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## **Single cohort vaccination can be cost-effective. Paradox in HPV mitigation model for Moldova.**

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Human papillomavirus, or HPV, is a sexually transmissible virus infection, which is necessary risk factor for developing cervical cancer, most common type of cancer in working age women in Moldova. We observe both behavioural change (increase in sexual partner acquisition rates) and demographical change (population ageing and massive emigration, but still very young), which both corresponding to second demographic transition since Soviet Union collapse (yearly expenditure on health limited to 150 EUR-per-capita). Moldova will spend around 400,000 EUR on 'single cohort' vaccination in 2018, which cost effectiveness is questionable, because vaccinating a single cohort may not have a substantial effect in other countries. Thus we examine such a single vaccination scenario to show its conditional cost-effectiveness.

We have run computer simulation to prepare cost-benefit/effectiveness analysis for different vaccination strategies, various screening programs and preventive programs for Moldova in low resource settings, based on its own demography and sexual behaviour. We used data since 1998 to 2017 to adjust model parameter and we project till around 2038. Model aggregated the most important paths of infection, cancer development, uncertainty in healthcare capacity and sexuality and prevention scenarios with around 100 differential equations (stochasticity introduced in sexual partner change rates).

Single cohort vaccination could be both cost-beneficial (total cost reduction balance intervention cost before 2037) and cost-effective (with incremental impact in 20 years perspective on the level of 2300 EUR/QALY).

The possible explanation of this nonintuitive behaviour is transitional situation in Moldova ( $R_0 \sim 1$ ), still small change of conditions could cause strong effect in epidemiology. Main effect of intervention is via men, which avoid infection and will not infect other women. This can have effect probably while changing partners is still not as common as in other countries. However, even slight change in initial conditions and parameter values could diminish positive effect (e.g. faster partner acquisition rate increase).

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