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Nowotwory
Journal of Oncology

ISSN: 0029-540X

e-ISSN: 2300-2115

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DOI: 10.5603/njo.104858

Article type: Research paper (original)

Submitted: 2025-02-08

Accepted: 2025-02-13

Published online: 2025-03-17

How to cite:

Miazga W, Tatara T, Religioni U. Analysis of health policy programs regarding HPV vaccinations implemented by Polish local government units and assessment of their effectiveness based on final reports on their implementation. NOWOTWORY J Oncol 2025; 75 (Ahead of print).

Original article

Cancer epidemiology

Analysis of health policy programs regarding HPV vaccinations implemented by Polish local government units and assessment of their effectiveness based on final reports on their implementation

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DOI: 10.5603/njo.104858

Introduction. This study analyzed the effectiveness of local human papillomavirus (HPV) vaccination programs in Poland based on final reports from public health program implementations.

Material and methods. The research team requested public data from the Polish Health Technology Assessment Agency (Polish HTA Agency), analyzing all final reports on local HPV prevention programs. Quantitative analysis was supplemented with geographical data, vaccination rates, and cost calculations.

Results. We examined 143 reports, with 85% of programs implemented by city and county governments. In 17% of cases, boys were also vaccinated. The average vaccination rate, based on 112 reports, was 58% of the target population. The average cost per vaccinated participant was PLN 682.00, with total costs of implementing all the analyzed programs reaching PLN 34 030 885.71.

Conclusions. The current evaluation framework allows flexibility in reporting outcomes. The achieved vaccination coverage in local programs is lower than the World Health Organization's (WHO's) global strategy target.

Keywords: vaccine, HPV, human papillomavirus, HTA Agency

Introduction

In 2022, cervical cancer was the 4th most common cancer in women in the world (662 301 cases) and the 4th cause of death due to cancer in women (348 874 deaths) [1]. Human papillomavirus (HPV) infection is commonly considered a necessary condition for the

development of cervical cancer, although HPV infection itself is not sufficient for the development of cancer [2]. The current approach to primary prevention of cervical cancer is based on preventing HPV infections through vaccination. On 1 June 2023, a universal, free vaccination program was carried out in Poland against the HPV among girls and boys aged 12–13 [3], while from 1 September 2024, the age of children eligible for vaccination was extended to include those aged 9 to 14. Before the introduction of the nationwide program, access to free HPV vaccinations was possible only as part of participation in local vaccination programs organized by local government units (cities, communes, counties, voivodeships). In accordance with Polish law [4], since 2017, local government units wishing to introduce a local health policy program must obtain a positive or conditionally positive opinion from the President of the Polish Health Technology Assessment Agency (Polish HTA Agency) — Agency for Health Technology Assessment and Tariff System (AOTMiT, *Agencja Oceny Technologii Medycznych i Taryfikacji*). Within 3 months of the end of the program, each local government also has a legal obligation to send the final report on the implementation of the health policy program to the AOTMiT, and publish its content in the Public Information Bulletin, in example an internet service with open access for all citizens.

In 2019, the President of the Polish HTA Agency issued a recommendation specifying how interested local governments should develop and implement local HPV vaccination programs [5]. From this moment, local governments wishing to implement the discussed programs do not have to request an opinion on the planned program, provided that they send a declaration to the Polish HTA Agency that their program will be consistent with the recommendation issued by the President. The implementation of the health policy program in accordance with the recommendation of the President of the AOTMiT does not release local governments from the obligation to send the final report on the implementation of a given edition of the program to this agency [4]. This article analyzes the data contained in the final reports on the implementation of health policy programs (HPP) in the field of HPV infection prevention in order to assess the effectiveness of local HPV vaccination programs implemented in Poland.

Aim of the article

Analysis of the effectiveness of local preventive programs in the field of HPV vaccination in Poland based on final reports on the implementation of health policy programs.

Material and methods

Pursuant to Polish law, within 3 months from the date of completion of the implementation of the local government health policy program, local government units prepare a final report on the implementation of the program according to the template specified by the Minister of Health, and then are obliged to immediately submit this report to the AOTMiT.

The final report on the implementation of the health policy program includes the following information:

- name of the health policy program;
- the implementation period provided for in the health policy program and the period of its actual implementation;
- a description of how the objectives of the health policy program will be achieved;
- characteristics of interventions implemented under the health policy program;
- results of monitoring and evaluation of the health policy program;
- costs of implementing the health policy program;
- information about problems that occurred during the implementation of the health policy program and about the modifying actions taken in connection with them [4].

Any information on public matters constitutes public information in Poland and every citizen has access to it in the manner described in the Act on Access to Public Information [6]. In accordance with these regulations, on 7 March 2024, the team submitted a request to the Polish HTA Agency to provide information in the following scope:

- lists of all final reports on the implementation of health policy programs in the field of HPV infection prevention (vaccination), which were sent to the agency;
- a list of all statements on the compliance of the draft health policy program with the recommendation of the Agency's President regarding the development of HPV vaccination programs, which were sent to the agency;
- the content of all final reports on the implementation of health policy programs in the field of HPV infection prevention (vaccination), which were sent to the agency.

The content of all final reports received from the AOTMiT (as of 7 May 2024) was analyzed, and the data obtained in this way was compiled in one Microsoft Excel file (*Appendix S3*) in order to enable further quantitative analyses, supplementing the content with geographical data and calculations regarding the vaccination rates achieved in the programs and the average costs of conducting programs.

Results

The number of submitted declarations of compliance with the recommendation of the President of AOTMiT and final reports on the implementation of the HPP

According to the list made available by the AOTMiT, obtained through access to public information by 16 March 2024, the Agency received 89 declarations from local governments on the compliance of HPP with recommendation 2/2019 of 11 October 2019 on "recommended medical technologies, activities carried out within health policy programs and conditions for the implementation of these programs regarding human papillomavirus (HPV) infections". The summary is provided in *Appendix S1*.

The second summary received from the Agency indicates that, in accordance with the current Polish law, local governments implementing local preventive programs sent to the Agency 143 final reports on the implementation of preventive programs during which population vaccinations against HPV were performed. The summary is provided in *Appendix S2*.

Geographic data regarding ongoing programs

Of all local HPV infection prevention programs for which final reports were submitted, 85% (122 HPP) were implemented by city and commune governments. Programs implemented by counties accounted for 13% (18 HPP). In the case of the remaining 2% (3 HPP), these were provincial programs, of which in 2 cases they were aimed at vaccinating girls staying in care facilities.

Figure 1 shows a cartogram visualizing the number of final reports sent to the AOTMiT regarding the implementation of programs in a given voivodeship. The largest number of final reports on the implementation of HPP in the field of prevention of HPV infections were sent from the Greater Poland Voivodeship — 20% (28 HPP), while the least — from the Podkarpackie Voivodeship — 1% (1 HPP).

Interventions and target populations

According to the final reports received on the implementation of local government programs in the field of prevention of HPV infections, all these programs were based on vaccination campaigns and information and educational activities. The vast majority (83%) of the programs described in the final reports directed their main intervention, in example vaccination, to the population of young girls. In 17% of cases, vaccinations were also directed to the population of boys, but often with the provision that boys should be vaccinated secondarily, in example after the primary vaccination of all willing girls.

Local governments are not obliged to include information on the vaccine used in the program in their final reports, however, 67 out of 143 final reports analyzed included information on the validity of the vaccine used in the program. It also happened that in subsequent years of the program; the organizers decided to change the validity of the preparation used. A summary of the frequency of use of each type of vaccine is presented in the Table I.

Implementation periods

The actual implementation periods of health policy programs regarding the prevention of HPV infections shown in the analyzed final reports were extremely diverse. The programs were implemented both for a period of several months (the shortest 5 months) and for several subsequent years (the longest program 15 years). Thirty-eight percent of the analyzed final reports indicated the implementation of vaccination programs for a period of up to 1 year. Programs conducted over a period of 1–2 years accounted for 23%, and the remaining HPP were implemented in several-year editions lasting 3 years or more. The analysis of the final reports shows that most often, preventive programs involving vaccination of particular age groups of children began in the second half of the year due to the conduct of education and administration of vaccines to the populations of particular school classes.

Efficiency

The key indicator proving the effectiveness of vaccination programs is the vaccination rate of the target population planned to participate in the program. Unfortunately, the mandatory template for the final report on the implementation of the discussed programs in Poland does not require a clear calculation of this parameter by the program implementers. As part of the analysis, in the case of final reports that did not directly provide the discussed indicator, but indicated the size of the planned population of the program and the number of people

ultimately vaccinated with the full vaccination scheme, the vaccination rates obtained in the program were calculated. The average vaccination rate obtained in 112 final reports containing data enabling the calculation of this parameter was around 58% of the vaccination rate of the initially assumed population. It is worth noting that the values of the discussed indicator fluctuated throughout all implemented HPP and that the planned population covered by the program was often not identical to the total population of a given age living in the area where the program was implemented, which makes it impossible to estimate the vaccination coverage of the entire population.

Implementation costs

Based on the analysis of the total and unit costs of running the program shown in the final reports on the implementation of the programs, the average values of these costs were calculated. The unit cost, understood as the cost of vaccinating one person with the full vaccination schedule, depended on the type of vaccine preparation used in the program and the number of doses used for the full vaccination course. The average unit cost was PLN 682.00 (1 PLN = 0.25 USD).

The average cost of one dose of individual vaccines was obtained by dividing the unit costs indicated in the final reports (vaccinating one person with the full vaccination scheme) by the number of doses of the vaccine constituting the full vaccination cycle indicated in this report. A summary of the average costs of one dose of individual vaccines in the program calculated in this way is presented in the Table II.

The total costs of running a local HPV vaccination program also depend on many factors, such as the size of the population covered by the program and the duration of the program. The total costs of implementing all the analyzed health policy programs amounted to PLN 34 030 885.71.

Problems in implementation

In most cases of the analyzed final reports regarding programs conducted before 2019, no numerous problems with their implementation were reported. The only problems recorded were related to the activity of anti-vaccination movements, which discouraged the target population from participating in vaccination programs.

When analyzing the final reports, it can be noticed that local governments more often reported problems occurring while running programs from 2019. The main obstacle in implementing the planned preventive activities was the limited availability of HPV vaccines and, therefore, difficulties in recruiting a program implementer. In 2019, the HPV4 (Silgard/Gardasil) and HPV9 (Gardasil 9) vaccines were unavailable on the Polish market due to delays in the production of these preparations reported by the manufacturer [7]. Taking into account that many local governments had planned to use unavailable preparations in their programs, some of these programs were suspended in 2019–2020. This resulted in a lower vaccination rate in the target population.

After 2019, the main problem indicated in the final reports on the implementation of the HPP was the epidemic situation related to the COVID-19 pandemic. The most frequently indicated obstacle to the implementation of planned activities was the limitation related to the obligation to maintain social distance, which resulted in significant difficulties in the implementation of educational activities and the immunization process itself.

Due to the introduction of a nationwide HPV vaccination program from June 2023, some local government units decided to end the implementation of the HPV vaccination program, pointing out the lack of purpose spending public funds on benefits offered in the central program.

Discussion

Based on the analysis of final reports on the implementation of health policy programs in the field of vaccination against HPV, a quantitative analysis was made of the data contained in the reports regarding the interventions carried out, the target population of the activities, the vaccination rate achieved and the implementation costs. Problems in the implementation of local HPV vaccination programs in Poland was also analyzed; this is indicated in the reports.

In Poland, each local government conducting a health policy program involves conducting a set of planned and intended health care activities assessed as effective, safe and justified, enabling the achievement of the assumed goals within a specified period of time. These activities consist of detecting and implementing specific health needs and improving the health condition of a specific group of beneficiaries [4], local governments are obliged to send a report on the implementation of this program to the AOTMiT in accordance with the template specified by the Minister of Health. Analyzing the final reports on the implementation of HPV infection prevention programs submitted to the AOTMiT, it was noticed that the current final report template leaves a lot of freedom in the way it is completed, which makes it impossible to clearly compare programs conducted in the country regarding the same health problem. In the future, it would be prudent to consider clarifying the template of the final report on the implementation of the health policy program so that it includes a designated place for entering specific numerical values for performance measures of program objectives and planned monitoring and evaluation indicators. Moreover, the new template could include a table enabling an accurate indication of the size of the population that was actually covered by the program activities and a brief description of the interventions carried out in the program.

A step that standardized the implementation of health policy programs in the field of HPV prevention in Poland was the issuance of the recommendation of the President of the AOTMiT in 2019 [5] specifying how interested local governments should develop and implement local HPV vaccination programs. The next step seems to be justified as it clarifies the template of final reports on the implementation of local prevention programs in order to be able to monitor the effectiveness of these programs at a central level.

"Global strategy to accelerate the elimination of cervical cancer as a public health problem" developed by the WHO calls on all institutions involved in the prevention of cervical cancer to take action to reduce the number of cases of this cancer to ≤ 4 cases/100 000/year, until the end of this century. The first stage of the World Health Organization (WHO) strategy assumes achieving minimum goals by 2030, including covering 90% of girls with full vaccination against HPV by the age of 15 [8].

In June 2023, a universal HPV vaccination program was introduced in Poland, under which girls and boys aged 12 and 13 can receive a free vaccination with a 2- or 9-valent preparation [3], and in September 2023 a 2-valent vaccine has been included on the list of medicines available free of charge to people up to 18 years of age [9]. On 1 September 2024, the age of children eligible for the national HPV vaccination program was extended to include those from 9 to 14 years of age [10]. Taking into account the above and the fact that in the last analyzed final reports on the implementation of local vaccination campaigns, some local government units indicated the decision to end the implementation of the HPP, pointing to the lack of purposefulness of spending public funds on the services offered in the central program, the President of the Polish HTA Agency on 14 October 2024 updated the recommendation regarding the implementation of health policy programs in the field of HPV infection prevention. In the current document, the President of the AOTMiT recommends carrying out information and educational activities within the framework of health policy programs in the general population on pro-health behaviors, risk factors and benefits of HPV prevention, as well as disseminating information on participation in the universal HPV vaccination program, and in the population from the age of 14 to the age of 26, prevention of HPV infections in the form of catch-up vaccinations [11].

Conclusions

In the current legal situation, the principles of developing results from the implementation of health policy programs leave a lot of freedom in the way they are described, which makes it difficult to draw clear conclusions at the level for the entire country.

The achieved average vaccination coverage of the planned population in local HPV infection prevention programs in Poland is lower than that assumed in the WHO global strategy, especially considering that the planned population covered by the program was often not identical with the total population of a given age living in the area where the program was implemented, which may lead to assume that the vaccination rate of the entire population is significantly lower.

The problems indicated by the organizers, in example, problems seen with the availability of vaccine preparations on the Polish market and the SARS-CoV-2 virus epidemic, had an impact on the reduction in the number of vaccinations performed.

In response to the ongoing changes in the central financing of HPV vaccinations in Poland, local government units should continue to take into account the role of local health policy

programs, which should effectively complement central actions aimed at cervical cancer prevention.

Limitations of the study

The current template of the final report on the implementation of the health policy program does not clearly indicate a place for a description of the population that actually took part in the program. The existing provisions indicating the possibility of a verbal description of the method of achieving the program objectives and the results of monitoring and evaluation without a clear indication of the reference to each of the indicators and measures proposed in the program enable selective transmission of this information by local governments.

Article information and declarations

Data availability statement

None.

Ethics statement

Decision of Medical University of Warsaw (no AKBE 240/2023).

Authors contributions

Wojciech Miazga — conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, supervision, validation, visualization, writing: original draft preparation, writing: review & editing.
Tomasz Tatara — conceptualization, formal analysis, funding acquisition, methodology, visualization, writing: review & editing.
Urszula Religioni — conceptualization, project administration, software, supervision, validation, visualization, writing: original draft preparation, writing: review & editing.

Funding

This research received no external funding.

Acknowledgments

None.

Conflict of interest

The authors declare no conflict of interest.

Supplementary material

1. S1_Summary of statements on compliance of programs with the AOTMiT recommendation.
2. S2_Summary of final reports.
3. S3_Summary of data included in the final reports.

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Received: 8 Feb 2025
Accepted: 13 Feb 2025
Early publication date: 17 Mar 2025

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Table I. Summary of vaccines used in programs

Validity of the vaccine used in the program	Number of final reports	Number of years the programs have been running
HPV2	4	10
HPV4	32	91
HPV9	38	63
HPV2/HPV9	1	1
HPV4/HPV9	6	25

HPV — human papillomavirus

Table II. Summary of average costs per dose of individual vaccines in the program

Validity of the vaccine used in the program	Average price	Number of final reports from which the average

		was calculated
HPV2	PLN 206.16	3 reports
HPV4	PLN 213.88	19 reports
HPV9	PLN 429.29	21 reports

HPV — human papillomavirus

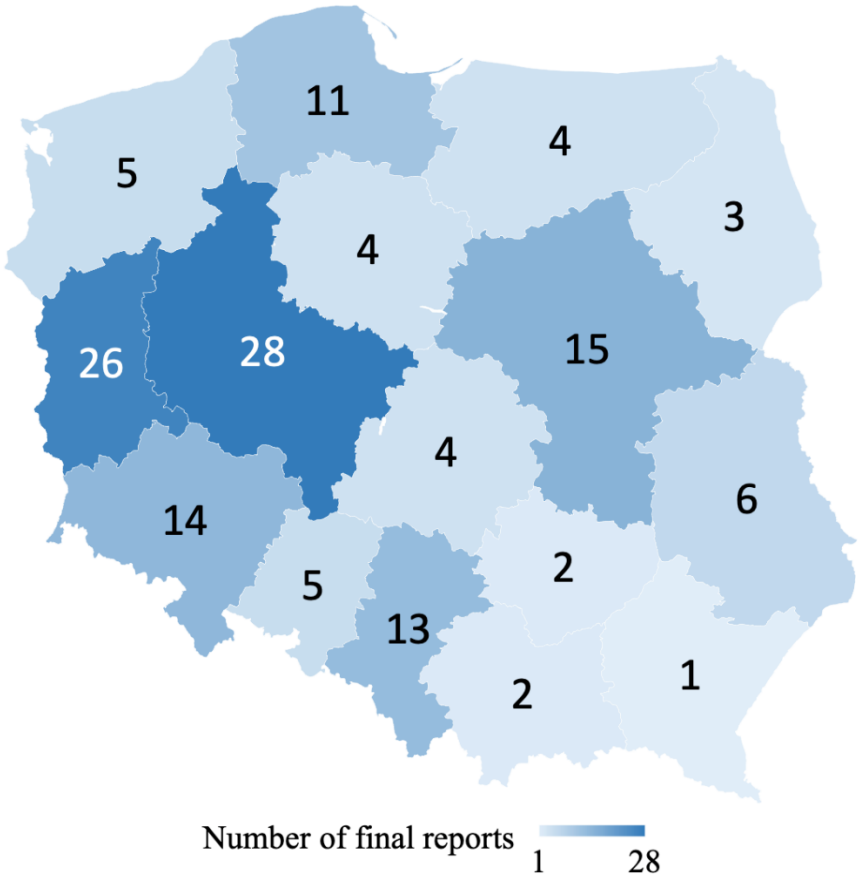

Figure 1. Number of final reports sent from a given voivodeship (prepared by the authors)