote AIDS awareness and prevent unintended pregnancy and STIs. Nevertheless, it remains unclear how effective a public health strategy this is for AIDS prevention.

Condom promotion programs must measure their impact better. Numbers of condoms are not sufficient. Rates of consistent use with various types of partners are necessary. Programs aimed at the general public should also monitor numbers of partners, especially casual partners, especially among the young. Such information can not only detect interactions but also protect programs from unfair criticism. For example, declining

condom distribution might mean success if caused by fewer men visiting sex workers or having other casual partners.

With all interventions, one must avoid doing harm. While condoms are not harmful, condom promotion can do harm if it takes resources from better uses or, worse yet, undercuts partner reduction or delay of sexual onset. It might also do harm if not accompanied by a steady and affordable supply of condoms. Anything less could encourage inconsistent condom use – certainly not an effective HIV prevention strategy. Avoiding harm also means telling the truth: condoms are safe and effective, but not 100% effective. Correctly informing people about the advantages of condoms is not impossible. Family planning programs around the world have achieved a similar balance in promoting contraception.

Whatever the difficulties with condom promotion, it must be used to best advantage. There are not so many weapons against AIDS that we can forego any, nor is any so effective that it makes the others superfluous. Much depends on realizing the potential that condoms offer.

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Figure 1. Condom use at last high-risk sex in 19 African countries

Figure 1a. Condom use at last high-risk sex in past year among 15-24 year-old females in Africa, 2001

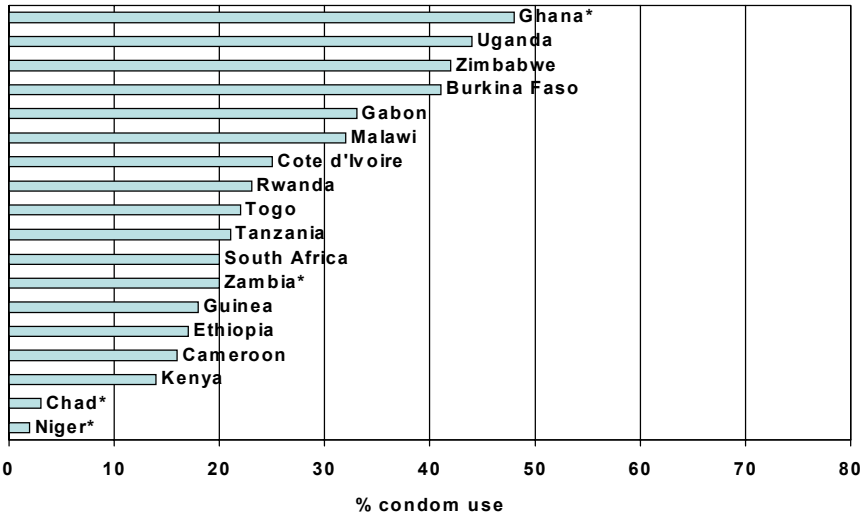
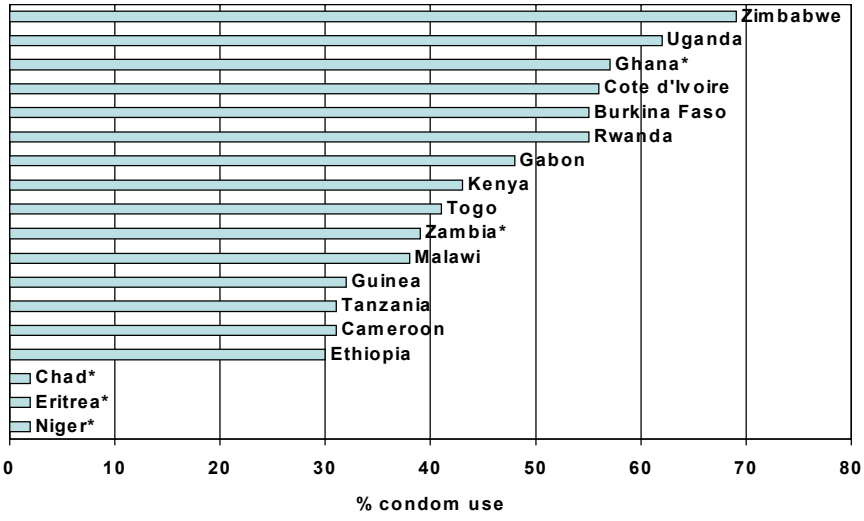


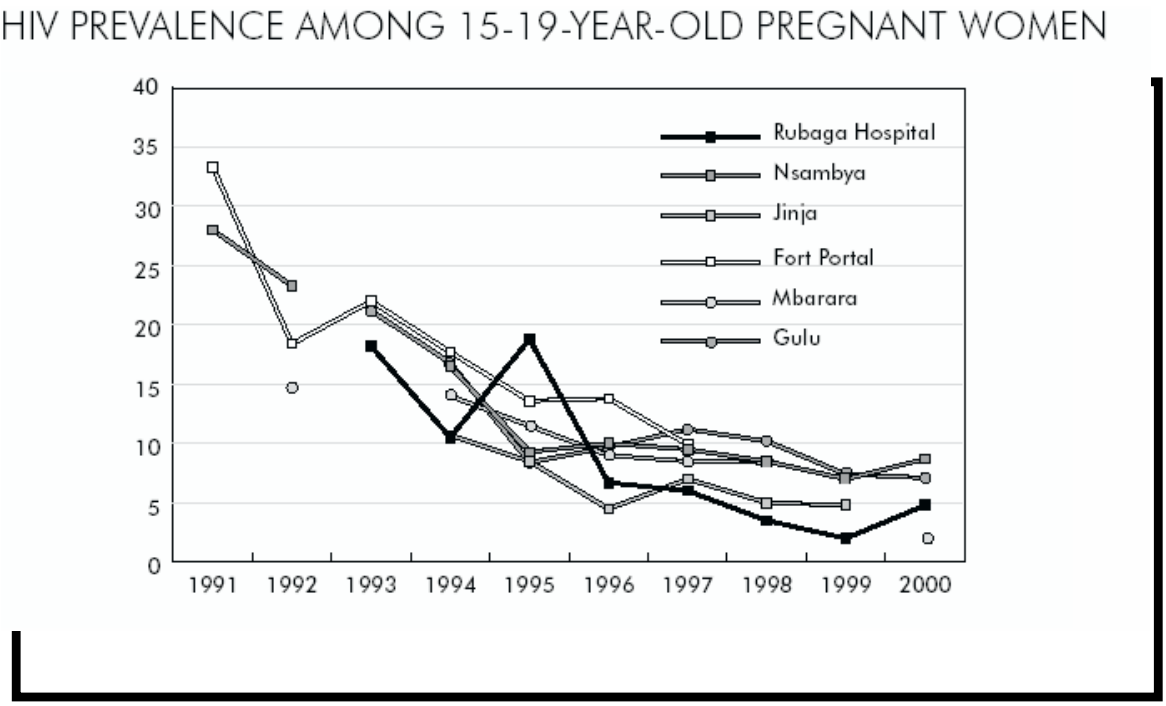
Figure 1b. Condom use at last high-risk sex in past year among 15-24 year-old males in Africa, 2001



* indicates data that refer to years other than 2001, differ from the standard definition, or are based on only part of a country.

Source: UNICEF [30]

Figure 2



Source: Ugandan Ministry of Health, 2001 [68].