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Background

- HPV is highly prevalent in both men and women. Persistent infection of HPV is causally linked to cervical cancer and an increasing range of non-cervical malignancies<sup>1,2</sup>.
- Beyond cervical cancer, HPV contributes substantially to oropharyngeal, anal, vulvar, vaginal, and penile cancers, with oropharyngeal cancer incidence rising particularly among men<sup>3</sup>.
- Genital warts and recurrent respiratory papillomatosis (RRP) are mainly caused by HPV types 6 and 11; RRP is a chronic upper-airway infection that requires repeated medical interventions and imposes a substantial psychosocial burden<sup>4</sup>.
- The economic burden of HPV-related diseases includes both direct healthcare costs and productivity losses, with previous studies across Europe demonstrating a significant societal impact<sup>5,6</sup>.

Objective

This study aimed to assess the economic and epidemiological burden of HPV-associated diseases in men and women in the Czech Republic.

Methods

This was a retrospective prevalence-based study using real-world administrative claims data from six Czech health insurance companies, covering ~44% of the national population. Data were extrapolated to the full Czech population.

- Study period: 2018–2020.
- Population: Individuals with HPV-related conditions identified by ICD-10 codes; HPV-attributable fractions (HPV-AFs) from published literature were applied to estimate the share of cases causally linked to HPV.

Endpoints

Primary outcomes:

- Incidence of HPV-related diseases (cancers, precancerous lesions, genital warts, respiratory papillomatosis).
- Direct medical costs of care (outpatient, inpatient, medication, devices).

Secondary outcomes:

- Indirect costs from productivity loss due to premature mortality (human capital approach).
- Years of life lost (YLL), calculated using sex- and age-specific life expectancy.

Statistical analysis

- Descriptive statistics performed in R software.
- Results stratified by sex and diagnosis.
- No inferential statistics; data presented as aggregated counts, means, and costs.

Results

Epidemiology

Over the course of the study period (2018–2020), 112,543 unique patients with HPV-related diseases were identified (corresponding to 117,316 recorded incident cases). The majority of patients were female (84.2%). The mean age was approximately 40 years, with males exhibiting a slightly younger age profile than females (39.0 and 39.9 years, respectively). **Table 1** presents a summary of the number of patients analysed in each year, with a breakdown by gender, accompanied by data on the age of the patients. **Table 2** present distribution of HPV related disease by disease category.

Direct Medical Costs

- Total direct medical costs of HPV-related diseases reached ~1.0 billion CZK during 2018–2020 (**Table 3**).
- Outpatient care accounted for the largest share (62.2%), followed by hospitalizations (33.5%); medications (e.g. prescription medicines) and devices (prescription medical devices) represented a minor proportion.
- Expenditures were markedly higher in women (724 mil. CZK) compared with men (307 mil. CZK), i.e. ~2.4-fold difference. Despite the impact of the COVID-19 pandemic in 2020, a trend of increasing costs can be observed in the male population.

Table 1 Annual patient counts with gender and age breakdown

	Total	2018	2019	2020
Gender				
Male (%)	17,759 (15.8)	6,870 (14.7)	5,884 (16.4)	5,005 (16.6)
Female (%)	94,784 (84.2)	39,725 (85.3)	29,942 (83.6)	25,118 (83.4)
Age				
Mean (sd)	39.7 (14.8)	40.6 (14.7)	40.5 (14.9)	40.8 (15.0)
Male: mean (sd)	39.0 (16.3)	40.5 (16.3)	42.3 (17.4)	43.8 (18.1)
Female: mean (sd)	39.9 (14.3)	40.6 (14.4)	40.1 (14.2)	40.1 (14.2)

Table 2 Distribution of HPV-related diseases by disease category (2018–2020)

	Main diagnoses	Cases (N)	Share (%)
Cancers*	Cervical, vulvar, vaginal, anal, penile, oropharyngeal, laryngeal	4,900	4.2%
Precancerous lesions	CIN I–III, VIN, VAIN, AIN, PIN	82,102	70.0%
Benign conditions	Genital warts	27,764	23.7%
Other	Recurrent respiratory papillomatosis+	2,550	2.2%

\*HPV-AF for penile cancers is up to 50%; for oropharyngeal carcinoma is up to 40%; for laryngeal cancer is up to 10%  
+ Cases identified as J38.2 and J38.1.

Table 3 Total direct medical costs

	Total	2018	2019	2020
Costs				
Total costs (CZK)	1,030,472,474	341,521,153	367,325,662	321,625,659
Outpatient costs (CZK)	641,203,883 (62.2%)	221,771,353	233,700,908	185,731,622
Inpatient costs (CZK)	344,933,132 (33.5%)	103,570,115	118,201,340	123,161,677
Medical device costs (CZK)	9,054,148 (0.9%)	3,257,644	3,661,677	2,134,827
Medicinal product costs (CZK)	35,281,314 (3.4%)	12,922,042	11,761,741	10,597,531
Male				
Total costs (CZK)	306,624,568	88,761,184	113,423,798	104,439,586
Outpatient costs (CZK)	183,047,785	54,443,130	68,461,238	60,143,417
Inpatient costs (CZK)	104,396,056	28,655,680	37,722,987	38,017,389
Medical device costs (CZK)	4,160,881	1,005,536	2,078,977	1,076,369
Medicinal product costs (CZK)	15,019,850	4,656,841	5,160,598	5,202,412
Female				
Total costs (CZK)	723,847,906	252,759,968	253,901,865	217,186,073
Outpatient costs (CZK)	458,156,098	167,328,223	165,239,670	125,588,205
Inpatient costs (CZK)	240,537,076	74,914,435	80,478,353	85,144,288
Medical device costs (CZK)	4,893,267	2,252,108	1,582,700	1,058,458
Medicinal product costs (CZK)	20,261,463	8,265,201	6,601,143	5,395,120

Indirect Costs & Mortality

- Productivity losses due to premature mortality were estimated at ~3.0 billion CZK over 2018–2020.
- HPV-related diseases (death form cancers) resulted in 27,436 years of life lost (YLL) during the study period.
- In women, cervical cancer was the dominant driver, with >1.0 billion CZK lost and 9,387 YLL.
- In men, the main contributors were oropharyngeal cances and anal cancer.

Conclusion

- HPV-related diseases represent a substantial public health and economic burden in the Czech Republic.
- The majority of cases are precancerous lesions and genital warts, while cancers drive most of the mortality and productivity losses.
- Direct medical costs exceeded 1.0 billion CZK and indirect costs 3.0 billion CZK over three years.
- These findings underscore the need for effective prevention strategies, including vaccination and early detection programs.

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Diclosures

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