

# Effectiveness of the National Population-Based Cervical Cancer Screening Programme in Poland – Outcomes, problems and possible solutions 7 years after implementation

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## Abstract

Cervical cancer is a substantial issue for public health in Poland. In 2006, in order to improve epidemiological data, the National Population-Based Cervical Cancer Screening Programme was developed and implemented. The Programme concerned 9.7 million women aged 25–59 to be screened during a 3-year interval. In 2010, a decline in cervical cancer incidence by 5.7% and 3.4% in mortality rate was observed. However, 5-year survival rates do not exceed 51%. Attendance rate reached 27%, then fell and presently remains on the level of 24%. Currently, the main concern for the screening organizers is searching for areas malfunctioning in local conditions, to improve them, and to provide further progress in cervical cancer prevention. The objective of the presented study was to critically review available data concerning the outcomes of the Screening Program and to suggest possible solutions. Two main factors were taken into account in the study: cost-effectiveness and attendance rate. To encourage attendance, women in Poland are sent personal invitations. This procedure consumes from a quarter up to a half of the budget of the Programme each year, but its effectiveness seems unsatisfactory. In addition to mailing, intensive training of doctors and midwives is conducted. Other activities to increase coverage include developing a social educational campaign. According to the Polish experience, the most effective way to increase coverage is training screening providers and involving them actively in encouraging screening participation. Thus, redistribution of funds from mailing to education and to a social campaign should be considered. Further development of cervical cancer prevention may depend on organizational changes including enhancing reporting, monitoring and quality control in opportunistic screening.

## Key words

cervical cancer, screening, coverage, attendance rate, effectiveness

## INTRODUCTION

Cervical cancer and its prevention is a substantial issue for public health in Poland. For the past three decades, early detection and treatment of this cancer has remained unsatisfactory compared to the Western European and Scandinavian countries [1]. The incidence rate in Poland in the 1980s, according to the National Cancer Registry, was estimated at 16/100,000 ASR (Age-Standardized Rate) and mortality exceeded 8/100,000 ASR [2] (Fig. 1).

To change the unfavorable position of Poland in this area various prevention initiatives were undertaken on both national and regional level. Subsequently, in 2006, the National Population-Based Cervical Cancer Screening Programme was developed and implemented (hereafter referred to as the Programme).

The basic assumption of the Programme realized within the framework of the National Programme for Cancerous Diseases was to improve detection of precancerous lesions and an early stage of cervix cancer, to improve treatment results and, consequently, to reduce mortality and incidence rates to the average levels represented by the EU countries [3, 4].

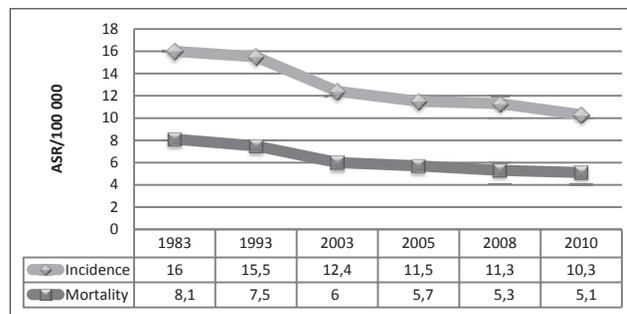


Figure 1. Cervical cancer in Poland: incidence and mortality 1983–2010. Age-standardized rate/100,000 women [1].

The Polish Programme concerns approximately 9.7 million women aged 25–59 insured within the National Health Fund (NHF) who constitute the target population to be screened at 3-year intervals. In addition to the basic level of the Programme where Pap tests are collected, there is a follow-up for verification of positive results with the use of HPV DNA testing, colposcopy and biopsy. The target population is identified on the basis of data from the System of Information Monitoring in Prophylaxis (SIMP), a computer database with access online, powered by the NHF and designed especially for screening monitoring and control, as well as for sending personal invitations by regular post to encourage participation in the screening. One National and 16 Regional

Coordinating Centres administer the Programme. Their competences include monitoring, evaluation and quality control in the screening. In addition, a uniform social educational campaign is run across the country to increase attendance. Although HPV vaccination is not incorporated into the Programme agenda, local authorities in many regions have introduced and financed the vaccination of 12- and 13-year-old girls. All procedures at the basic and the diagnostic level of the Programme are based on detailed guidelines developed by boards of experts [5, 6].

As a result, the incidence rate decreased, reaching 10.3/100,000 ASR in 2010 (3,078 new cases). Mortality remains very high with an almost constant value: 5.1/100,000 ASR in 2010 (1,735 deaths) [2]. This means that within 4 years from the implementation of the Programme in 2006, there was a decline in cervical cancer incidence by 5.7%, and 3.4% in mortality rate [4]. However, 5-year survival rates do not exceed 51% according to the EUROCARE-4 data [7] and 54% according to the National Cancer Registry (these values differ regionally, ranging from 44.3 – 65.3%) [2, 8], which is well below the European average of 60% [7, 9].

Obviously, more time is required to fully estimate the actual influence of the organized cervical cancer screening on epidemiological indicators in Poland, as the survival rates refer to the patients diagnosed with cancer before implementation of the organized screening. However, evaluation of the Programme and its effectiveness is of crucial importance. Currently, the main concern for screening organizers is to identify the areas malfunctioning in local conditions, to improve them, and therefore to provide further progress in cervical cancer prevention.

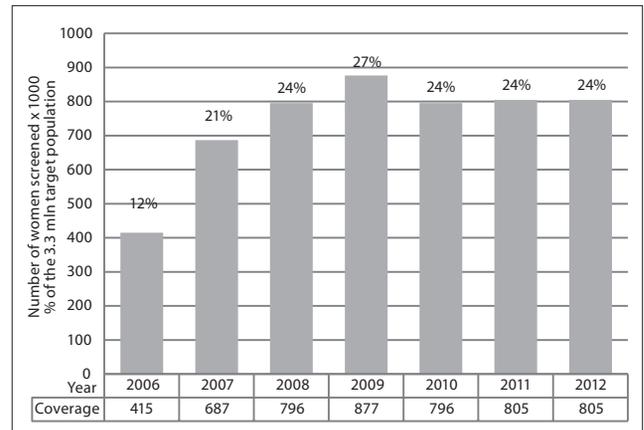
## OBJECTIVE

The objective of the presented study was to critically review available data concerning the outcomes of the National Polish Population-Based Cervical Cancer Screening Programme in order to find out which organizational aspects of the implemented model of screening are effective and which areas require improvement. Furthermore, an attempt was made to suggest possible solutions. Two main factors were taken into account in our study: cost-effectiveness and attendance rate.

The data concerning the Programme realization were extracted from the System of Information Monitoring in Prophylaxis (SIMP) and from the archival documentation of the National Coordinating Centre of the National Population-Based Cervical Cancer Screening Programme in Poland, including practical and financial reports. Articles and analyses concerning the Programme realization were also reviewed.

## DESCRIPTION OF CURRENT STATUS

**Coverage.** Coverage, which is defined as the number of women tested within a recommended interval, is one of the key factors influencing screening effectiveness. Despite many initiatives and significant financial means involved in the social educational campaign, the coverage within organized screening in Poland never exceeded 27%. Moreover, after 4 years of constant increase, the number of Pap tests collected slightly decreased, and currently remains at the level of 24% (Fig. 2).



**Figure 2.** Programme coverage for 2006-2012. The number of women screened within the Screening Programme expressed in thousands and as a percent of 3.3 mln target population. SIMP data.

However, the data concerning coverage in Poland is incomplete. Due to existence of opportunistic screening, both within public and private healthcare, not all results are registered. Consequently, the actual number of women screened is unknown. On the basis of the Central Statistical Office's European Health Interview Survey, it can only be estimated that it doubles or even triples the population reported by organized screening. According to this survey, the number of women aged 20–69 who declared that they had never had a Pap test carried out was 14% in 2011, and has diminished compared to the year 2004 when this percentage equaled 30% [10, 11]. Also, 72% declared that they had had Pap test performed within the last 3 years. This allows the claim that since the introduction of organized screening in 2006, there has been a significant increase in overall screening uptake.

**Invitations.** To encourage attendance, women in Poland are sent personal invitations – about 3.2 mln annually – which covers approximately 100% of the target population to be tested, although mailing was irregular in the rollout period. The National Health Fund constantly updates the SIMP database and the percentage of undelivered mail is around 1%. The cost of sending one invitation differs slightly locally, but on average is 1.50 PLN. This procedure consumes from a quarter up to a half of the Programme budget each year (Tab. 1). However, the effectiveness of this method of increasing screening uptake seems much less satisfactory than assumed and expected [12, 13]. Distribution of financial means provided for cervical screening in the year 2010 is illustrated in Table 2 and Figure 3.

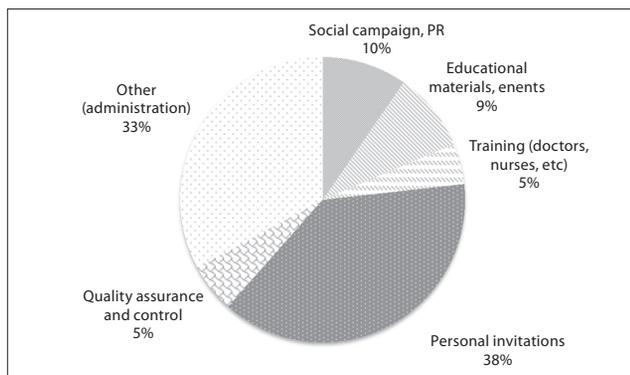
**Table 1.** The budget of the National Population-Based Cervical Cancer Screening Programme in Poland in the years 2007-2010 with the amount spent on personal invitations specified. The budget covers all administrative and organizational expenses. Medical costs (Pap tests, follow-up) are not included.

Program Budget (PLN)	2007*	2008*	2009	2010
<b>Total</b>	<b>14 749 524</b>	<b>11 809 129</b>	<b>9 357 011</b>	<b>12 505 639</b>
– cost of invitations	7 567 815	3 830 934	1 462 315	4 790 465
<b>% of the whole budget</b>	<b>51%</b>	<b>32%</b>	<b>16%</b>	<b>38%</b>

\*In the years 2007-8 invitations were sent by the National Health Fund, then by the Coordinating Centers. Data inclusive of the NHF costs.

**Table 2.** The National Population-Based Cervical Cancer Screening Programme budget in 2010.

Programme Budget in 2010	
Assignment	Spending
Social campaign, PR	1 204 297
Educational print materials, actions to improve attendance, events	1 128 052
Training (doctors, nurses, screening providers)	574 197
Personal invitations	4 790 465
Quality assurance and control	694 938
Other (administration)	4 113 690
<b>Total</b>	<b>12 505 639</b>

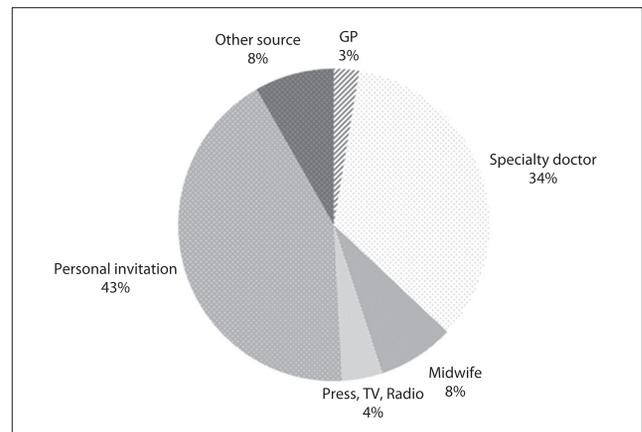
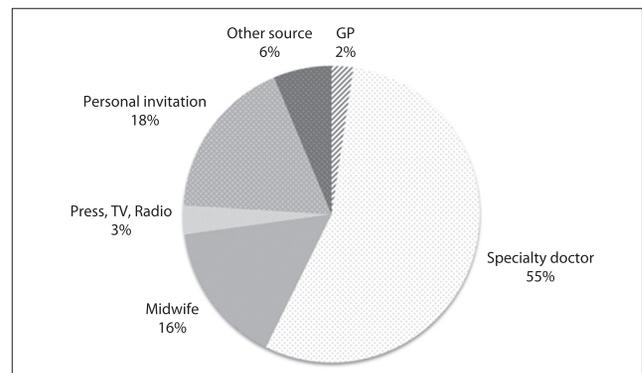
**Figure 3.** Programme budget in 2010. Distribution of finances.

Analysis of the influence of the invitations on the attendance rate in the Programme proved that in the months when letters were sent, a statistically significant increase in Pap test collection was observed, whereas in the months when letters were not sent, a decrease in screening uptake was visible [13]. Regardless of this fact, the number of women responding to the invitations still remains low. SIMP analysis of ID numbers of those attending have shown that only 6–8% of the women tested are those who were sent an invitation and promptly responded. These values were: 7.96% in 2008, 7.77% in 2009, 6.8% in 2010 and 6.45% in 2011.

In addition, according to the questionnaire routinely filled out by all those attending screenings as a part of the medical interview for the SIMP database, where patients are asked about the primary source of information about the screening, the role of invitations within recent years has been gradually losing importance. The questionnaire shows that while 43% of the respondents in 2007 declared that they attended a screening in response to the letter of invitation, in 2010, it was only 18% (Fig. 4, 5).

Another point is the organization of massive mailing. Due to logistic problems, in the first 3 years invitations were sent irregularly. Idle months were followed by massive mailing. This caused obstruction, negatively influenced screening accessibility, delayed obtaining Pap test results and, consequently, deterred women from participation. These problems were gradually resolved. Nonetheless, the outcome of the efforts made and the financial resources spent on this method of increasing coverage remain unsatisfactory.

**Medical staff training.** In addition to mailing, an important initiative for increasing screening uptake was an intensive training of doctors and midwives throughout

**Figure 4.** Sources of information about screening in 2007. SIMP data.**Figure 5.** Sources of information about screening in 2010. SIMP data.

the country, which cost about 550–650 000 PLN each year. This included incorporating midwives in the Programme to collect Pap tests after especially developed training and apprenticeship supervised by a gynaecologist, followed by a central examination. Compared to the expenses on personal invitations, this method of increasing coverage proved to be much more effective and resource-saving. In addition, it resulted in an increased accessibility of screening providers, and consequently, improved screening uptake [13].

A significant increase of the role of doctors (34% in 2007 vs. 55% in 2010) and of midwives (8% vs. 16%, respectively) as screening recruiters was also confirmed by the SIMP questionnaire mentioned above (Fig. 3). This trend, as well as the diminishing importance of personal invitations, was observed within the years 2007–2010.

To sum up, comparison of the two methods of encouraging screening participation shows that training medical staff to become actively involved in screening recruitment is far more reasonable than costly letters of invitation.

**Social and educational campaign.** Other activities aiming at increasing screening uptake included developing a social educational campaign run in uniform style, under one logo and one slogan throughout the country, managed and produced by PR specialists and medical experts. Basic assumptions of the campaign were uniformity to build brand recognition and the trust of the general public, consistent messaging across different channels of communication to increase message uptake and understanding, as well as central coordination of activities undertaken to provide cost-effectiveness. The campaign encompassed designing a website,

printing educational materials (leaflets, brochures, posters), broadcasting TV and radio commercials and producing other PR supports, such as an educational film, articles in the press, interviews, TV programmes, product placement in popular TV series, events, educational meetings, etc.

As a result, the presence of the topic in the media provoked a wider discussion about the problem in Poland and attracted more interest to cervical cancer prevention. Undoubtedly, the campaign run within the Programme has contributed to an increase in Pap tests uptake, also beyond the frames of the organized screening. As available data indicate [10], opportunistic screening similarly benefited from it.

To summarize, although it is hard to estimate the direct influence of particular activities on screening coverage, it is believed that the social education was crucial for increasing awareness of cervical cancer and indeed encouraged many women to get involved in active prevention. This is proved by the fact that in the periods when the first TV spots were broadcast in 2008, a 38% increase was observed in the number of Pap tests collected [14]. However, the cost of the social campaign limited its extent, especially in the media. Therefore, it can be stated that providing more resources for this purpose could be beneficial for screening uptake.

## SUMMARY

**Coverage issues in the European context.** High attendance rate is one of the crucial factors responsible for screening effectiveness, according to the IARC guidelines [15], although the Polish experience shows that this element of the screening is difficult to achieve. While development of the whole infrastructure, building a network of screening providers and maintaining adequate quality seems to be functioning well in the Polish environment, a satisfactory coverage of 70–80% currently appears impossible to achieve.

However, despite the efforts made to implement and to develop cervical screening, non-compliance is a problem in many countries. In Estonia, Hungary and the Slovak Republic, where screening programmes were implemented in the recent years, the programme coverage also remains low (44%, 24% and 23%, respectively) and opportunistic screening exists on a large scale [16, 17]. Only the Czech Republic recently observed a significant improvement (52% in 2010 compared to 33% in 2000). But the coexistence of opportunistic screening and overcapacity resulting from it, excessive number of Pap tests recommended in a lifetime, and the lack of central reporting systems, are problematic issues in many countries, even those with a much longer screening tradition (Belgium, Germany, Austria, Sweden and Spain). Coverage numbers within organized screening hardly ever exceed 80% and currently range from 10–79%. What is more, the overall screening volume, including non-programme tests, in many countries still well exceeds 100%, which makes cost-effectiveness questionable [16].

Nowadays, the highest coverage is reported in the UK with approximately 80% in a 5-year interval [18]. However, even there mortality and morbidity rates decreased by 35% only 20 years after screening introduction. In the beginning, coverage was 14% with an annual increase of about 6% [19]. Morbidity rates were diminishing by 1–2% annually. The

real breakthrough was observed only after the introduction of a call-recall system, as well as of financial incentives for the doctors who encouraged screening. As a result, the attendance rate doubled, reaching 80%, and mortality and morbidity statistics fell significantly [19, 20].

As for screening outcomes, the statistics of mortality and morbidity in most Eastern European countries are similar to those in Poland. This concerns Latvia, Hungary, Estonia, the Slovak Republic and Bulgaria. In Romania and Lithuania the situation is even worse. All those countries face similar problems with organization, coverage and the existence of opportunistic screening.

**Programme development options.** In Poland, the coverage is far from satisfactory and epidemiological data have not yet shown much progress. Mortality from cervical cancer remains very high. Extensive opportunistic screening without a reporting system, quality control and follow-up, as well as the lack of the data determining which part of the population remains unscreened, makes further progress in cervical cancer prevention questionable.

Clearly, solutions to improve the capacity of the Programme need to be sought. Further increase in the budget seems unjustified, as the costs of its functioning are high [21]. Redistribution of the funds should be more effective. Furthermore, it is worth considering some organizational changes, as proposed below.

According to the experience of the Polish Screening Programme, the most effective way to increase coverage was to train screening providers to involve them in actively encouraging screening participation. Personal invitations sent by regular post proved to be expensive and much less effective than expected. This is why redistributing funds from mailing to the education of screening providers and extending the social campaign seems reasonable. For this purpose, it is worth considering sending invitation letters by e-mail or text messages, which would result in savings that could be spent on a media campaign and education. This method of invitation could also diminish the number of undelivered mail due to changes of place of residence. However, it would not reach the part of the population who do not use contemporary electronic devices.

A cost-free method of increasing screening success could be primary education on cancer prevention incorporated in the school curriculum. Sadly, health education in Polish schools is a shamefully neglected subject.

Another option considered for reaching the underserved population is to introduce Pap testing into the periodical employee examination list. There is also a concept that social benefits might be obtained under the condition of presenting a certificate confirming participation in screening within the previous 3 years. This could motivate women with low socio-economic status who are at higher risk of developing cervical cancer [22] to attend prevention programmes. However, according to the WHO, such interventions are against the assumption that disease prevention, as well as the decision whether to participate in screening or not, should be voluntary. Nonetheless, from the point of view of the presented study, this is incongruent with the WHO policy of obligatory vaccination against some diseases, and arguable in the light of the Polish non-compliance scale, as well as the economic and social costs of cancer. Hence, the need for further discussion on this issue.

As for improvement of the system, it is worth considering enhancing the monitoring and quality control of the screening by partial incorporation of the opportunistic screening into the system. For the public healthcare, Pap tests reported in the SIMP should be valued higher by the NHF than those collected within a regular gynecological examination and not registered. Or, if non-registered, Pap tests should be disqualified from the NHF refund. For the private sector, it is more complex. Introduction of obligatory registration of Pap test results in the SIMP seems to be the only option and could be executed by the laboratories evaluating the tests. However, some gynaecologists still evaluate the tests themselves, which constitutes another issue. Nonetheless, for the quality and sensitivity of Pap testing, tightening the regulations to limit uncontrolled and unverifiable test evaluation should be profitable.

Another substantial barrier for radical improvement in the prevention of cervical cancer is the limited control over the treatment which results from the lack of a CIN (Cervical Intraepithelial Neoplasia) registry in Poland. This aspect was neglected at the stage of the Programme's development, but should definitely be introduced as the detection of precancerous lesions is the main objective of screening. However, without proper follow-up and a reporting system, pathological lesions cannot be treated effectively. Thus, further improvements require the creation of a CIN registry. Reporting all histologically confirmed neoplasms should be obligatory and should be conducted by pathologists. This would certainly positively influence the epidemiologic situation.

Regarding the coverage problems, another reasonable solution seems to be the introduction of a free-of-charge vaccination programme for 12–13-year-old girls, with a central registry connected with the SIMP. This could significantly reduce cervical cancer mortality in the future. So far, local authorities in many regions of Poland have introduced such vaccination programs. Unfortunately, a corresponding HPV vaccination registry was not created and the distant results of primary prevention will be difficult to estimate.

Apart from that, it is known that cytological screening can decrease cervical cancer morbidity by an 80% maximum due to limited coverage (60–80% in the best organized programmes in the UK, The Netherlands and Scandinavia), and due to the sensitivity of this method [23, 24]. Low specificity results in an excessive number of the tests for further verification (ASCUS) and causes unnecessary follow-up in healthy women with false positive results, which generates additional costs [25]. Given this, some new, cheaper and more accurate methods of verification of abnormal Pap test results are needed. Immunocytochemistry used for this purpose have proved to be of high value in recent research [25, 26, 27]. Therefore, it is certainly worth considering to incorporate this method into the running screening system.

Finally, regarding the shortcomings of cytodiagnosics mentioned above, as well as the cost of Pap testing, which in Poland equals about 52 PLN per test [21], it is reasonable to consider HPV DNA testing in 5-year intervals as an alternative to cytology in women aged 30–60. In younger women, this procedure is not recommended, as HPV infection, similarly to low-grade squamous intraepithelial lesions, often regresses spontaneously and do not require treatment [28]. This change would reduce the number of tests in a lifetime from 12 to 7.

In addition, HPV DNA testing based on self-sampling could be a solution for women refusing to participate in cytological testing. However, this idea requires further investigation, development of procedures for positive test results, and subsequent cost analysis. Another interesting option, probably effective in terms of sensitivity, is the combination of cytology and HPV DNA testing at 5-year intervals (i.e. both tests performed every 5 years). Specific guidelines regarding this matter have been developed by the Polish Gynaecological Society [29], although the cost-effectiveness of the proposed algorithm is arguable.

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