

Supplementary Table 1 | Prevalence ratios of overall HPV and covariates in POP-Brazil 1 and POP-Brazil 2

Group	Crude		Adjusted	
	PR	95% CI	PR	95% CI
Overall (n=16,726)				
POP1	1.00	—	1.00	—
POP2-Unvaccinated and vaccinated	1.21	(1.14-1.28)	1.17	(1.10-1.25)
POP2-Unvaccinated	1.19	(1.12-1.27)	1.22	(1.13-1.32)
POP2-Vaccinated	1.23	(1.15-1.32)	1.12	(1.04-1.22)
Men (n=4,932)				
POP1	1.00	—	1.00	—
POP2-Unvaccinated	1.23	(1.07-1.40)	1.13	(0.96-1.33)
POP2-Vaccinated	1.06	(0.86-1.32)	0.93	(0.72-1.20)
Women (n=11,794)				
POP1	1.00	—	1.00	—
POP2-Unvaccinated	1.25	(1.18-1.33)	1.26	(1.18-1.35)
POP2-Vaccinated	1.27	(1.21-1.35)	1.17	(1.10-1.25)

^aOverall adjusted for sex, age group, alcohol consumption, number of sexual partners, and HIV status.

^bSex-stratified analyses adjusted for age group, alcohol consumption, number of sexual partners, and HIV status.

Supplementary Table 2 | Prevalence of genital HPV covered by the 4vHPV vaccine by participant characteristics, stratified by study.

Variable	POP-Brazil 1		POP-Brazil 2	
	n	% (95% CI)	n	% (95% CI)
Overall	1002	14.98 (13.61-16.45)	869	7.95 (6.92-9.12)
Sex				
Men	174	13.81 (11.15-16.99)	364	10.39 (8.35-12.85)
Women	828	15.64 (14.23-17.17)	505	5.92 (5.23-6.70)
Age				
16-17	84	12.93 (8.87-18.45)	26	1.32 (0.72-2.39)
18-19	270	18.08 (15.08-21.52)	100	3.52 (2.68-4.62)
20-21	253	15.42 (12.76-18.52)	164	5.41 (4.30-6.79)
22-23	211	13.81 (11.23-16.86)	271	10.89 (8.40-13.99)
24-25	184	13.81 (11.07-17.10)	308	15.61 (12.36-19.53)
Skin color/Ethnicity				
White	248	14.77 (12.25-17.70)	224	7.33 (5.54-9.64)
Black	163	13.57 (10.83-16.88)	168	8.43 (6.05-11.65)
Pardo	550	15.16 (13.27-17.27)	459	7.93 (6.61-9.49)
Other	34	21.11 (13.00-32.41)	17	11.14 (5.57-21.06)
Socioeconomic class				
A-B	189	13.38 (10.70-16.61)	177	7.04 (5.58-8.85)
C	536	15.46 (13.56-17.57)	483	7.57 (6.33-9.03)
D-E	277	14.96 (12.53-17.77)	209	9.70 (7.01-13.28)
Alcohol consumption				
No	293	10.89 (9.09-12.98)	293	6.01 (5.06-7.13)
Yes	709	17.17 (15.35-19.16)	574	8.98 (7.52-10.69)
Partnership status				
Single/Widowed/Divorced/Separated	260	14.53 (12.05-17.43)	365	9.09 (7.18-11.46)
Dating	463	18.74 (16.25-21.52)	291	6.22 (5.24-7.38)
Married/Living together	279	11.15 (9.37-13.23)	213	8.96 (6.65-11.97)
Hormonal contraceptive				
No	431	15.86 (13.88-18.06)	133	6.25 (4.98-7.81)
Yes	391	15.41 (13.45-17.61)	230	5.55 (4.56-6.74)
Condom use (last intercourse)				
No	612	15.11 (13.34-17.07)	556	7.68 (6.63-8.89)
Yes	386	14.89 (12.83-17.21)	309	8.54 (6.51-11.13)
Sexual partners (last year)				
Up to one	585	13.00 (11.50-14.65)	389	5.82 (4.84-6.99)
Two or more	362	17.89 (15.30-20.82)	399	10.78 (8.63-13.39)
Age at sexual debut				
< 15	303	14.56 (12.12-17.40)	242	8.14 (6.26-10.53)
≥ 15	675	15.17 (13.55-16.94)	606	7.61 (6.50-8.89)
HIV				
Negative	681	16.01 (14.25-17.93)	746	8.45 (7.24-9.84)
Positive	7	24.65 (8.90-52.27)	31	21.34 (12.34-34.34)

Supplementary Table 3 | Genital 4vHPV prevalence ratio estimates for POP-Brazil 1 and POP-Brazil 2.

Group	POP-Brazil 1				POP-Brazil 2			
	PR	Crude 95% CI	Adjusted ¹ PR	Adjusted ¹ 95% CI	PR	Crude 95% CI	Adjusted ² PR	Adjusted ² 95% CI
HPV vaccination								
Unvaccinated					1.00	—	1.00	—
Vaccinated					0.29	(0.21-0.41)	0.47	(0.32-0.71)
Sex								
Men	1.00	—	1.00	—	1.00	—	1.00	—
Women	1.13	(0.90-1.43)	1.16	(0.85-1.59)	0.57	(0.44-0.73)	0.77	(0.58-1.03)
Age								
16-17	1.00	—	1.00	—	1.00	—	1.00	—
18-19	1.40	(0.93-2.10)	1.45	(0.90-2.32)	2.68	(1.39-5.16)	1.90	(0.83-4.31)
20-21	1.19	(0.79-1.80)	1.27	(0.80-2.04)	4.11	(2.17-7.81)	2.87	(1.29-6.36)
22-23	1.07	(0.70-1.62)	1.10	(0.68-1.78)	8.27	(4.32-15.9)	5.38	(2.39-12.1)
24-25	1.07	(0.70-1.64)	1.06	(0.66-1.70)	11.9	(6.26-22.5)	7.39	(3.37-16.2)
Skin color/Ethnicity								
White	1.00	—			1.00	—		
Black	0.92	(0.69-1.23)			1.15	(0.75-1.77)		
Pardo	1.03	(0.82-1.29)			1.08	(0.78-1.51)		
Other	1.43	(0.87-2.34)			1.52	(0.74-3.13)		
Socioeconomic class								
A-B	1.00	—			1.00	—		
C	1.16	(0.89-1.49)			1.07	(0.80-1.44)		
D-E	1.12	(0.84-1.48)			1.38	(0.93-2.04)		
Alcohol consumption								
No	1.00	—	1.00	—	1.00	—	1.00	—
Yes	1.58	(1.28-1.95)	1.44	(1.11-1.85)	1.49	(1.17-1.91)	1.34	(1.03-1.72)
Partnership status								
Single/Widowed/Divorced/Separated	1.00	—			1.00	—		
Dating	1.29	(1.02-1.63)			0.68	(0.51-0.91)		
Married/Living together	0.77	(0.60-0.99)			0.99	(0.68-1.43)		
Condom use (last intercourse)								
No	1.00	—			1.00	—		
Yes	0.99	(0.81-1.19)			1.11	(0.82-1.51)		
Sexual partners (last year)								
Up to one	1.00	—	1.00	—	1.00	—	1.00	—
Two or more	1.38	(1.13-1.67)	1.43	(1.11-1.85)	1.85	(1.39-2.47)	1.66	(1.25-2.21)
Age at sexual debut								
< 15	1.00	—			1.00	—		
≥ 15	1.04	(0.84-1.29)			0.93	(0.69-1.27)		
HIV								
Negative	1.00	—	1.00	—	1.00	—	1.00	—
Positive	1.54	(0.64-3.73)	1.11	(0.40-3.09)	2.53	(1.48-4.31)	1.77	(0.98-3.20)

¹ Adjusted for sex, age group, alcohol use, number of sexual partners, and HIV status.

² Adjusted for vaccination status, sex, age group, alcohol use, number of sexual partners, and HIV status.

Supplementary Table 4 | Genital 4vHPV vaccine types prevalence ratio estimates for POP-Brazil 1 and POP-Brazil 2 by age group.

Group	Younger group ^a				Older group ^b			
	Crude		Adjusted ^c		Crude		Adjusted ^c	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Men (n=4,932)								
POP1	1.00	—	1.00	—	1.00	—	1.00	—
POP2-Unvaccinated and vaccinated	0.43	(0.29-0.64)	0.35	(0.21-0.58)	0.99	(0.67-1.45)	1.07	(0.70-1.64)
POP2-Unvaccinated	0.54	(0.36-0.83)	0.46	(0.27-0.80)	1.12	(0.77-1.64)	1.22	(0.80-1.86)
POP2-Vaccinated	0.25	(0.14-0.45)	0.21	(0.10-0.41)	0.50	(0.17-1.47)	0.56	(0.18-1.68)
Women (n=11,794)								
POP1	1.00	—	1.00	—	1.00	—	1.00	—
POP2-Unvaccinated and vaccinated	0.20	(0.16-0.25)	0.20	(0.15-0.25)	0.96	(0.75-1.23)	0.90	(0.68-1.18)
POP2-Unvaccinated	0.46	(0.35-0.59)	0.43	(0.32-0.58)	1.10	(0.86-1.42)	1.04	(0.79-1.38)
POP2-Vaccinated	0.11	(0.08-0.15)	0.12	(0.08-0.17)	0.71	(0.46-1.10)	0.64	(0.39-1.05)

^a Men: 16-22 years; Women: 16-23 years;

^b Men: 23-25 years; Women: 24-25 years;

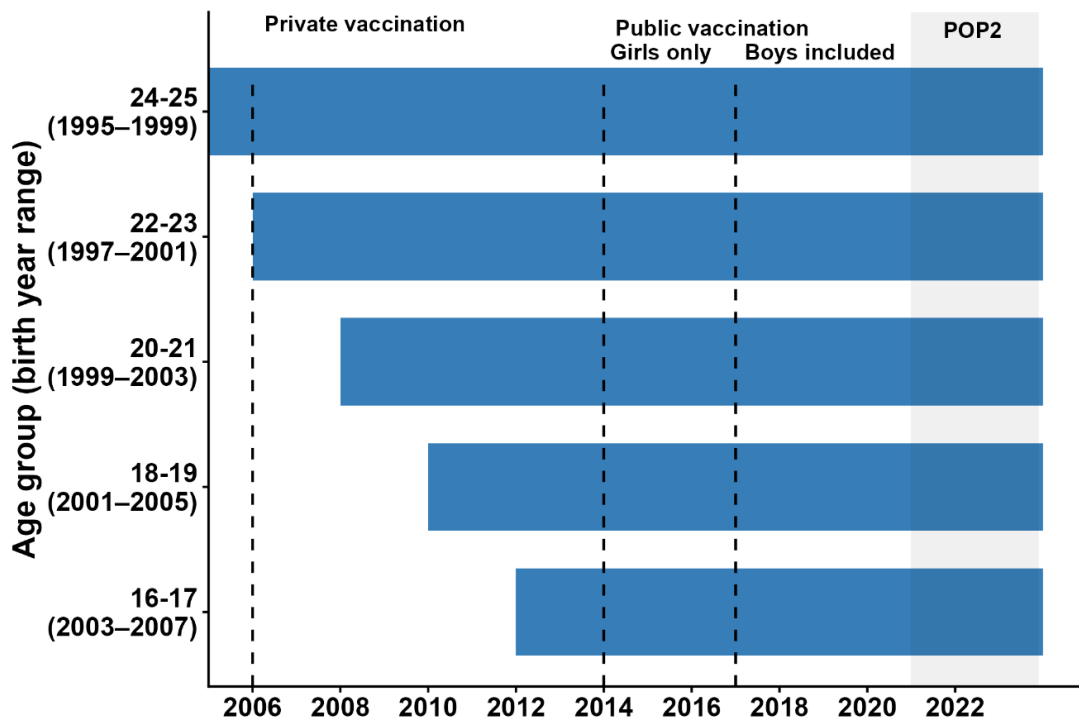
^c Sex-stratified analyses adjusted for alcohol consumption, number of sexual partners, and HIV status.

Supplementary Table 5 | Prevalence of HPV infection, stratified by study, HPV vaccination status, and sex.

HPV Type	Men											
	POP1			POP2-Unvaccinated			POP2-Vaccinated			Women		
	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)
Overall (any HPV)	488	42.4% (37.7-47.2)	1,453	52.0% (48.2-55.8)	328	45.1% (37.2-53.3)	2,593	49.1% (47.1-51.2)	1,786	61.4% (58.7-63.9)	2,272	62.6% (60.2-65.0)
High-risk	328	29.2% (25.1-33.8)	1,032	36.8% (33.2-40.6)	225	34.6% (27.1-42.9)	2,030	38.6% (36.6-40.6)	1,402	49.4% (46.8-52.1)	1,698	47.8% (45.4-50.3)
High-risk (non 16 18)	271	24.6% (20.6-29.0)	964	34.1% (30.6-37.8)	220	34.3% (26.8-42.6)	1,738	32.6% (30.7-34.6)	1,309	46.6% (44.0-49.3)	1,663	47.2% (44.7-49.7)
Multiple infection	224	19.0% (15.7-22.9)	787	28.1% (24.9-31.5)	173	23.8% (17.5-31.5)	1,420	27.2% (25.4-29.0)	1,086	37.6% (35.1-40.1)	1,404	39.1% (36.7-41.5)
9vHPV types	265	23.3% (19.5-27.5)	684	26.0% (22.6-29.6)	126	18.3% (12.6-25.9)	1,577	30.2% (28.4-32.1)	934	31.8% (29.4-34.3)	971	26.7% (24.5-28.9)
4vHPV types	174	13.8% (11.2-17.0)	318	13.0% (10.4-16.1)	46	4.6% (2.35-8.88)	828	15.6% (14.2-17.2)	369	10.5% (9.18-12.1)	136	3.1% (2.38-3.95)
HPV-16 or 18	103	8.1% (6.0-10.8)	149	4.5% (3.2-6.5)	16	2.3% (0.6-7.8)	654	12.2% (11.0-13.6)	258	7.4% (6.3-8.8)	86	1.8% (1.3-2.5)
HPV-6	70	5.2% (3.71-7.19)	150	6.9% (5.04-9.47)	24	1.4% (0.799-2.52)	283	5.8% (4.86-6.83)	111	3.3% (2.53-4.22)	42	0.9% (0.575-1.48)
HPV-11	26	2.6% (1.59-4.37)	53	2.5% (1.40-4.34)	12	2.6% (0.843-7.88)	48	0.7% (0.474-1.12)	32	0.9% (0.538-1.36)	18	0.4% (0.215-0.717)
HPV-16 ^a	68	4.9% (3.55-6.79)	100	2.7% (1.95-3.67)	9	0.6% (0.258-1.21)	479	8.9% (7.82-10.1)	173	4.9% (3.98-5.99)	56	1.3% (0.821-1.91)
HPV-18 ^a	39	3.7% (2.20-6.09)	55	2.0% (0.976-4.01)	9	1.8% (0.369-8.41)	208	3.8% (3.18-4.65)	99	2.8% (2.16-3.71)	34	0.7% (0.401-1.07)
HPV-26	9	0.7% (0.322-1.67)	40	1.1% (0.633-1.84)	9	1.0% (0.373-2.55)	79	1.3% (0.988-1.79)	41	1.4% (0.864-2.23)	89	2.3% (1.68-3.12)
HPV-31 ^a	19	1.6% (0.711-3.49)	99	3.5% (2.60-4.73)	15	4.3% (1.69-10.6)	231	4.8% (3.92-5.75)	174	5.9% (4.80-7.14)	129	3.6% (2.77-4.57)
HPV-33 ^a	7	1.2% (0.360-3.96)	49	1.4% (0.870-2.11)	7	1.8% (0.351-8.50)	102	2.0% (1.50-2.60)	73	2.5% (1.76-3.49)	83	2.6% (1.86-3.58)
HPV-35 ^a	15	1.0% (0.534-1.95)	109	3.8% (2.51-5.79)	20	2.7% (0.901-7.79)	165	3.4% (2.74-4.22)	193	7.0% (5.77-8.51)	250	6.7% (5.58-8.12)
HPV-39 ^a	23	1.6% (0.896-2.74)	165	5.9% (4.22-8.31)	42	4.9% (2.61-9.11)	209	3.6% (2.95-4.42)	215	7.2% (5.95-8.60)	328	8.6% (7.30-10.0)
HPV-40	15	1.6% (0.728-3.59)	170	5.2% (3.81-7.15)	35	4.2% (2.04-8.55)	57	0.8% (0.571-1.26)	155	5.2% (4.23-6.48)	228	6.1% (5.04-7.44)
HPV-42	30	2.4% (1.39-4.15)	245	10.5% (8.32-13.2)	50	7.6% (3.92-14.1)	156	3.0% (2.35-3.72)	246	8.6% (7.21-10.2)	396	11.2% (9.73-12.9)
HPV-45 ^a	23	1.6% (0.970-2.73)	86	3.3% (2.10-5.18)	16	1.3% (0.676-2.47)	186	3.2% (2.51-3.96)	127	4.5% (3.54-5.67)	161	4.7% (3.69-5.87)
HPV-51 ^a	61	6.0% (3.99-8.88)	188	5.8% (4.63-7.28)	52	8.2% (4.46-14.7)	297	4.8% (4.07-5.76)	231	8.0% (6.69-9.53)	342	10.3% (8.85-12.1)
HPV-52 ^a	79	6.0% (4.08-8.62)	148	5.6% (3.93-8.06)	36	9.7% (5.07-17.7)	452	8.8% (7.71-10.1)	238	8.2% (6.90-9.73)	348	9.5% (8.15-11.0)
HPV-53	47	3.0% (1.87-4.89)	194	6.8% (5.06-9.19)	42	6.3% (3.23-11.8)	347	6.7% (5.75-7.81)	289	9.1% (7.79-10.7)	402	11.1% (9.64-12.8)
HPV-54	30	2.4% (1.37-4.30)	182	6.4% (4.88-8.46)	49	7.6% (3.99-14.0)	215	4.3% (3.50-5.16)	227	8.1% (6.79-9.68)	311	7.6% (6.44-8.87)
HPV-56 ^a	13	0.8% (0.405-1.64)	175	7.0% (5.08-9.46)	45	9.6% (5.33-16.7)	170	3.3% (2.63-4.10)	205	6.9% (5.74-8.27)	279	8.1% (6.76-9.57)
HPV-58 ^a	38	4.1% (2.45-6.71)	157	4.1% (3.19-5.22)	35	3.0% (1.79-4.95)	314	6.1% (5.21-7.20)	243	9.0% (7.59-10.6)	336	9.7% (8.32-11.4)
HPV-59 ^a	71	6.5% (4.54-9.30)	166	6.5% (4.89-8.51)	42	5.9% (2.85-11.7)	264	4.7% (3.92-5.58)	173	6.6% (5.39-8.00)	248	6.7% (5.62-7.89)
HPV-61	59	6.8% (4.63-9.97)	136	5.0% (3.86-6.49)	31	2.4% (1.39-4.09)	296	5.6% (4.72-6.58)	200	7.7% (6.41-9.16)	341	9.3% (8.00-10.8)
HPV-66	51	3.8% (2.42-5.84)	159	6.8% (4.88-9.27)	55	7.0% (3.78-12.5)	270	5.0% (4.16-5.89)	198	6.1% (5.08-7.33)	310	8.5% (7.17-10.0)
HPV-68 ^a	28	1.9% (1.16-2.96)	192	6.8% (5.00-9.20)	43	4.3% (2.76-6.77)	155	2.8% (2.21-3.51)	291	11.6% (9.89-13.5)	361	9.4% (8.10-10.9)

		Men						Women					
		POP1	POP2-Unvaccinated		POP2-Vaccinated				POP1	POP2-Unvaccinated		POP2-Vaccinated	
HPV-69	8	0.8% (0.219-2.67)	39	0.8% (0.462-1.41)	7	0.5% (0.212-1.19)	40	0.8% (0.481-1.32)	57	1.6% (1.17-2.30)	70	1.6% (1.10-2.38)	
HPV-70	8	0.6% (0.257-1.25)	65	2.5% (1.40-4.42)	11	0.6% (0.294-1.28)	127	2.8% (2.15-3.57)	146	5.2% (4.13-6.55)	177	5.5% (4.36-6.82)	
HPV-73	37	3.4% (1.95-5.87)	145	4.9% (3.51-6.70)	29	3.7% (1.63-8.10)	190	3.7% (2.96-4.51)	135	4.3% (3.44-5.39)	228	5.9% (4.85-7.18)	
HPV-82	25	3.1% (1.66-5.88)	104	3.4% (2.23-5.29)	32	4.7% (1.95-10.9)	118	2.4% (1.86-3.14)	144	5.5% (4.40-6.91)	185	5.2% (4.22-6.35)	

^a High-risk HPV types



Supplementary Figure 1 | Mapping of POP2 participant age groups (by birth year) to the timeline of HPV vaccination rollout in Brazil. Horizontal bars represent the vaccination windows, extending to the survey period (2021–2023). Dashed vertical lines mark key vaccination policy milestones: private-sector availability (2006), public program launch for girls (2014), and extension to boys (2017).

STROBE Statement. Checklist of items that should be included in reports of cross-sectional studies

Item			Page
	No	Recommendation	No
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4
Data sources/ measurement	8 ^a	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	4/5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	4/5
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	5
		(b) Describe any methods used to examine subgroups and interactions	5
		(c) Explain how missing data were addressed	4
		(d) If applicable, describe analytical methods taking account of sampling strategy	5
		(e) Describe any sensitivity analyses	N/A
Results			
Participants	13 ^a	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6/7
		(b) Give reasons for non-participation at each stage	6
		(c) Consider use of a flow diagram	6
Descriptive data	14 ^a	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6/7
		(b) Indicate number of participants with missing data for each variable of interest	6
Outcome data	15 ^a	Report numbers of outcome events or summary measures	7/8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7/8
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	7/8
Discussion			
Key results	18	Summarise key results with reference to study objectives	8/9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10/11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9/10
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	11

^aGive information separately for exposed and unexposed groups.