# Supporting information

## HPV transmission model equations

**Females**



**Males**

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where

: persons of gender, *g* , and age, *a*, who are susceptible to HPV type at time *t*

: persons of gender, *g* , and age, *a* , who are infected with initial HPV type at time *t*

: women of gender, *g* , and age, *a*, who have CIN1-type lesions attributable to HPV type at time *t*

: women of gender, *g* , and age, *a*, who have CIN2-type lesions attributable to HPV type at time *t*

: women of gender, *g* , and age, *a*, who have CIN3-type lesions attributable to HPV type at time *t*

: women of gender, *g* , and age, *a*, who have cancer attributable to HPV type at time *t*

: persons of gender, *g* , and age, *a*, who are resistant to HPV type at time *t*

**: population size of gender, *g*

: force of infection acting on persons of gender, *g* , and sexual activity group, *i*

: annual rate of loss of naturally-acquired immunity

: annual rate of progression from initial infection to CIN1-type lesions

: annual rate of progression from CIN1-type lesions to CIN2-type lesions

: annual rate of progression from CIN2-type lesions to CIN3-type lesions

: annual rate of progression from CIN3-type lesions to cancer

: annual rate of clearance of initial infection

: annual rate of clearance of CIN1-type lesions

: annual rate of clearance of CIN2-type lesions

: combined rate for screening and subsequent treatment of lesions

: birth rate

 : natural-cause mortality

: rate or mortality due to cervical cancer