

**ARCC**  
Canadian Centre  
for Applied Research  
in Cancer Control

# Case study evaluation of cervical cancer screening programs in British Columbia using CPAC's Cancer Risk Management Model (CRMM)

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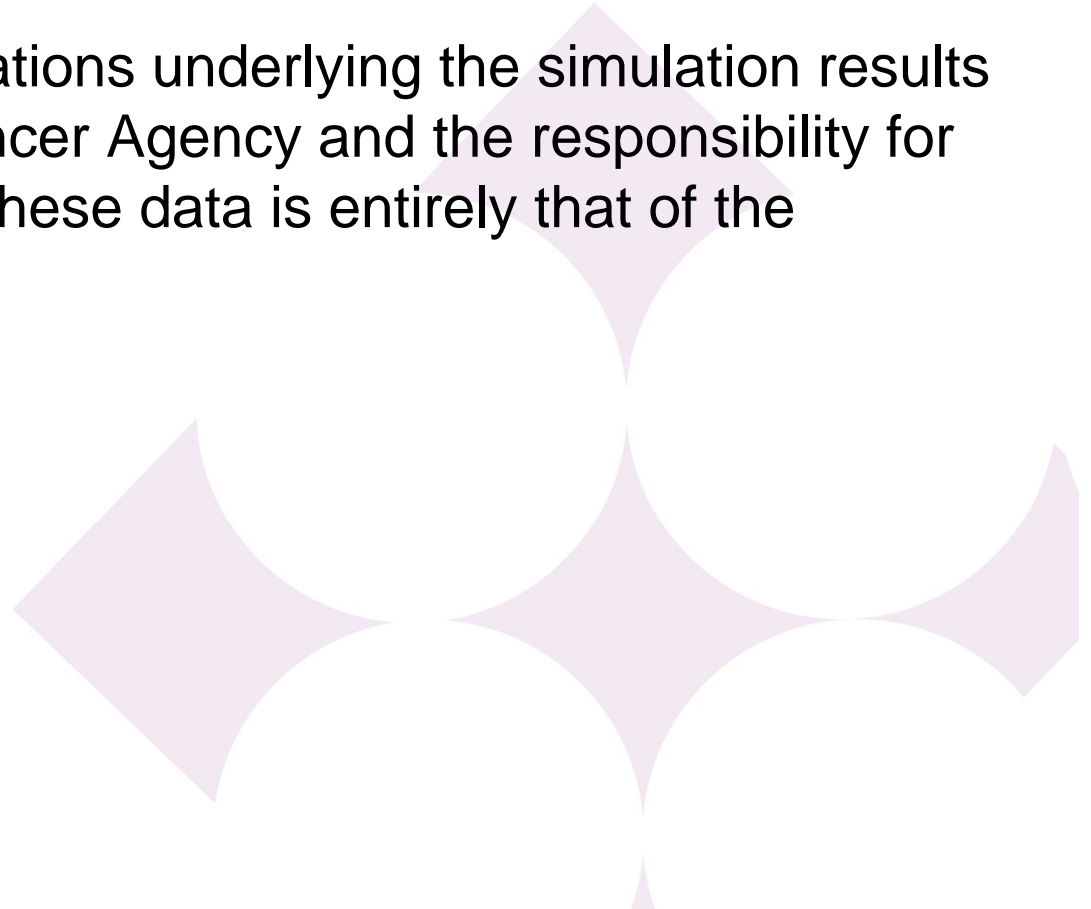
**Cancer Care Ontario**  
**Action Cancer Ontario**

# Acknowledgements

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  - Dirk Van Niekerk, Jane Lo and Monika Naus
- Funding for this project was provided by the Canadian Partnership Against Cancer (CPAC).

# Disclaimer

“The assumptions and calculations underlying the simulation results were prepared by the BC Cancer Agency and the responsibility for the use and interpretation of these data is entirely that of the author(s).”





# **BACKGROUND**

# Cervical cancer

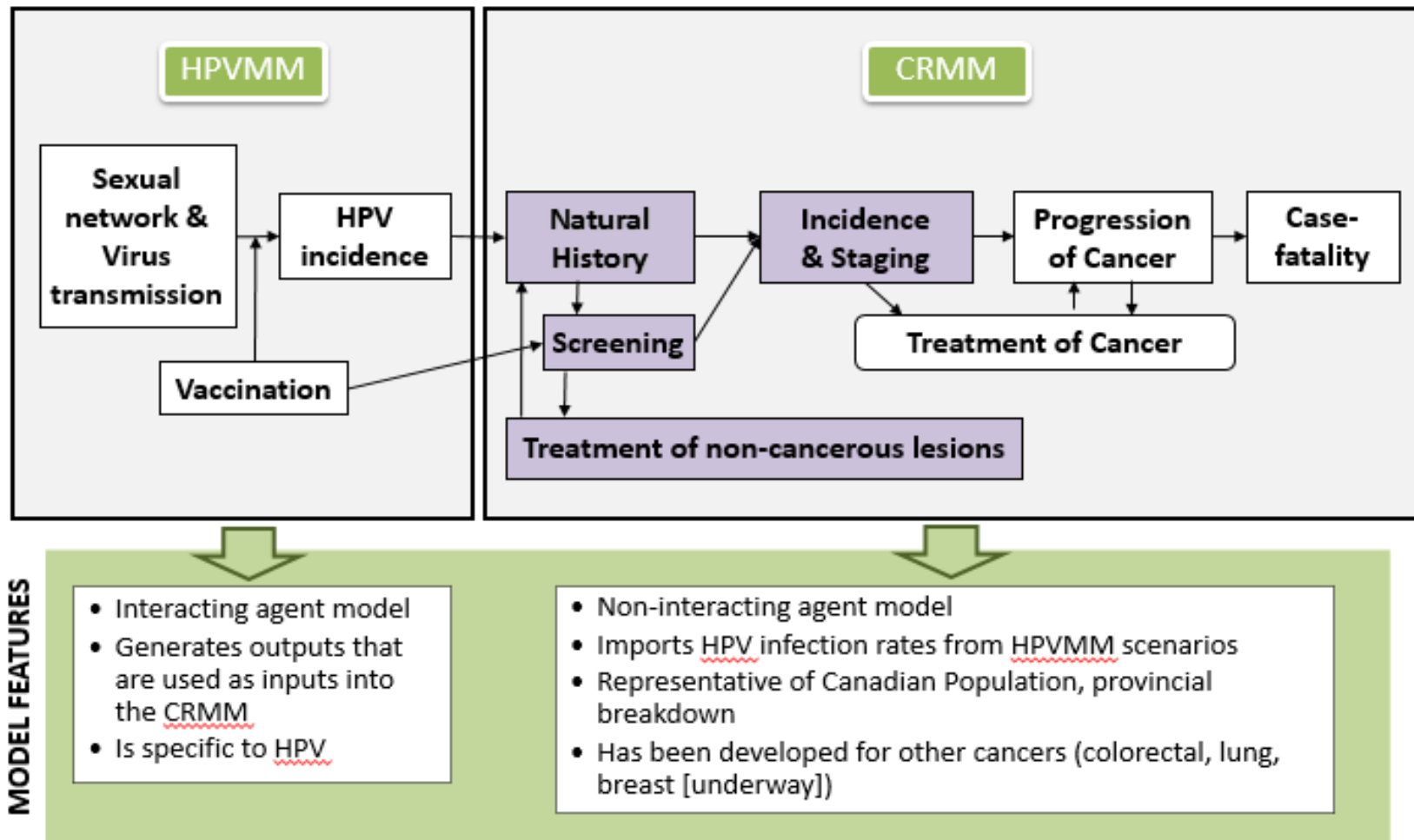
- Cervical cancer accounts for 2% of all new cancer cases among women in Canada<sup>1</sup>.
- Incidence and mortality rates have remained low in British Columbia, yet more can be done to improve screening participation rate.
- Decision-makers are interested in interventions that reduce the incidence of cervical cancer, yet the cost-effectiveness of these options may not always be known.

# Evaluation of Cancer Risk Management Model (CRMM) and HPVMM platforms

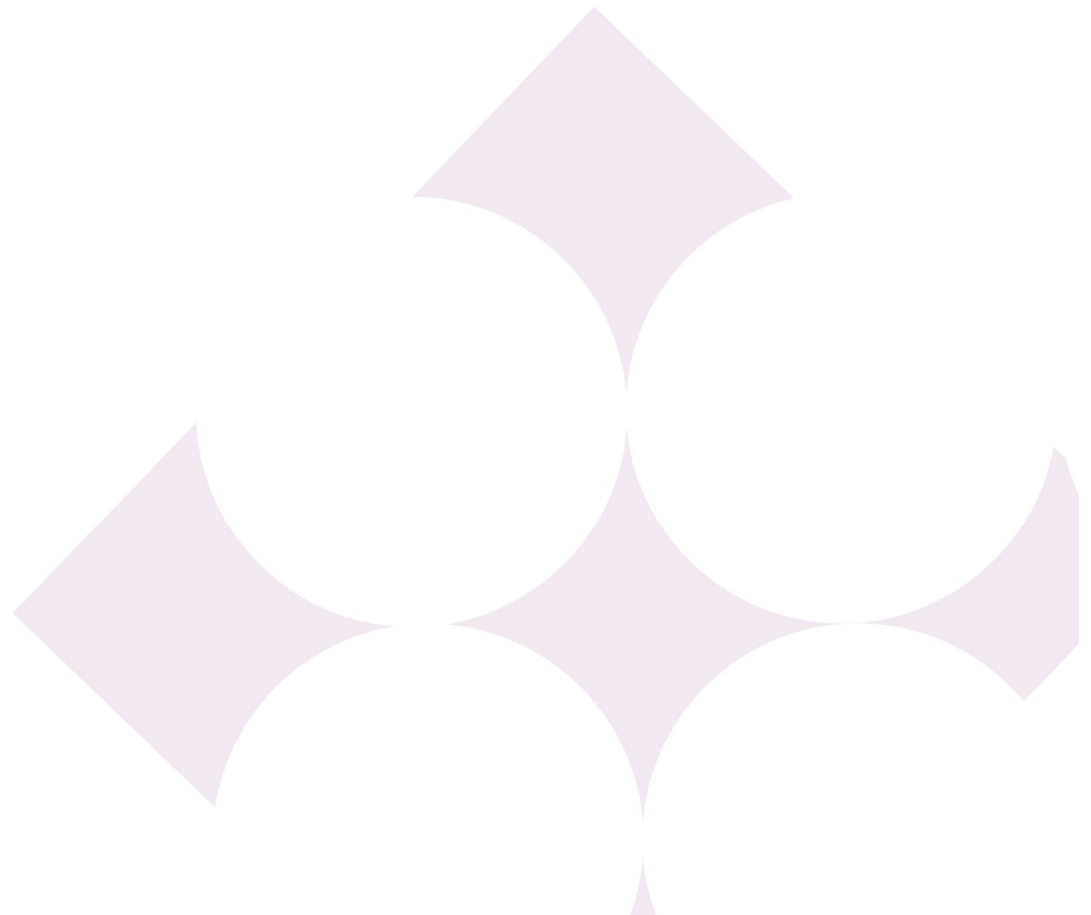
- Three main project objectives:
  1. To conduct a case study evaluation of CRMM/ HPVMM platforms;
  2. To compare various cervical cancer control interventions; and
  3. To provide constructive feedback on usability of the model platforms.

# Interaction between CRMM and HPVMM models

www.cancerview.ca



# METHODS





# Research question

Using the CRMM and HPVMM models, what is the projected impact of changes to the current cervical cancer screening program from a BC perspective, in terms of costs and health care outcomes?

# Scenarios of interest

Ten scenarios were modeled over 35-year time period (2013-2048):

Factor	Scenario
“BC base case”	<ul style="list-style-type: none"> <li>Parameters changed to reflect British Columbia’s cervical cancer screening program, treatment protocols and guidelines, and HPV vaccination schedules.</li> </ul>
Method of screening	<ul style="list-style-type: none"> <li>Screen starting at age 25 years using Pap test.</li> <li>Screen starting at age 30 years using HPV DNA test.</li> </ul>
Screening interval	<ul style="list-style-type: none"> <li>Screen using Pap test every 3 years.</li> <li>Screen using Pap test every 5 years.</li> <li>Screen using HPV DNA test every 3 years.</li> <li>Screen using HPV DNA test every 5 years.</li> </ul>
Screening participation	<ul style="list-style-type: none"> <li>Provincial screening participation rate of 70%.</li> </ul>
Prevalence of HPV	<ul style="list-style-type: none"> <li>HPV vaccination of males aged 12-14 years.</li> <li>Vaccination participation rate of 74% (females only).</li> </ul>

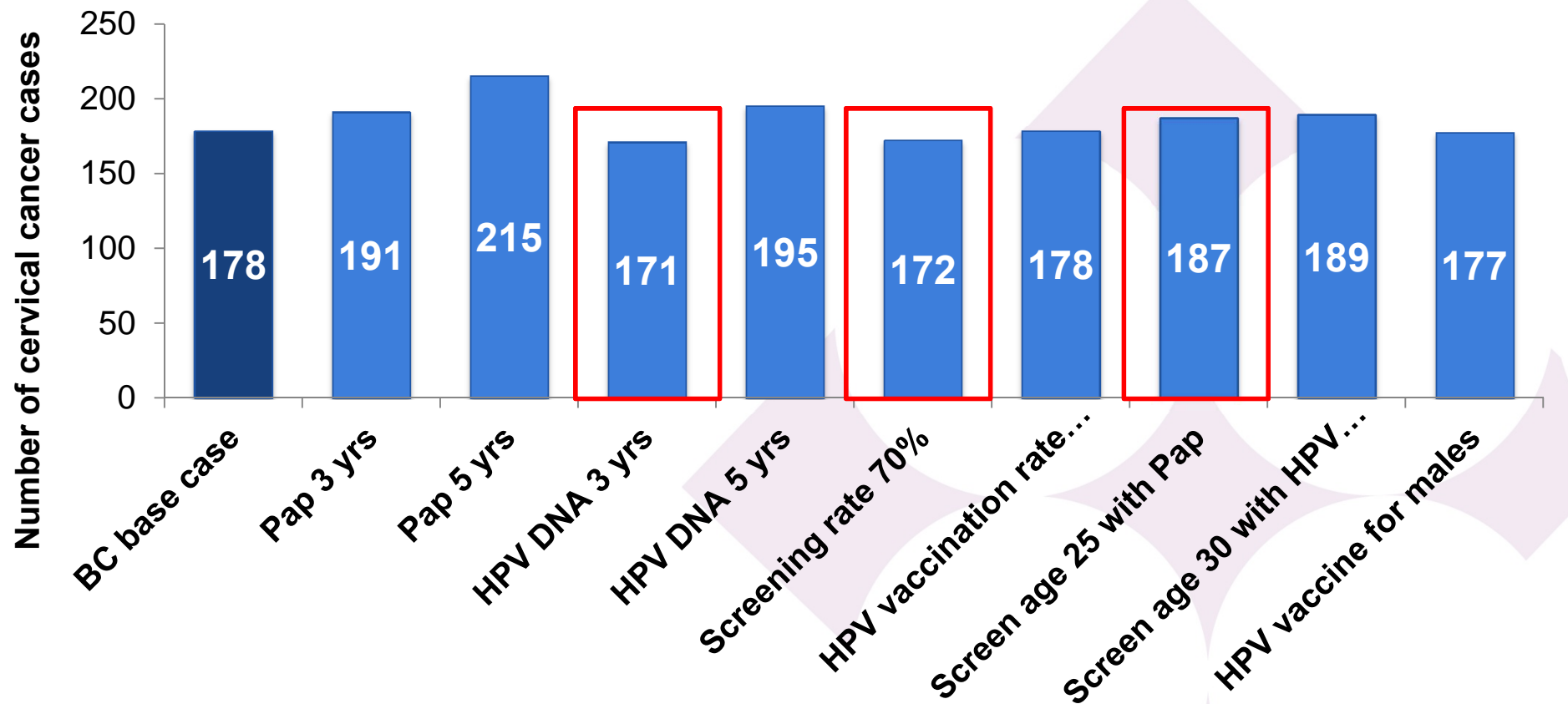


# RESULTS



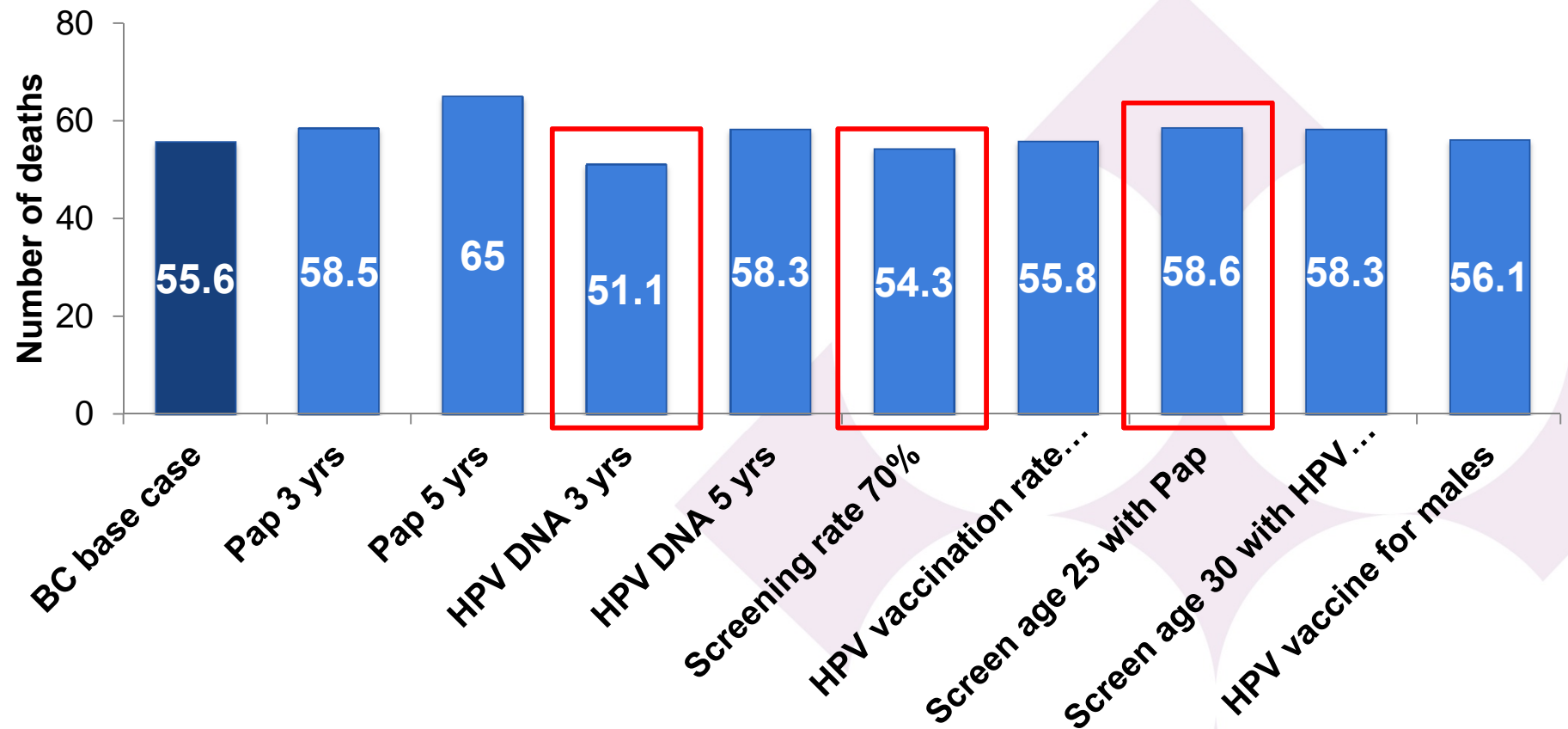
# Cervical cancer incidence cases

Average number of new cervical cancer cases per year (2013-2048)



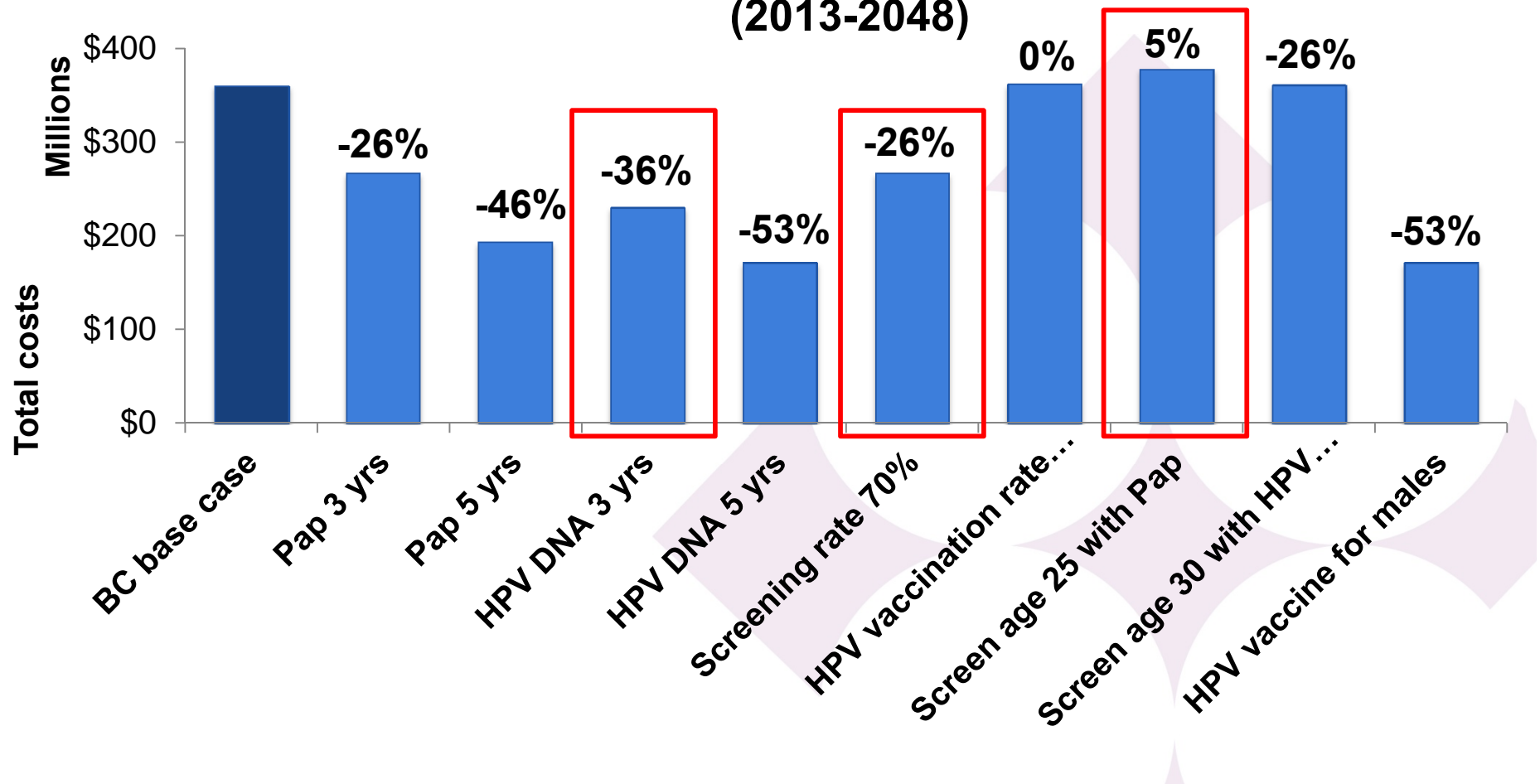
# Deaths due to cervical cancer

Average number of deaths from cervical cancer per year (2013-2048)



# Impact on total costs related to cervical cancer

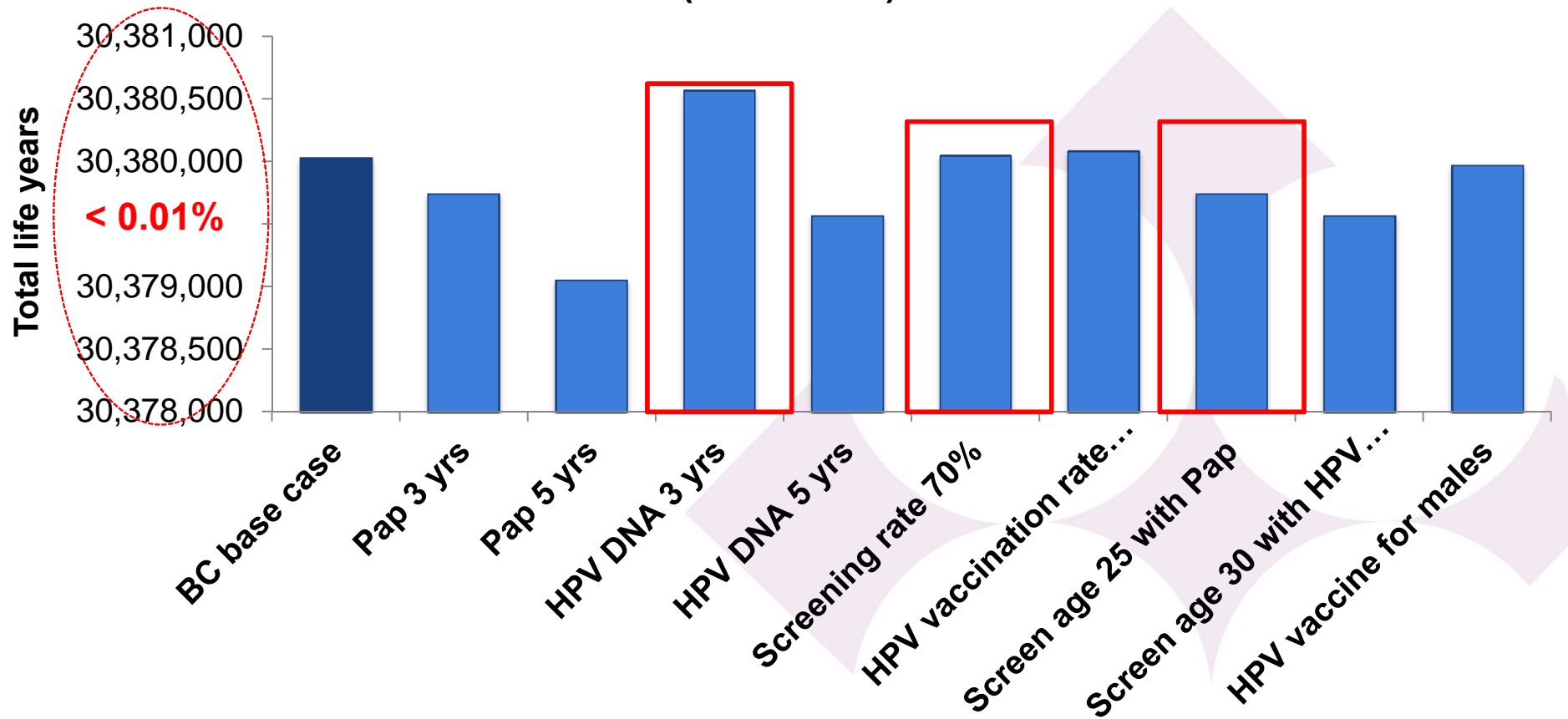
**Total cumulative costs over 35-year period\*, by scenario (2013-2048)**



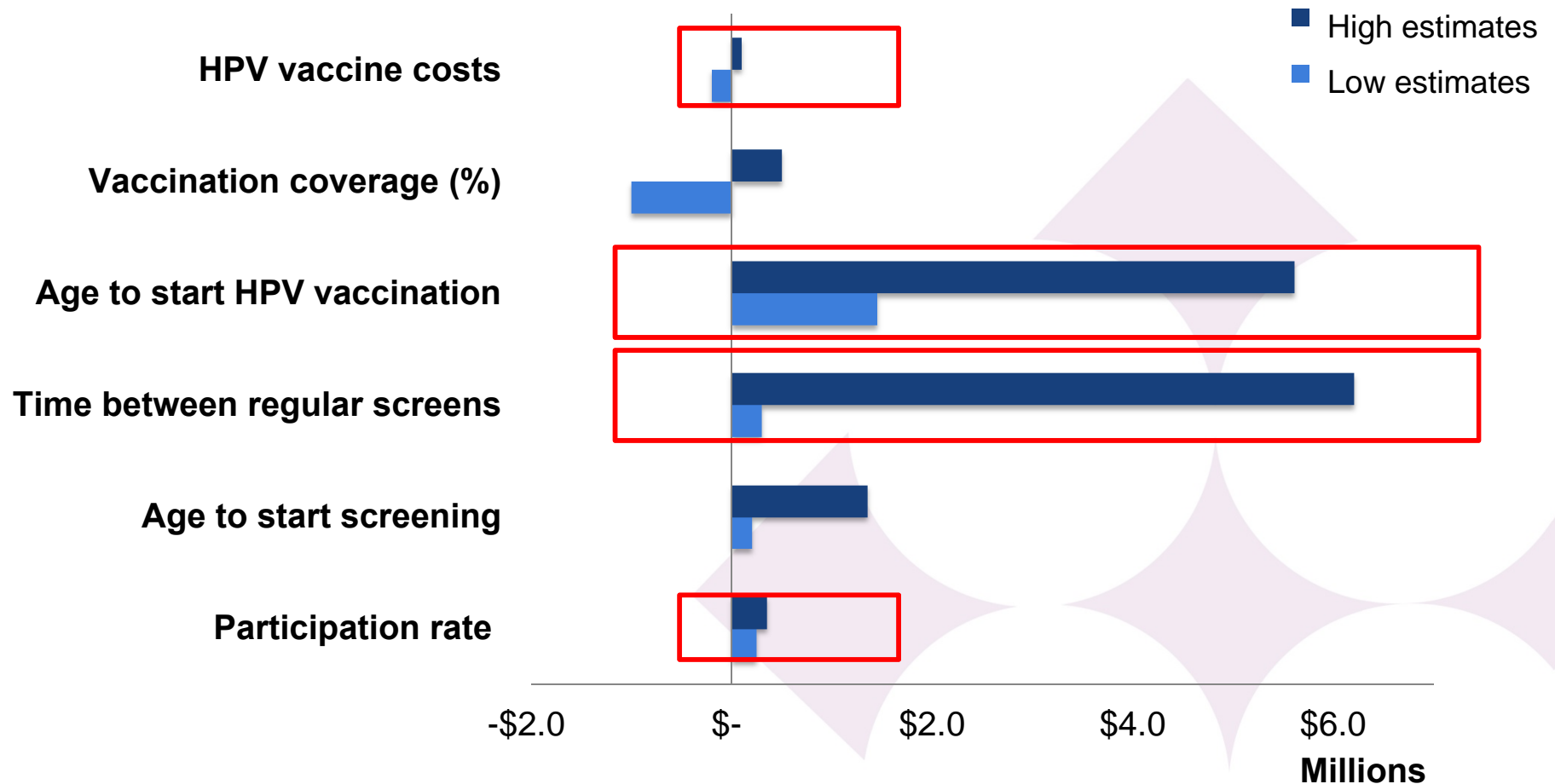
\*comparator: BC base case  
Analysis level: Females, user-defined population

# Impact on total life years

Cumulative life years over 35-year period, by scenario (2013-2048)



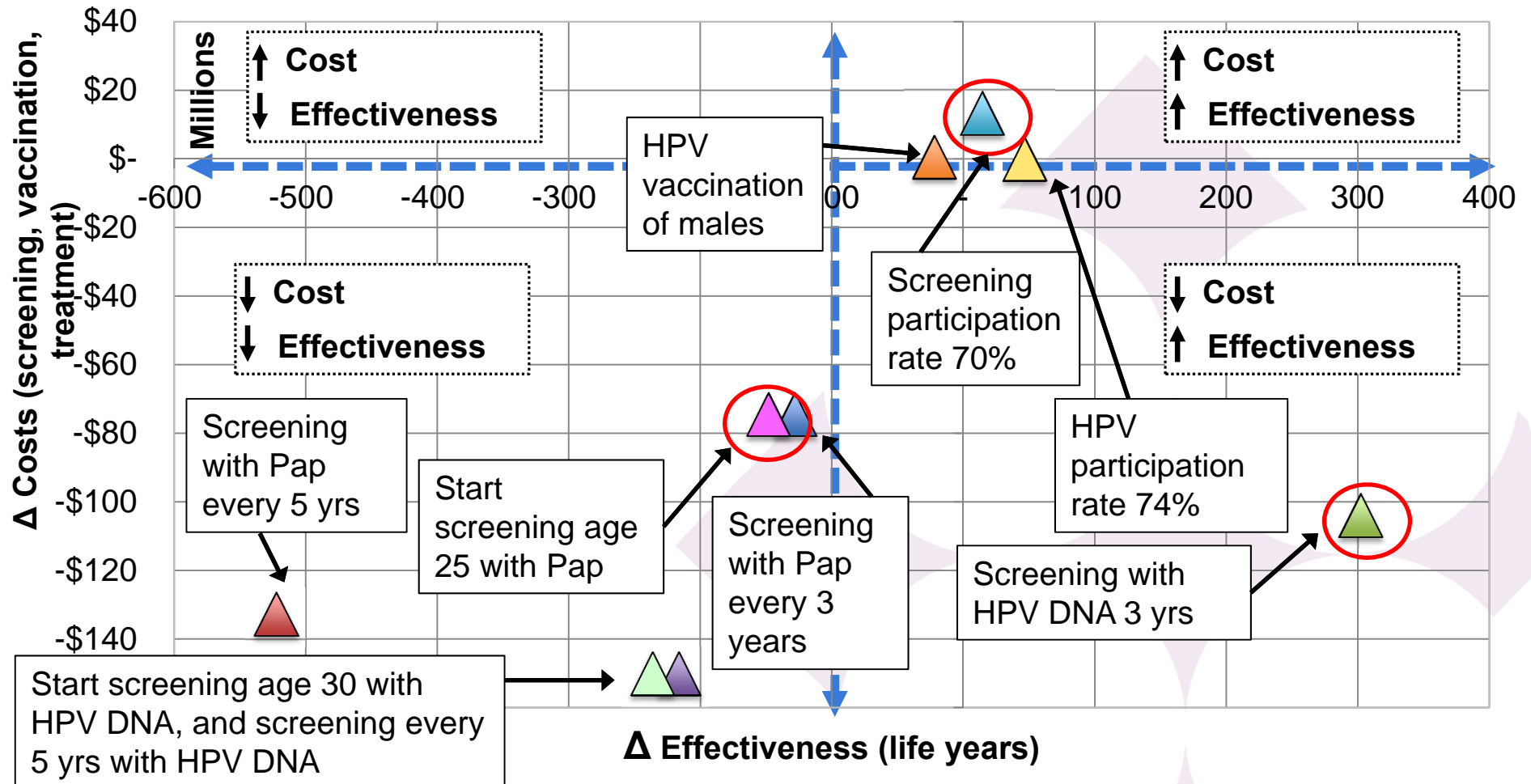
# Univariate sensitivity analysis





# Incremental cost-effectiveness ratios (ICER)

Incremental cost-effectiveness ratios\* (ICER), all scenarios



\*comparator: BC base case  
 Analysis level: Females, user-defined population  
 Discount rate 3%



# **DISCUSSION**

# Feedback

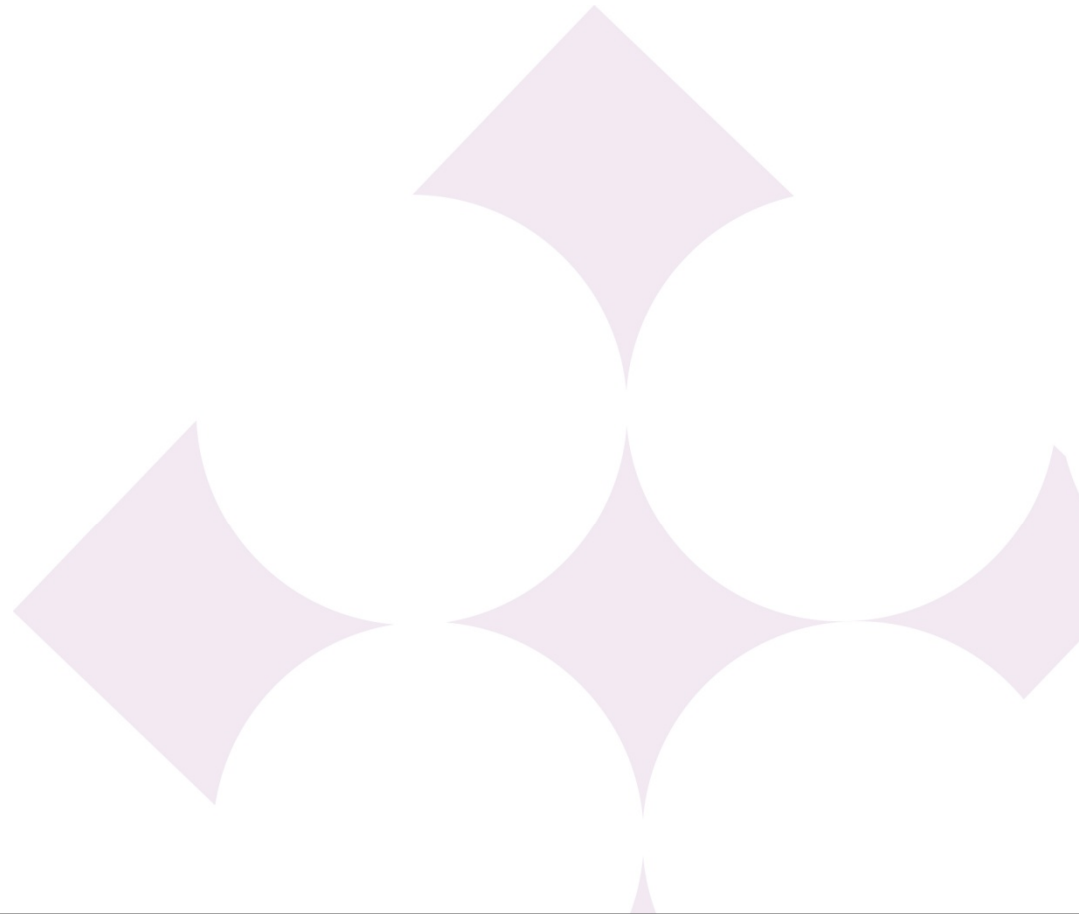
Some examples:

- Probabilistic sensitivity analysis
- Outputs for all parameters at province-level
  - E.g., cytology results
- Other scenarios relevant to HPV vaccination strategies
  - E.g., MSM populations

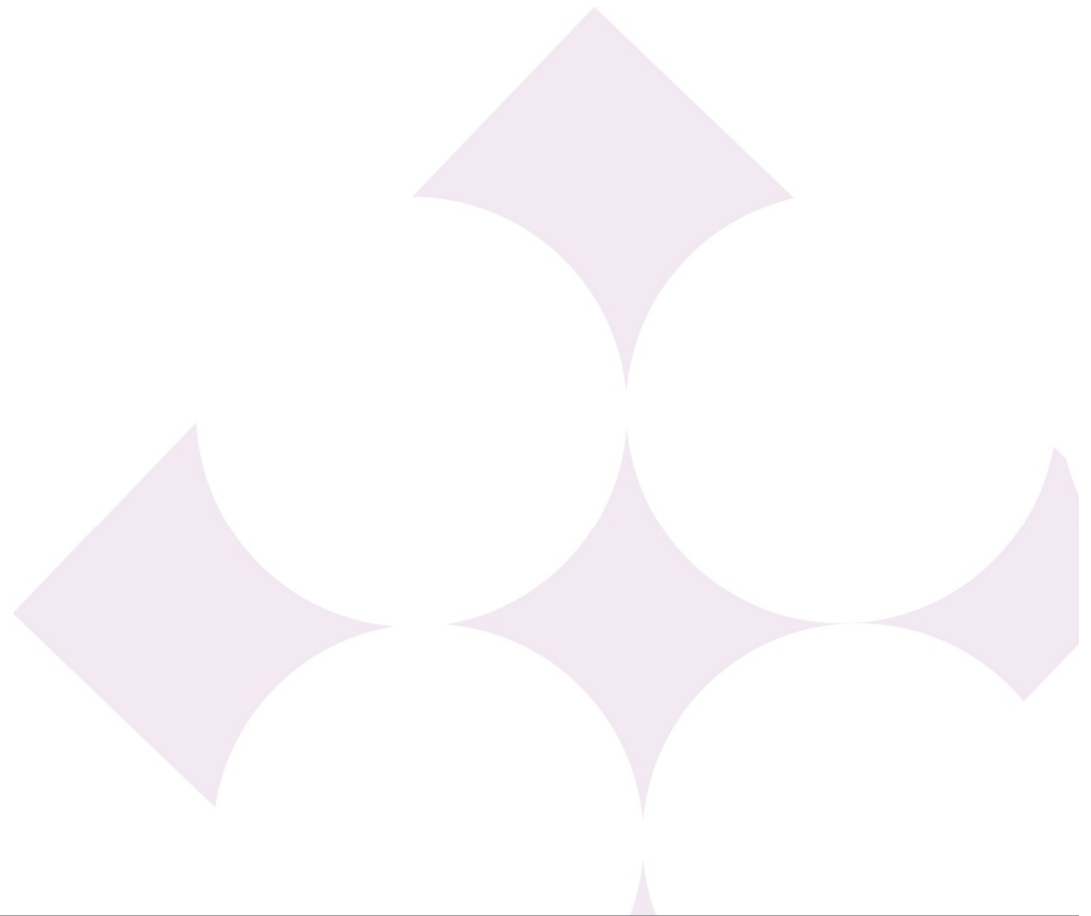
# Conclusion

- Cervical CRMM and HPVMM model platforms have potential to inform policy decisions regarding cervical cancer management.
- However, limitations with models prevent widespread application of results to inform our research questions.
- Overall, models can signal researchers to the interventions that warrant further investigation.

Thank you



# APPENDIX



# Establishment of “BC base case”

20+ parameters were changed across the two models:

<b>Model parameter</b>		<b>Inputs</b>
<b>HPVMM</b>	Vaccination program design	2-dose HPV vaccination schedule in grades 6 and 9 (ages 11-12, 14-15), with participation rates informed by BC’s program.
<b>Cervical CRMM</b>	Cervical screening program (Dispatcher)	Women aged 21-69 years are screened annually until obtain three negative consecutive results, after which screened every 2 years. BC’s 2014 participation rates of 66% used.
	Cervical cancer screening follow-up protocols	If Pap test result is normal, then follow-up with Pap test (repeated within 6 mos).
	Cancer stage distribution	Distribution of rates by type and age group match internal analyses on cervical cancer.
	Cervical cancer screening and pre-cancer treatment costs	Costs were changed for pre-cervical cancer treatments: - Cytology (pap) - HPV test - Colposcopy (without biopsy) - Hysterectomy - Biopsy - loop electrosurgical excision procedure