HPV Prevention and Control Board,
Dublin, Ireland, 30 Nov – 1 Dec 2017

Gender neutral vaccination: the discussion in the UK and globally

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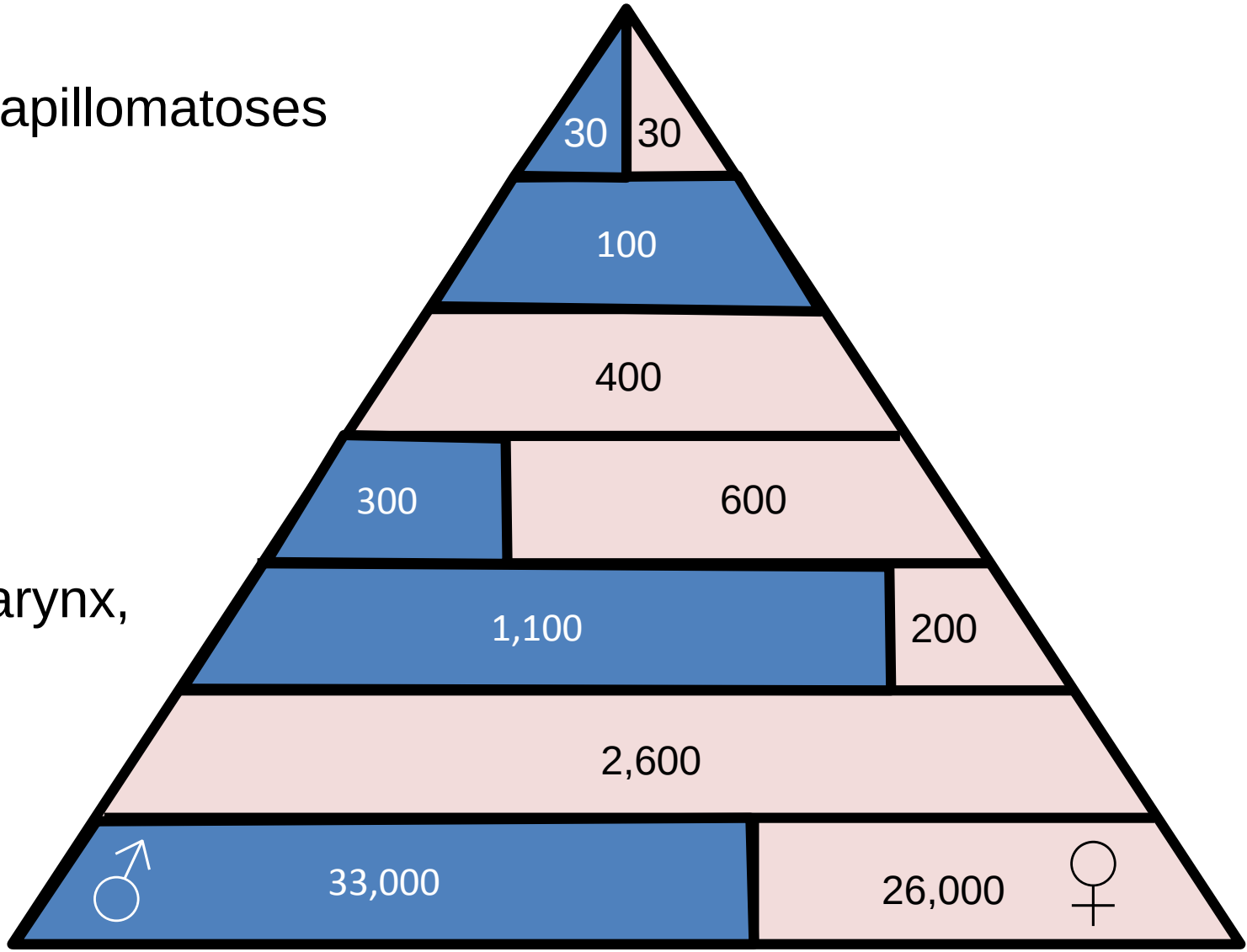
HPV disease burden in England (preliminary)



Sources: (1) ONS Cancer Registration Statistics, England, 2014 (First Release). Table 1: Registrations of newly diagnosed cases of cancer (third digit): site, sex and age, England, 2014. (2) Public Health England. Sexually transmitted infections (STIs): annual data tables. Table 1: STI diagnoses & rates in England by gender, 2005 - 2014.

Policy statements

*JCVI did not recommend vaccinating boys, as it was **not cost-effective**. Since vaccine efficacy is high, if there were a high coverage in girls then vaccinating boys would not provide any additional benefit since vaccination causes a decrease in the prevalence of disease, generated by herd immunity. Moreover, if there is high coverage in women, the vaccination of boys does not add any additional benefit to the prevention of cervical cancer.*

Joint Committee on Vaccination and Immunisation (UK).
Statement on HPV vaccines to protect against cervical cancer. 18 July 2008.

*Vaccination of males in addition to females and selective vaccination of high-risk groups alone is **not likely to be as effective** as vaccination of young females, nor as cost-effective.*

European Centre for Disease Prevention and Control.
Guidance for the introduction of HPV vaccines in EU countries. January 2008

*For the prevention of cervical cancer, the WHO-recommended target age group for HPV vaccination is girls aged 9–13 years, prior to becoming sexually active … HPV vaccination of males is **not recommended** as a priority, especially in resource-constrained settings, as the available evidence indicates that the first priority should be for cervical cancer reduction by timely vaccination of young females and high coverage with each dose.*

World Health Organization.
Human papillomavirus vaccines: WHO position paper, October 2014. Published in the Weekly Epidemiological Review 2014; 43(89):465-92.

Female only vs gender-neutral vaccine impact

Vaccinating females at high coverage pre-sexual debut protects

(i) females through direct and indirect protection

(ii) males through indirect protection

Graph redacted

Female only vs gender-neutral vaccine impact

Vaccinating females at high coverage pre-sexual debut protects

(i) females through direct and indirect protection

(ii) males through indirect protection

At high coverage, extending vaccinating to males has less additional benefit because most females and males are already protected (directly or indirectly).

Graph redacted

Female only vs gender-neutral vaccine impact

When vaccine coverage is low, then extending vaccination to males can have a larger impact. It can achieve

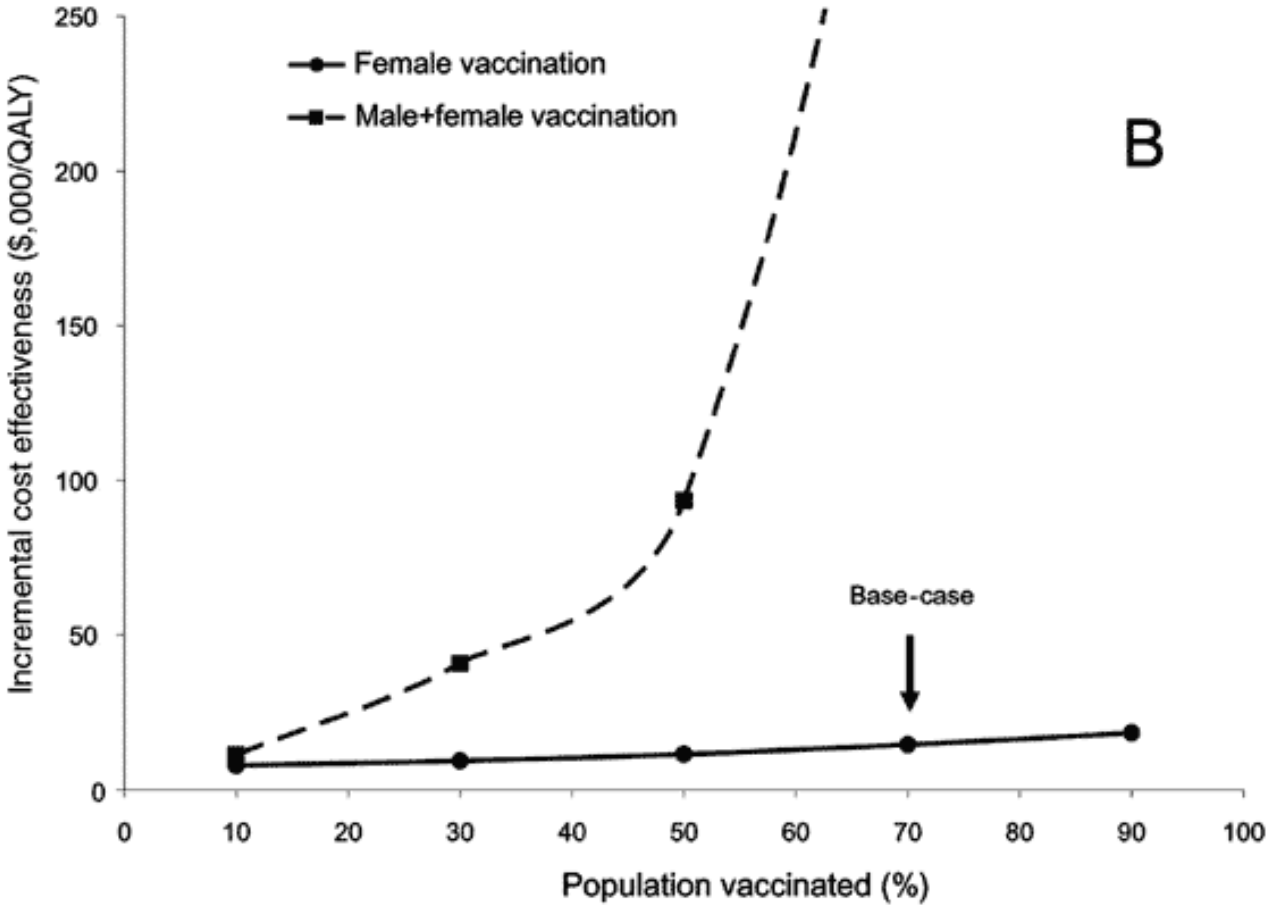
(i) faster and greater reduction in HPV infection in females (by indirect protection).

(ii) faster and greater reduction in HPV infection in males (by direct and indirect protection).

Graph redacted

Female only vs gender-neutral vaccine impact

Consequently, the incremental cost-effectiveness of male vaccination increases rapidly with higher coverage in females.

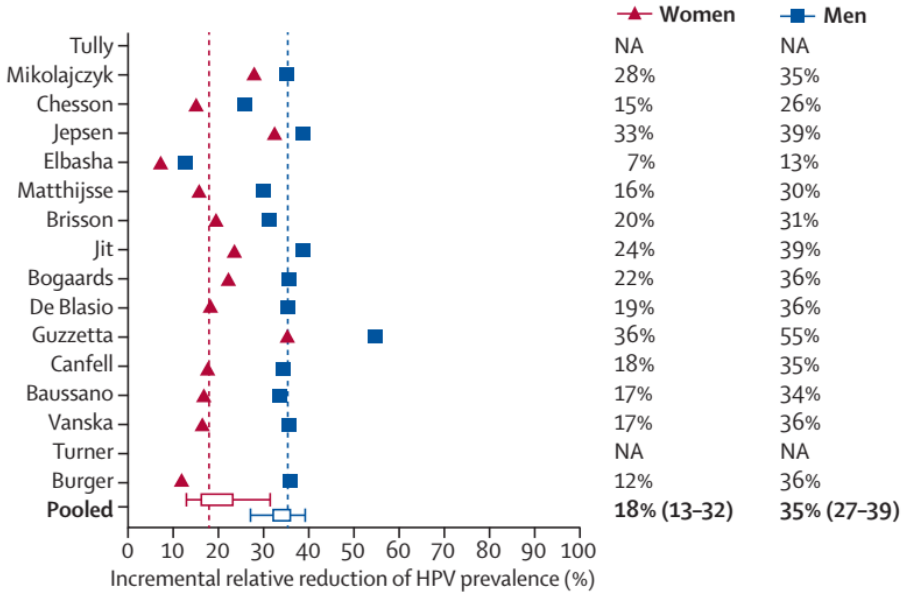


Taira et al. *Emerg Infect Dis* 2004; 10:1915.

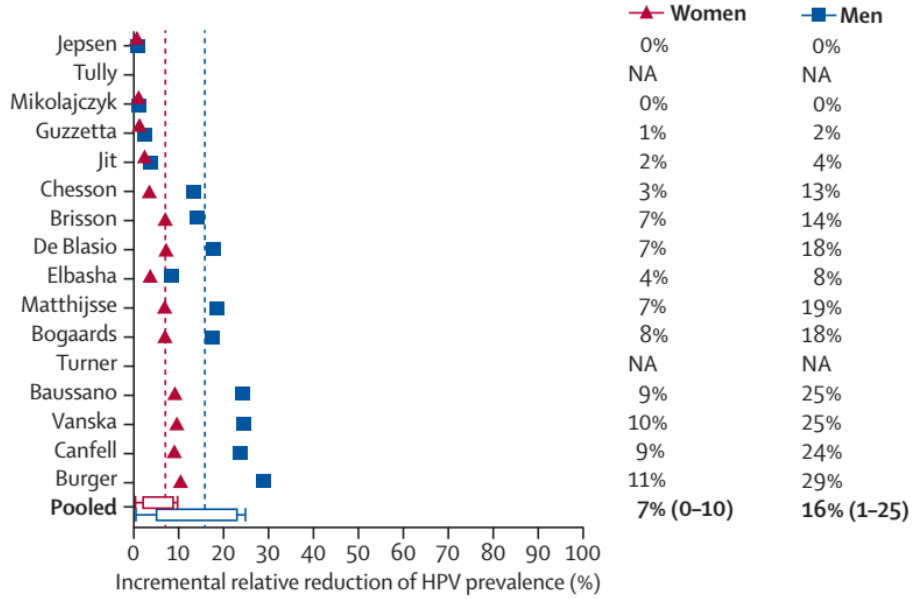
Female only vs gender-neutral vaccine impact

Incremental impact after 70y of vaccinating males in addition to females in high-income countries. From a meta-analysis of 16 transmission dynamic models.

40% coverage (F+M)

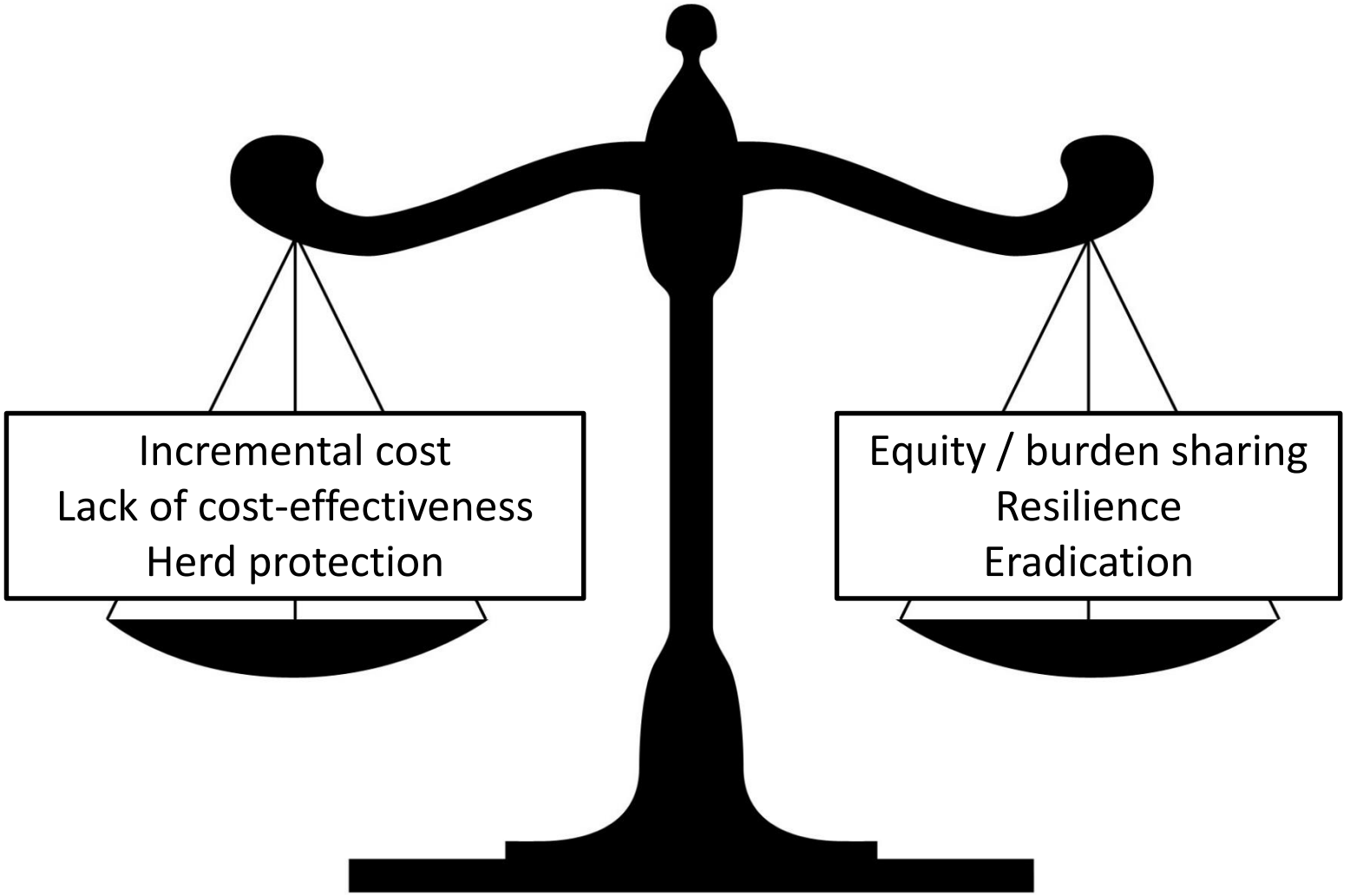


80% coverage (F+M)



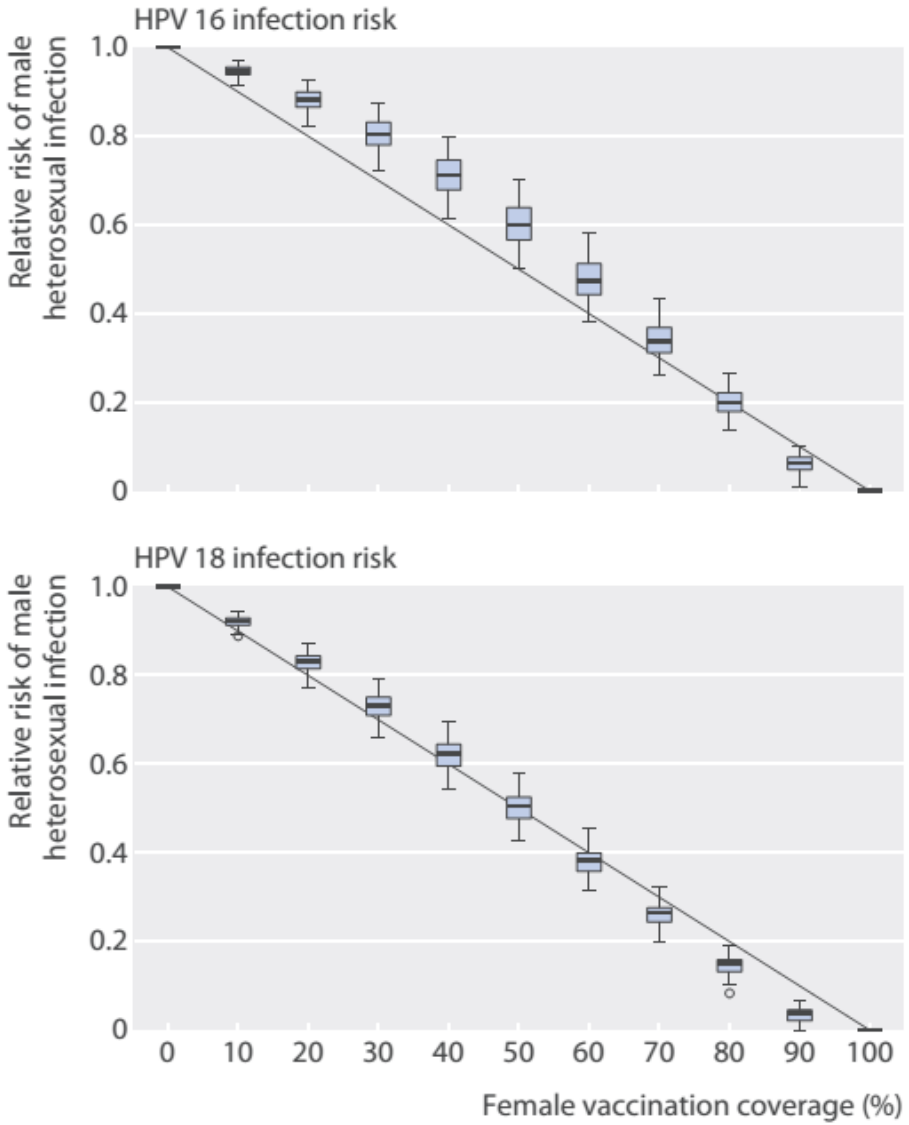
Brisson et al. *Lancet Public Health* 2016; 1:e8.

Gender-neutral vaccination



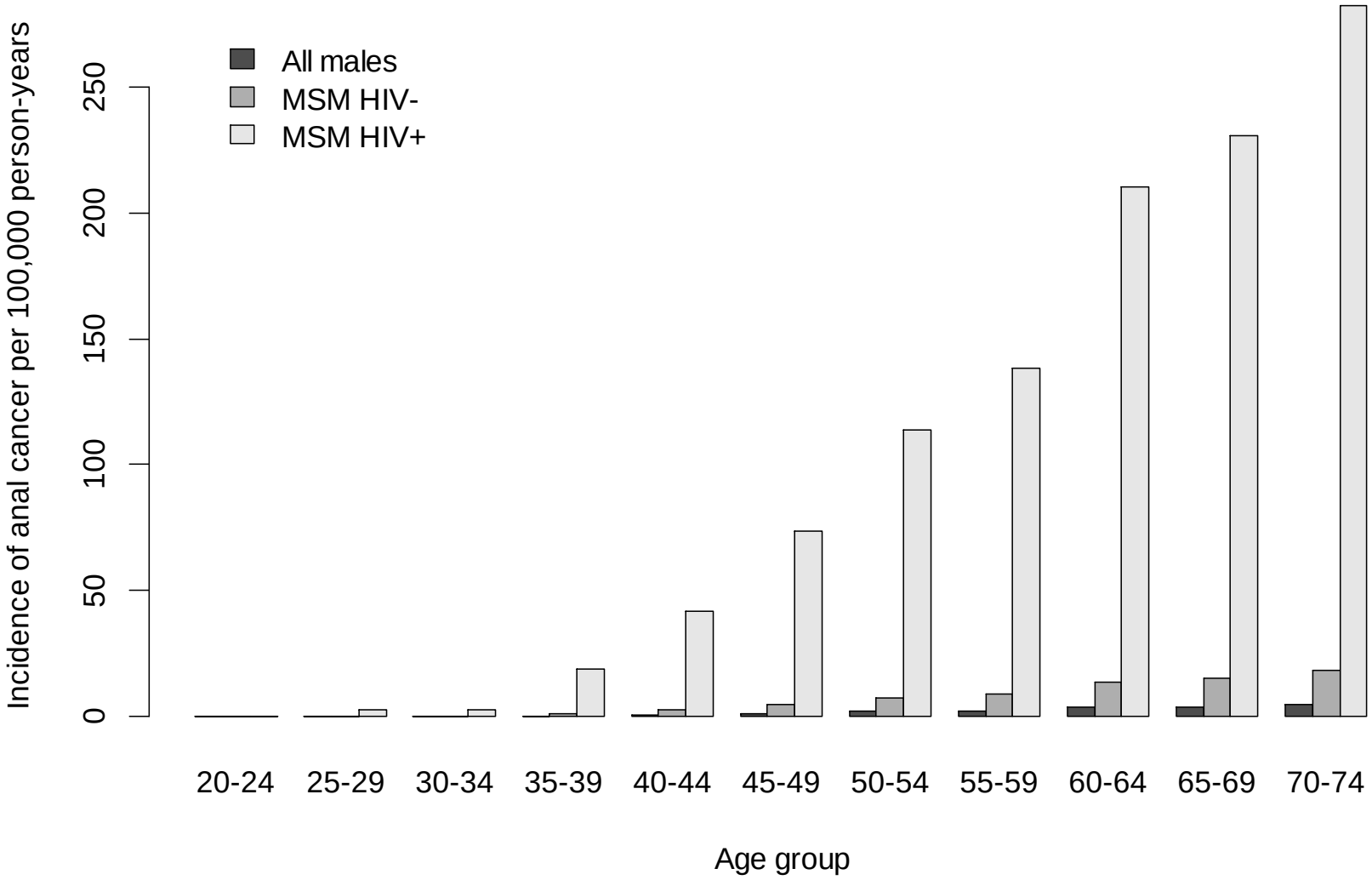
Equity

On average, vaccinating 1 female protects 1 male from HPV infection.



Bogaards et al. *BMJ* 2015; 350:h2016.

Equity



Lin et al. *Clin Infect Dis* 2017; 64:580.

Cost-effectiveness of MSM vaccination

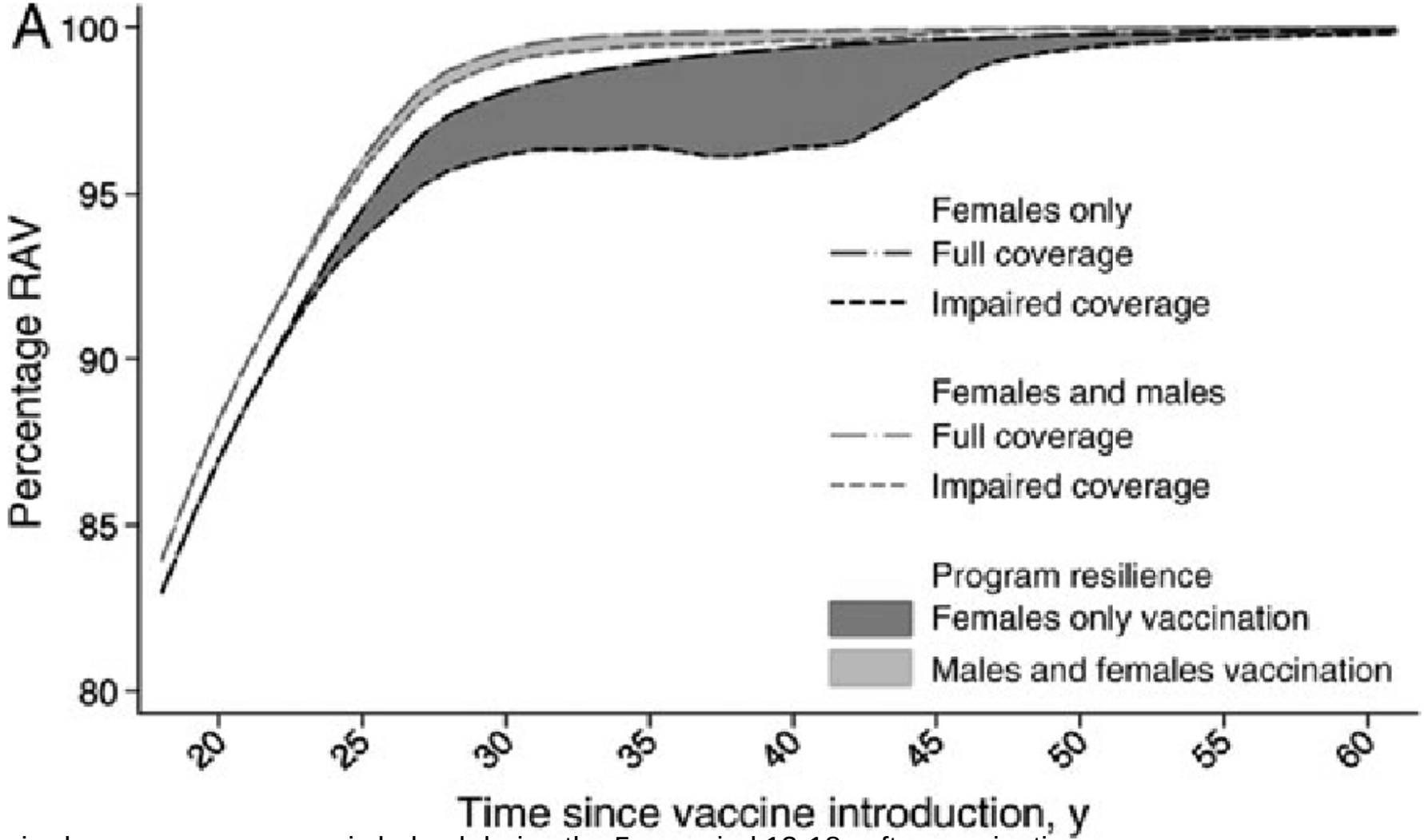
Table 2. Incremental Costs, QALYs Gained and Cost per QALY Gained over 100 years for the Different Vaccination Options

Vaccination option	Vaccine doses		Incremental costs (£m)		Incremental QALYs gained			Incremental cost (£) per QALY gained	
	Undiscounted	Discounted	£96.50/ dose	£48/ dose	Due to warts	Due to cancers	Total	£96.50/ dose	£48/ dose
No vaccination	0	0							
HIV + 16–25	65 288	19 100	−0.39	−1.32 [a]	172	289	461	Cost saving[a]	Cost saving[a]
HIV + 16–30	126 158	18 700	0.21	−0.69 [a]	96	219	315	682	Cost saving
HIV + 16–35	183 605	18 800	0.58	−0.34 [a]	61	172	233	2 470	Cost saving
HIV + 16–40	234 452	18 200	0.83	−0.05	37	124	161	5 160	Cost saving
All 16–25	941 495	207 000	19.3	9.23	194	47	241	80 100 [b]	38 300 [b]
All 16–30	1 172 038	295 000	25.8	11.5	323	312	634	40 600 [b]	18 100 [b]
All 16–35	1 269 048	348 000	29.7	12.9	384	477	861	34 500 [b]	14 900 [b]
All 16–40	1 335 684	395 000	33.4	14.3	423	596	1020	32 800	14 000

Lin et al. *Clin Infect Dis* 2017; 64:580.

Resilience

Gender-neutral vaccination maintains high protection over about 5 years of impaired coverage.

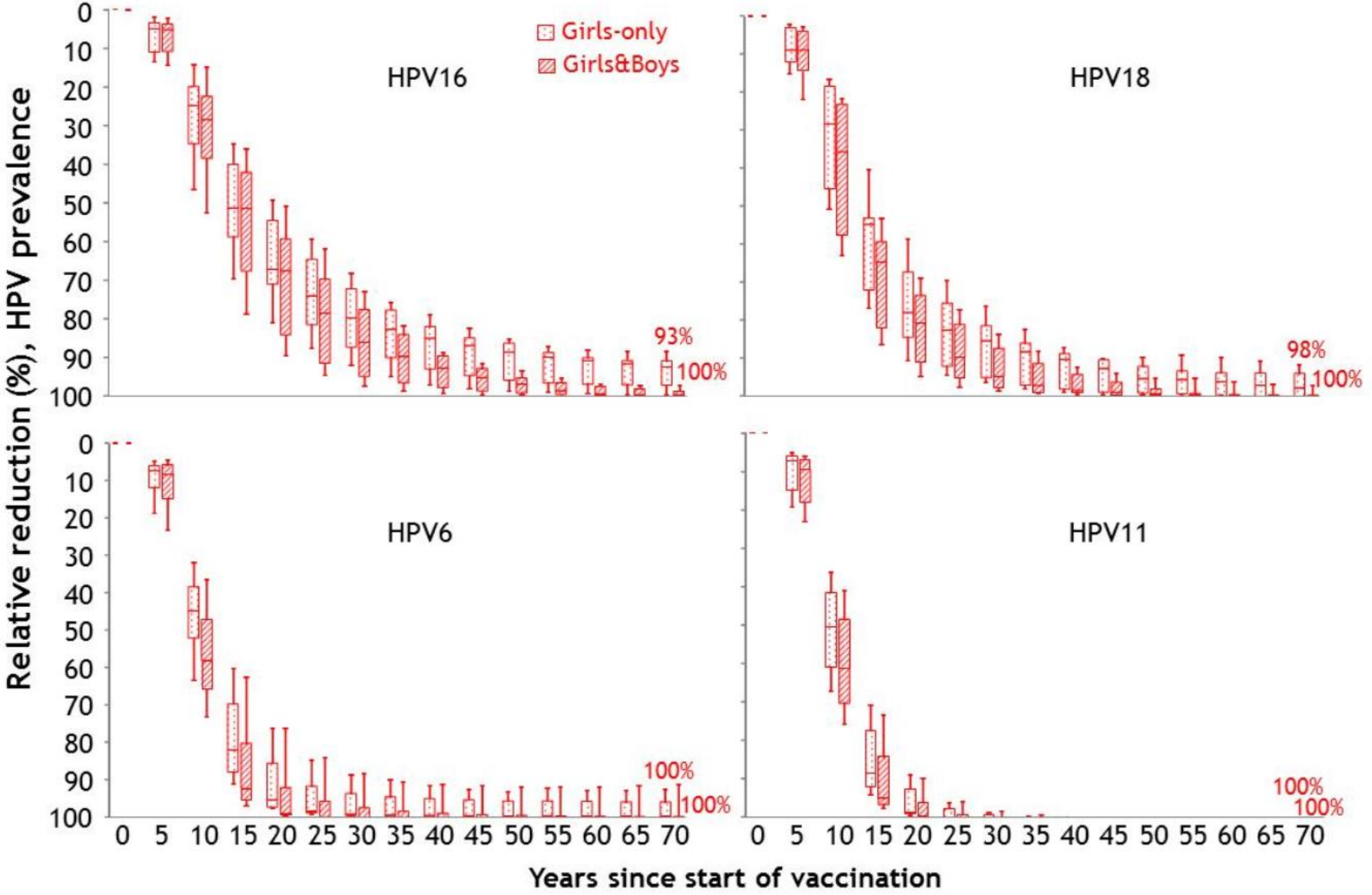


Impaired coverage: coverage is halved during the 5-yr period 13-18y after vaccination.

Elfström et al. *J Inf Dis* 2016; 213:199.

Eradication

Female HPV prevalence after vaccination, meta-analysis of 16 models.



Brisson et al. *Lancet Public Health* 2016; 1:e8.

Summary of conclusions

- Vaccinating females with an efficacious and long-lasting HPV vaccine at high levels of coverage will protect most heterosexual males through herd immunity.

- However, gender-neutral vaccination will increase protection if coverage is low, protect MSM, improve resilience to temporary reductions in coverage, and eventually be necessary for eradication of vaccine-type HPV.