

HIV prevention

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Interventions included in this evidence brief are:

1. Mass media encouraging use of condoms, voluntary medical male circumcision, and STI testing
2. Voluntary medical male circumcision service in settings with high prevalence of HIV
3. Provision of condoms to MARPS
4. PrEP for discordant couples and others at high risk of HIV (in high prevalence settings)
5. Prevention of mother to child HIV transmission (PMTCT, option B+) and syphilis

Description of condition and intervention

Risk of HIV can be reduced through various interventions like institution of anti-retroviral treatment (ART) to prevent HIV transmission from mother to child (PMTCT) during pregnancy, delivery, and breastfeeding. Other interventions include testing for sexually transmitted infections, provision of condoms, pre-exposure prophylaxis to those at high risk, voluntary medical male circumcision in high burden of HIV areas.

International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
World Health Organization (July 2021)	Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach	Yes

Intervention attributes

Type of interventions & Delivery platform

Table 1: Type of interventions & delivery platform

Intervention	Type	Delivery platform
1. Mass media encouraging use of condoms, voluntary medical male circumcision, and STI testing	Prevention	Community
2. Voluntary medical male circumcision service in settings with high prevalence of HIV	Prevention	Health centre
3. Provision of condoms to MARPS	Prevention	Community
4. PrEP for discordant couples and others at high risk of HIV (in high prevalence settings)	Prevention	Health centre
5. Prevention of mother to child HIV transmission (PMTCT, option B+) and syphilis	Prevention	Health centre

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are

affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

Low level of urgency. Treatment outcomes not highly affected by some days of delay.

Population in need of interventions

Table 2: Population in need of interventions

Intervention	Treated population		Affected population	
	Treated age	Treated fraction	Affected age	Affected fraction
1. Mass media encouraging use of condoms, voluntary medical male circumcision, and STI testing	15 to 99 years; both genders; all	Health facility use (country input file)	No effects	
2. Voluntary medical male circumcision service in settings with high prevalence of HIV	0 to 60 years; male; all	VMC (country input file)	0 to 99 years	1
3. Provision of condoms to MARPS	15 to 49 years; both genders; all	HIV; STI risk; No condom (country input file)	0 to 99 years	1
4. PrEP for discordant couples and others at high risk of HIV (in high prevalence settings)	15 to 49 years; both genders	HIV; High risk HIV (country input file)	0 to 99 years	0.1
5. Prevention of mother to child HIV transmission (PMTCT, option B+) and syphilis	15 to 49 years; female	0.05	0 to 0 years	0.05

Disease state addressed

The included interventions target HIV/AIDS.

Intervention effect and safety

Table 3: *Effect and safety of interventions for HIV prevention*

Effect of intervention		Certainty of evidence
<p>Incidence</p> <p>Voluntary medical male circumcision service in settings with high prevalence of HIV</p> <p>Provision of condoms to MARPS</p> <p>PrEP for discordant couples and others at high risk of HIV (in high prevalence settings)</p> <p>Prevention of mother to child HIV transmission (PMTCT, option B+) and syphilis</p>	<p>Relative risk of HIV with the intervention is 0.44 (0.33 to 0.60) based on the study by Mills, Cooper, Anema, Guyatt 2008.</p> <p>RRR=0.7 (Pinkerton, Abramson 1997)</p> <p>Overall results from the four trials that compared TDF-FTC versus placebo showed a reduction in the risk of acquiring HIV infection (RR 0.49; 95% CI 0.28 to 0.85; 8918 participants) (Okwundu, Uthman, Okoromah 2012)</p> <p>Starting AZT, 3TC, and nevirapine (NVP) at 34 weeks in a mixed-feeding population reduced infant HIV-transmission or death at 7 months compared to a short-course regimen RR 0.39 (0.12-0.85) (Sturt, Dokubo, Sint 2010)</p>	See appendix

RRR=Relative risk reduction

Model assumptions

Table 4: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Interventions	Mass media encouraging use of condoms, voluntary medical male circumcision, and STI testing Voluntary medical male circumcision service in settings with high prevalence of HIV Provision of condoms to MARPS PrEP for discordant couples and others at high risk of HIV (in high prevalence settings) Prevention of mother to child HIV transmission (PMTCT, option B+) and syphilis	
Cost calculation		
Treated population	See Table 2	Epidemiologic al data from Global Burden of Disease Study 2019
Effect calculation		
Affected population	See Table 2	
Affected fraction	See Table 2	
Comparison	No intervention	
Incidence reduction (RRR) Voluntary medical male circumcision service in settings with high prevalence of HIV	0.56	Mills, Cooper, Anema, Guyatt 2008
Provision of condoms to MARPS	0.7	Pinkerton, Abramson 1997
PrEP for discordant couples		

and others at high risk of HIV (in high prevalence settings)	0.51	Okwundu, Uthman, Okoromah 2012
Prevention of mother to child HIV transmission (PMTCT, option B+) and syphilis	0.61	Sturt, Dokubo, Sint 2010

Intervention cost

The cost for mass media encouraging the use of condoms, voluntary medical male circumcision, and STI testing is estimated to be BDP 17.45 per person-year in a specified population in 2011 in Bangladesh (Sarker et al 2013).

The cost for voluntary medical male circumcision service in settings with a high prevalence of HIV is estimated to be \$38.3 per procedure in 2009 USD in Kenya (Marseille et al 2014).

The cost of provision of condoms to MARPS is estimated to be \$1.54 in 2001 USD in Tanzania (Terris-Prestholt 2006).

The cost of PrEP for discordant couples and others at high risk of HIV (in high prevalence settings) is estimated to be \$200 per person-year in specified population in 2011 USD in South Africa (Hallett 2011).

The cost of preventing mother-to-child HIV transmission (PMTCT, option B+) and syphilis is estimated to be \$278 per affected pregnancy in 2008 USD in Zambia (Bratt, Torpey, Kabaso, Gondwe 2010)

References

Mills, Cooper, Anema, Guyatt 2008: Mills E, Cooper C, Anema A, Guyatt G. Male circumcision for the prevention of heterosexually acquired HIV infection: a meta-analysis of randomized trials involving 11,050 men. *HIV Med.* 2008 Jul;9(6):332-5. doi: 10.1111/j.1468-1293.2008.00596.x. PMID: 18705758.

(DCP4 ID: HIVSTI03-01,02,03,04,05)

Cluster: HIVSTI

Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105.

Okwundu, Uthman, Okoromah 2012: Okwundu CI, Uthman OA, Okoromah CA. Antiretroviral pre-exposure prophylaxis (PrEP) for preventing HIV in high-risk individuals. Cochrane Database Syst Rev. 2012 Jul 11;(7):CD007189. doi: 10.1002/14651858.CD007189.pub3. PMID: 22786505.

Sturt, Dokubo, Sint 2010: Sturt AS, Dokubo EK, Sint TT. Antiretroviral therapy (ART) for treating HIV infection in ART-eligible pregnant women. Cochrane Database Syst Rev. 2010 Mar 17;(3):CD008440. doi: 10.1002/14651858.CD008440. PMID: 20238370.

Pinkerton, Abramson 1997: Pinkerton SD, Abramson PR. Effectiveness of condoms in preventing HIV transmission. Soc Sci Med. 1997 May;44(9):1303-12. doi: 10.1016/s0277-9536(96)00258-4. PMID: 9141163.

Sarker et al 2013: Sarker, B.K., Ahmed, S., Islam, N. et al. Cost of behavior change communication channels of Manoshi -a maternal, neonatal and child health (MNCH) program in urban slums of Dhaka, Bangladesh. Cost Eff Resour Alloc 11, 28 (2013). <https://doi.org/10.1186/1478-7547-11-28>

Marseille et al 2014: Marseille, E., Kahn, J.G., Beatty, S. et al. Adult male circumcision in Nyanza, Kenya at scale: the cost and efficiency of alternative service delivery modes. BMC Health Serv Res 14, 31 (2014). <https://doi.org/10.1186/1472-6963-14-31>

Terris-Prestholt 2006: Terris-Prestholt, Fern MSc*; Kumaranayake, Lilani PhD*; Obasi, Angela I. N. MSc*; Cleophas-Mazige, Bernadette MSc†; Makokha, Maende BA†; Todd, Jim MSc*; Ross, David A. PhD*; Hayes, Richard J. PhD* From Trial Intervention to Scale-Up: Costs of an Adolescent Sexual Health Program in Mwanza, Tanzania, Sexually Transmitted Diseases: October 2006 - Volume 33 - Issue 10 - p S133-S139 doi: 10.1097/01.olq.0000200606.98181.4

Hallett et al 2011: Hallett TB, Baeten JM, Heffron R, Barnabas R, de Bruyn G, Cremin Í, Delany S, Garnett GP, Gray G, Johnson L, McIntyre J, Rees H, Celum C. Optimal uses of antiretrovirals for prevention in HIV-1 serodiscordant heterosexual couples in South Africa: a modelling study. PLoS Med. 2011 Nov;8(11):e1001123. doi: 10.1371/journal.pmed.1001123. Epub 2011 Nov 15. PMID: 22110407; PMCID: PMC3217021.

Bratt, Torpey, Kabaso, Gondwe 2010: Bratt JH, Torpey K, Kabaso M, Gondwe Y. Costs of HIV/AIDS outpatient services delivered through Zambian public health facilities. Trop Med Int Health. 2011 Jan;16(1):110-8. doi: 10.1111/j.1365-3156.2010.02640.x. Epub 2010 Oct 19. PMID: 20958891.

Appendix

Literature Review for effectiveness & safety

This literature search is an example of Level 1 search for intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, metaanalysis, systematic review, clinical practice guidelines)