

AIDSTAR-One SPOTLIGHT ON PREVENTION

Reinvigorating Condoms as an HIV Prevention Tool

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The world is enticingly close to realizing the vision of an AIDS-free generation. More HIV-infected individuals are accessing treatment earlier in the course of their disease, and elimination of vertical (mother-to-child) transmission—while still a challenge—is closer to becoming a reality (Ciaranello et al. 2012). However, this vision cannot be achieved through treatment alone. HIV will only slow down when new infections, currently at two for every one person put on treatment, diminish dramatically (Joint United Nations Programme on HIV/AIDS 2010). This means improved access to, and utilization of, combination prevention—a mix of evidence-based HIV prevention interventions including condoms.

In this editorial, we summarize the evidence on condoms for HIV prevention, discuss barriers and opportunities regarding supply, and propose ways to reinvigorate the use of condoms as an HIV prevention tool. This reinvigoration is needed now more than ever, given the vital role of condoms in both primary HIV prevention and in interventions to promote positive health, prevention, and dignity for people living with HIV.

Condoms Work, and Many People Use Them

Condoms are an effective barrier method for preventing HIV, other sexually transmitted infections

(STIs), and unintended pregnancy, and are used in hundreds of millions of sex acts each year (Davis and Weller 1999; Pinkerton and Abramson 1997; Weller and Davis-Beaty 2002). They play a key role in sustaining the benefits of other high-impact HIV prevention interventions such as male circumcision and prevention of mother-to-child transmission. Thus, condoms are a vital component of a comprehensive HIV prevention strategy.

Condom promotion is generally considered a cost-effective HIV prevention intervention as measured by the cost per disability-adjusted life year (DALY) averted. The DALY is a composite metric that combines years lived with disability and years lost to premature death, and one DALY averted represents one year of healthy life. While cost effectiveness ratios are context-specific and there isn't universal agreement on thresholds of cost effectiveness, a cost per DALY averted ratio of under U.S.\$50 is generally considered cost-effective. The cost per DALY averted for male condoms ranges from U.S.\$19 to \$205, and this range indicates condom programs vary in design and implementation (Jamison et al. 2006).

Condom promotion can be controversial. Earlier in the course of the epidemic, there were concerns that condoms were being promoted in ways that ignored structural barriers and religious sensitivities, failed to include communities, and potentially increased promiscuity (Pfeiffer 2004). Were these concerns overstated? Perhaps. We now know that condoms

have been essential to achieving significant prevention gains in both generalized and concentrated HIV epidemics. For example, a recent modeling paper suggests that HIV incidence in South Africa among 15 to 49 year olds declined by as much as 23 to 37 percent from 2000 to 2008—and that much of this decline can be attributed to increased condom use (Johnson et al. 2012). Similarly, in Zimbabwe, reduction of multiple and concurrent partnerships, high condom use in non-regular partnerships, and improved consistency of condom use among women with their casual partners are thought to have contributed to a fall in HIV prevalence from 29.3 percent in 1997 to 15.6 percent in 2007 (Gregson et al. 2010). Thailand's program requiring 100 percent condom use during commercial sex had similar results from 1991 to 1995 among young Thai men—condom use at last commercial sex increased from 61 percent to 92.5 percent, and HIV prevalence fell from between 10.4 and 12.5 percent to 6.7 percent (Nelson et al. 1996). Similar successes are noted in other countries (Population Services International 2006; Population Services International 2009; Riedner et al. 2006; World Health Organization [WHO] 2000).

But Not Everyone Wants to Use—Or Is Able to Use—Condoms

Despite proven effectiveness, there are still several challenges to condom use. Moving forward, programs must address these barriers and incorporate (and test) potential solutions as part of any prevention strategy.

Risky Behavior

Even the most ardent condom promoter will admit that it is difficult to promote condoms among couples in established sexual relationships, one or both of whom may also have other sex partners. This is true regardless of whether societal and cultural norms condone multiple and concurrent sexual partnerships (Halperin et al. 2011; Shelton 2006). Moreover, condom use is self-reported and survey respondents may

therefore adjust their answers according to what seems more socially desirable (Aho et al. 2010). Condom promotion without efforts to reduce the number of partners is only half a solution.

Two behavioral models of risk-taking provide insights into why people use condoms less often, or stop using condoms altogether, even when they are aware that continued use protects against HIV and other STIs. The risk compensation model suggests that when an effective prevention or treatment intervention (or one perceived to be effective) is available, an individual's perception of transmission risk may be reduced, which in turn can lead to increased risk-taking (Eisele et al. 2009; Kelly et al. 1998; Tun et al. 2004). For example, men who become circumcised—and who are thus partially protected from HIV acquisition—may incorrectly perceive themselves to be at no risk for HIV, and thus may choose to discontinue condom use or to have more sex partners. The behavioral disinhibition model suggests that when an effective intervention such as antiretroviral treatment is available, an individual may be less likely to exercise self-restraint and more likely to focus on the pleasure of unprotected sex—and not use a condom (Blower, Gershengorn, and Grant 2000; Law et al. 2001; Wilson et al. 2008). Substance use is thought to further increase such risk-taking because of its own disinhibiting effect.

Both models of risk-taking help to explain the rationale for stopping or reducing condom use among men who are medically circumcised (Agot et al. 2007; Bailey et al. 2007; Gray et al. 2007), alcohol or substance users with their partners (Fritz 2011), men who have sex with men (MSM) (Grulich 2000; Hogg et al. 2001; Sampaio et al. 2002), and discordant couples (Allen et al. 2003; Coldiron et al. 2008; Eaton and van Der Straten 2009). There is mixed evidence of consistent condom use in some of these populations. Furthermore, the concept of partial protection that is conferred by HIV prevention interventions such as medical male circumcision, and the attendant need to continue using condoms consistently, is difficult to convey.

Understanding the underlying reasons for risk-taking better, and designing interventions based on that understanding, becomes even more important with the U.S. Food and Drug Administration's recent approval of pre-exposure prophylaxis (U.S. Food and Drug Administration 2012). Messages may need to address several types of barriers—such as a risk-based calculation that condom use is not as necessary, or arousal-based barriers to condom use.

Structural Barriers

It is essential to consider, and address where possible, structural factors that may contribute to increased risk-taking. These barriers—including stigma, criminalization, and other legislative and social barriers—can impede condom use in important ways. For example, even though we know that unprotected receptive anal sex is the most efficient route for transmitting HIV, condom promotion among MSM and transgendered people is patchy or absent in a number of countries (Ayala n.d.; Baggaley, White, and Boily 2010). A recent report shows that limited or absent condom promotion results from criminalization of same-sex behaviors, homophobia, and discrimination against this vulnerable population (Beyrer 2010; Global Commission on HIV and The Law 2012). When condoms, lubricants, and educational materials promoting condom use are used as evidence of crime, it becomes difficult to reach MSM—and other at-risk populations such as sex workers—with these much-needed interventions. Sadly, such criminalization continues despite growing evidence that robust coverage of HIV interventions for MSM has positive epidemiologic effects and is cost-effective (Beyrer et al. 2011).

Dual Protection and Dual Use

Another prevention option that needs to be better understood is the use of condoms for dual protection (against STIs and pregnancy), as well as dual use of condoms plus one other modern contraceptive method to prevent unintended pregnancy and HIV

transmission or re-infection (Pazol, Kramer, and Hogue 2010; Prata, Sreenivas, and Bellows 2008). There is no globally accepted indicator for measuring use of dual protection, and Demographic and Health Surveys only report on the primary family planning method used. These are missed opportunities to understand the impact of family planning and HIV integration programs—with potential negative impacts on reduction of both heterosexual and vertical transmission (Wilcher and Cates n.d.).

These and other challenges demand fresh thinking about how to address impediments to equitable access, as well as rigorous evaluation of which elements of condom programming work—and, equally importantly, don't work—in both concentrated and generalized epidemics (Hearst and Chen 2004).

The Supply Side: Who Procures and Distributes Condoms?

Next, we discuss who buys and distributes condoms for HIV prevention, quality considerations, and key challenges in condom commodity procurement planning and forecasting.

Donor Contributions

Condoms are listed on the WHO's Model List of Essential Medicines (2011). Male condoms are very affordable (U.S.\$0.02–0.04 per unit) and are widely distributed. In 2010, procurement of male condoms by bilateral and multilateral donors for public sector distribution and social marketing exceeded 2 billion for the first time and reflected a 22 percent increase over 2009 (Reproductive Health Supplies Coalition n.d.). The five leading agencies that purchased male and female condoms in 2010 were the U.S. Agency for International Development (USAID; 37 percent), the UN Population Fund (UNFPA; 22 percent), the Global Fund to Fight AIDS, Tuberculosis and Malaria (9 percent), Kreditanstalt Für Wiederaufbau (KfW; 2 percent), and the UK Department for International

Development (2 percent). Sub-Saharan African countries are the major recipients of donated condoms.

Country Contributions

Unfortunately, very few governments in the countries worst hit by the epidemic procure sizeable quantities of condoms. By 2015, an estimated 13 billion condoms will be required globally for HIV prevention, and an additional 5 billion for family planning (Reproductive Health Supplies Coalition 2009). While larger middle-income countries such as Brazil, China, India, and South Africa have begun, and will probably continue, to include condoms in their own country budgets, donors—and ministries of health with available resources—will still need to help lower-income countries purchase an estimated 2.4 billion condoms for HIV prevention, and 2 billion condoms for family planning in 2015. This signifies a 120 percent increase over current donor procurement levels (Reproductive Health Supplies Coalition 2009). Additional resources would be needed for shipping, distribution, and promotion. While the volume of condoms needed seems large, the funding needed to support condom commodity security in the highest-need countries is a fairly modest \$88 million (assuming a unit cost per male condom of \$0.02)—less than 1.5 percent of total HIV funding disbursements made by donor governments in 2010 (Kates et al. 2011). Separate calculations are needed to estimate the funding needed for lubricants.

Quality Considerations

Also on the supply side, condom quality is an essential consideration. Most donors and implementing agencies procure condoms from manufacturers whose factories are pre-qualified by WHO. However, from time to time, reports of poor condom quality—often difficult to substantiate—do surface, and these can rapidly undermine condom promotion programs. There are other quality-related issues too. While there were 26 pre-qualified male condom factories owned by 21 different manufacturers in 2011 (UNFPA 2012; WHO, UNFPA, and Family Health International 2010), there

are only two WHO pre-qualified female condom manufacturers at the time of writing. Also, while there is clear guidance from WHO on male latex condom specifications and procurement (WHO, UNFPA, and Family Health International 2010), there is no globally agreed protocol for ongoing quality control from the point of manufacture to the end user.

Another issue is that male condoms are often paired with lubricant for distribution to certain key populations (MSM and transgendered people, and sometimes sex workers). The absence of globally accepted manufacturing specifications for lubricant, and of evidence to strongly support lubricant use for HIV prevention, is of concern. *In vitro* studies suggest that hyperosmolar lubricant may increase the risk of HIV transmission by causing damage to colonic and rectal surface epithelial cells (Begay et al. 2011; Fuchs et al. 2007).

Challenges in Quantifying How Many Condoms are Needed

In a number of settings, capacity to undertake accurate forecasting and procurement planning is limited. It is thus currently a challenge to precisely quantify how many condoms are needed, and where. Even basic current information on the quantities of condoms procured by country governments, or distributed by private sector players, is either difficult or prohibitively expensive to obtain. This limits the ability to define the size, value, and capacity of the total condom market to meet current need to prevent HIV/STIs and unintended pregnancy. Broader participation by more agencies, country governments, and commercial players in providing data to the Reproductive Health Supplies Coalition's [RHInterchange](#) will help make such information more widely available.

Additionally, at the country level and often at the donor level, condom requirements are typically calculated separately for HIV prevention and family planning, which can lead to losses in procurement efficiency. USAID's Central Contraceptive Procurement Project

seeks to resolve this coordination problem by providing guidance on condom procurement for both purposes (Family Planning Logistics Management 2000).

As condom promotion programs strive for sustainability, it is important to consider the total market for condoms, including public-sector (free), subsidized, and commercial distribution. Programs should also monitor use in key populations, equity of condom access, and levels of subsidy needed to maintain high levels of consistent condom use among the highest-risk populations. Finally, they should seek to increase levels of use among non-users or inconsistent users who are at higher risk for HIV (Chapman et al. 2012).

Call to Action to Reinvigorate Condom Promotion

We propose a call to action to reinvigorate the promotion of condoms as an HIV prevention tool. We believe that if programs follow the steps outlined below, condom promotion will be more effective and cost-effective, and ultimately will achieve a higher health impact:

- Consider and address behavioral disinhibition and risk compensation when designing condom promotion and combination prevention programs.
- Combine condom promotion with initiatives to address the structural factors associated with risky sexual behaviors, such as stigma, discrimination, and criminalization of certain key populations.
- Develop a globally accepted indicator and a body of evidence on dual use of condoms with other modern family planning methods.
- Disseminate to policymakers evidence on the impact of making HIV prevention interventions, including condoms and lubricants, freely accessible to MSM.
- Address the evidence gap for lubricants in the context of HIV transmission.

- Build consensus on protocols for condom quality control at the country level to address quality concerns among consumers.
- Advocate with country governments for the inclusion of condom procurement within their health budgets, while reaffirming donor commitments to countries most in need.
- Strengthen capacity at the national and global levels to coordinate condom procurement for both HIV and family planning, and at national levels to improve procurement planning to prevent stockouts and shortages.
- Invite and involve private-sector players to join forums such as the [Reproductive Health Supplies Coalition](#), so that comprehensive supply information becomes available.
- Develop country-level condom commodity security strategies that consider the total market for condoms, and not just the public and social marketing sectors.

Condoms are an effective, affordable, and vital part of a comprehensive and combined response to the HIV epidemic. Condom use can, and must, be included among the critical strategies for achieving the vision of an AIDS-free generation. ■

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Krishna Jafa is Director of Sexual & Reproductive Health & Tuberculosis at PSI. She is a physician and epidemiologist with experience in the design, management, and monitoring and evaluation of public health programs and research in Asia, Africa, and the United States. Areas of technical expertise include: family planning; sexual and reproductive health and rights; HIV prevention and diagnosis; commodity security; quality improvement of clinical services; correctional health; post-conflict humanitarian response; and epidemic response. Dr. Jafa has successfully led efforts to improve

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