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Addressing the Critical Gap in Women's Cancer Prevention in Serbia: High Screening Awareness Versus Low Participation in Organized Screening Programmes

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ABSTRACT

Breast and cervical cancer prevention in Serbia is marked by a striking contrast: women report high awareness and substantial use of preventive services, yet participation recorded within organized screening programmes remains low. We analysed a cross-sectional online survey conducted nationwide between 19 September and 15 December 2025 among 1,133 women and interpreted the findings against previously published public data from institutional sources.

Ninety-nine per cent of respondents understood screening as testing of people without symptoms. In a breast-prevention subsample (n=456), most women (82.3%) reported never receiving an institutional screening invitation, 15.6% reported receiving one, and 2.1% did not recall. Among invitees with an evaluable response, 90.9% reported attending. Difficulty obtaining an appointment (38%) and lack of time (20%) were the most frequently cited barriers, while 76.8% were willing to share contact details with health authorities to facilitate scheduling. In a cervical-prevention subsample (n=263), 64 women (24.3%) had undergone HPV testing; 64.6% had visited a gynaecologist in the preceding year, yet communication about HPV and vaccination remained limited. Published evidence indicates that programme-based cervical screening reached approximately 6% in 2023, compared with 63% self-reported participation in 2019, and that final-dose HPV vaccination coverage in 2024 was 4% among girls and 2% among boys. The findings support the implementation of systematic invitations, direct scheduling, reminders, flexible appointments, mobile services, stronger clinician communication about HPV, and reliable population-level monitoring.

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Introduction

Breast cancer is the most commonly diagnosed cancer and the leading cause of cancer death among women in Serbia, while cervical cancer continues to impose a substantial burden of preventable morbidity and premature mortality. These patterns make effective primary and secondary prevention central to cancer control [1, 10, 11].

The most recent public synthesis reported 1,060 new cervical cancer cases and 404 deaths in Serbia in 2022. The age-standardized incidence rate was 19.1 per 100,000 women and mortality was 5.9 per 100,000, leaving incidence almost five times above the WHO elimination threshold of fewer than 4 cases per 100,000 women. Nearly one-third of cases occurred before age 50, and cervical cancer was the second leading cause of cancer death among women aged 15–44 [2].

Serbia introduced organized screening programmes in 2012. The breast cancer programme is based on personal invitations for

mammography every two years among women aged 50–69 years, and the cervical cancer programme invites women aged 25–64 years for cytology every three years. National programmes set a screening-coverage target of at least 75%, but implementation is decentralized and not all municipalities participate [3].

The gap between formal programme design and population reach is visible across data sources. The report "Cancer Dashboard for Serbia" by the Swedish Institute for Health Economics (IHE) noted that 30% of women aged 50–69 years said they had undergone mammography within the previous two years in 2019, whereas programme-recorded breast-screening participation was around 8% in 2023. For cervical cancer, 63% of women aged 20–69 years reported a Pap smear within the previous three years in 2019, compared with programme-recorded participation of approximately 6% in 2023. These indicators are not directly interchangeable: self-reported surveys capture both organized and opportunistic examinations, whereas programme statistics capture activity within the organized pathway. Their divergence nevertheless suggests that many women obtain preventive examinations outside the invitation-based programme [4].

Human papillomavirus (HPV) vaccination adds another important prevention opportunity. Vaccination has been recommended in Serbia for many years and has been publicly funded for girls and boys aged 9–19 years since June 2022. However, data from the World Health Organization (WHO) summarized in the IHE dashboard indicate that only 4% of girls and 2% of boys had received the final programme dose in 2024, far below the WHO target of 90% coverage among girls by age 15 by 2030 [5,6].

Against this background, the present study examined whether low organized-screening participation is more closely associated with limited awareness or with failures in institutional outreach and access. We assessed knowledge, screening behaviour, receipt of invitations, appointment barriers, willingness to be contacted, and communication about HPV prevention. Survey findings were interpreted exclusively alongside publicly available national evidence.

Materials and Methods

Study Design and Setting

We conducted a cross-sectional online survey between 19 September and 15 December 2025 as part of the “Not Without Her” campaign, implemented by Women’s Center “Milica” with support from the Ministry of Health of the Republic of Serbia. The survey link was disseminated through an open public call via the organization’s communication channels and social media. It was not sent to a predefined list of current or former service users. Participation was voluntary and self-selected.

The study included a total of N = 1,133 respondents, aged 18 to 80 years. For data precision, the sample was stratified, with particular focus on the target population for breast cancer screening that the state has been inviting in recent years (women aged 45–69), which formed a subsample of n = 699 respondents, while, according to official documents, the organized screening target population (women aged 50–69) forms a subsample of n = 456, representing 39.1% of respondents [7].

The sample was not probability-based and should not be interpreted as nationally representative.

Questionnaire and Analytical Populations

The closed-ended questionnaire covered knowledge of screening, mammography and cervical-screening behaviour, HPV testing, receipt of institutional invitations, attendance after invitation, appointment barriers, preferred service-delivery options, contact with gynaecologists, communication about HPV and vaccination, and willingness to share contact information for direct scheduling.

Results are presented using the denominator for the relevant questionnaire module. General awareness, invitation experience, mammography, barriers and willingness to be contacted were assessed in the full sample unless otherwise stated. Questions on HPV testing, gynaecological visits, Pap-test history and vaccination communication were administered in a second module completed by approximately 263 respondents; small denominator differences reflect item-level non-response. Percentages should therefore not be compared across modules without considering their denominators [8].

For this study, organized screening was defined as screening undertaken following an invitation issued through the national programme. Opportunistic screening referred to self-initiated examinations obtained in either the public or private sector. The available data did not permit separation of private-sector activity from self-initiated use of public services [9].

External Data

Survey results were contextualized exclusively with publicly available evidence. Indicators for breast and cervical screening and HPV vaccination were drawn from the 2026 IHE Cancer Dashboard for Serbia [1]. Cervical cancer burden, prevention, early detection, data-system gaps and policy recommendations were additionally drawn from the 2026 IHE Policy Brief on Cervical Cancer in Serbia, which was based on targeted literature searches and interviews with three Serbian experts [4]. Survey estimates and published population or programme indicators were kept analytically separate.

The analysis was descriptive. Counts and percentages were calculated for survey responses, and no weighting or inferential testing was applied. Where a percentage was recalculated from published counts, the calculation is explicitly described.

Results

Participant Characteristics and Screening Awareness

The sample included 91 women aged 18–30 years (8.0%), 376 aged 31–45 years (33.2%), 561 aged 46–60 years (49.5%), and 105 aged 61 years or older (9.3%). The mean age was 47 years. The age distribution is shown in Table 1.

Table 1: Age Distribution of Survey Respondents (N=1,133)

Age group	n	%
18–30 years	91	8.0
31–45 years	376	33.2
46–60 years	561	49.5
61+ years	105	9.3
Total	1,133	100.0
The mean age of the respondents was 47 years.		

Overall, 99% correctly identified screening as regular testing of people without symptoms, indicating high awareness within this self-selected online sample.

Invitation and Attendance

In the breast-prevention subsample (n=456; aged 50–69), most women (82.3%) reported never receiving an institutional screening invitation, 15.6% reported receiving one, and 2.1% did not recall. Among women with an evaluable attendance response after invitation, 90.9% reported attending. Thus, in this sample, non-receipt of an invitation was common, while reported uptake after an invitation was high.

Breast Cancer Screening

In the survey, 24% of respondents reported never having undergone mammography, whereas 44% reported mammography within the previous two years. Because examinations could have been self-initiated and obtained in public or private care, these figures describe respondents’ screening behaviour rather than participation in the organized programme.

The IHE dashboard provides the appropriate national context: 30% of women aged 50–69 reported mammography within the preceding two years in 2019, while programme-based coverage was approximately 8% in 2023 [1]. These figures use different years and data-collection methods and cannot be interpreted as a direct trend. They nevertheless indicate that a substantial share of mammography takes place outside the organized programme.

Cervical Cancer Screening and HPV Testing

In the cervical-prevention module, 64 of 263 respondents (24.3%) reported having undergone HPV testing, 166 (63.1%) had not, and 33 (12.5%) were unsure. With respect to Pap testing, 58.9% reported annual testing and a further 25.9% reported testing every one to three years; 15.2% had not been tested within the previous three years or had never been tested. These self-reported data describe a selected subgroup and should not be treated as population coverage estimates.

The IHE policy brief reports that programme-based cervical-screening participation remained low between 2013 and 2023, peaking at almost 11% in 2018 and standing at around 6% in 2023 [4]. In contrast, 63% of women aged 20–69 self-reported a Pap smear within the previous three years in 2019.

The policy brief also notes that organized screening was offered in only 18 of 145 municipalities and remained constrained by incomplete population contact data, letter-based invitations, limited booking flexibility and the absence of a national screening registry.

Communication about HPV Prevention

Among respondents of the cervical-prevention module, 64.6% reported visiting a gynaecologist within the preceding 12 months. Despite this contact with care, most respondents reported that HPV prevention or vaccination had not been discussed with them. Overall, 245 of 264 respondents (92.8%) said that a physician had not recommended HPV vaccination, nine (3.4%) reported a recommendation, and ten (3.8%) were unsure. In addition, 40.2% wanted more information and 30.3% indicated that they might be interested, suggesting substantial openness to further education.

A history of an abnormal Pap result was self-reported by 76 respondents in this module. Of these, 65 (85.5%) stated that a physician had not recommended HPV vaccination. This finding should not be interpreted as indicating that vaccination treats an existing abnormality. Rather, it suggests that encounters related to cervical health may not consistently include broader counselling about HPV prevention and protection against future vaccine-type infections.

Barriers and Preferred Facilitators

Difficulty obtaining an appointment was the most frequently reported barrier to screening (38%), followed by lack of time (20%). Respondents most often selected mobile screening services and appointment times outside standard working hours as useful facilitators. In addition, 871 women (76.8%) consented to sharing their contact details with the Ministry of Health or primary healthcare centres to facilitate direct scheduling; 262 (23.2%) did not consent.

Selected survey findings and their analytical denominators are summarized in Table 2.

Table 2: Selected Survey Findings, with Analytical Denominator Indicated

Domain	Finding	Denominator / interpretation
Screening knowledge	99% correctly identified screening	Full survey sample; self-selected
Institutional invitation	yes (15.6%); no (82.3 %); unsure (2.1%)	n=456 breast-prevention respons (50-69 years)
Attendance after invitation	90.9% attended	Invitees with evaluable response
HPV testing	yes (24.3%); no (63.1%); unsure (12.5%)	n=263 cervical-prevention module
Physician recommendation for HPV vaccination	yes (3.4%); no (92.8%); unsure (3.8%)	n=264; item-level denominator
Consent for direct contact	871 yes (76.8%); 262 no (23.2%)	N=1,133

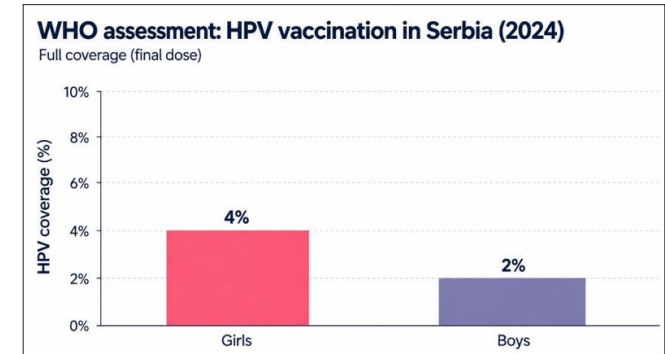


Figure 1: HPV Vaccination Programme Coverage in Serbia in 2024: Final-Dose Coverage Among Girls (4%) and Boys (2%). Source: IHE Cancer Dashboard for Serbia, Based on WHO Data.

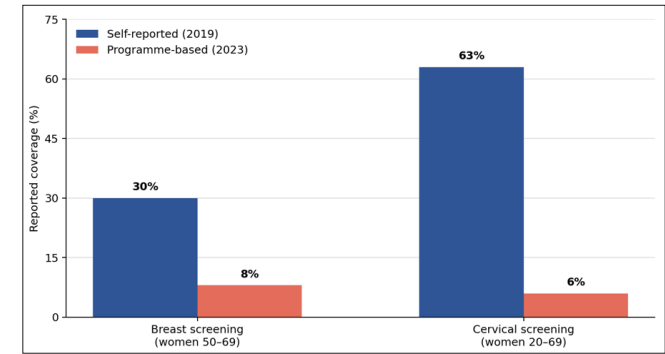


Figure 2: Published screening indicators for Serbia. Self-reported estimates include screening both within and outside organized programmes and are not directly comparable with programme-based estimates because years and methods differ. Source: IHE Cancer Dashboard for Serbia.

Discussion

This study identifies a practical gap between women's readiness to engage in prevention and the reach of organized screening in Serbia. Respondents demonstrated high awareness, and reported attendance was strong once an institutional invitation was received. At the same time, more than eight in ten women said they had never received such an invitation. The result does not establish causality, but it shifts attention from a simple narrative of "low awareness" towards the functioning of the pathway that should identify, invite and schedule eligible women.

The comparison with external evidence reinforces this interpretation. In the IHE dashboard, self-reported mammography and Pap-test use was several times higher than programme-recorded participation. The two types of data measure different phenomena and were collected in different years, so direct numerical comparison must be made cautiously. Nevertheless, the pattern is consistent with substantial opportunistic screening. Women who are able to arrange examinations themselves may receive preventive care, while those who depend on a systematic invitation are at greater risk of being missed.

The IHE policy brief adds an important systems perspective. It describes cervical screening as largely opportunistic, identifies the absence of a national screening registry and a comprehensive invitation infrastructure, and reports substantial educational and geographic inequalities: self-reported participation was 43% among women with lower education and 77% among women with tertiary education. These findings support interpreting low programme reach as a structural and equity problem, rather than simply a deficit in individual motivation.

Access barriers reported by participants were concrete rather than abstract. Difficulty securing an appointment and lack of time were common, while women favoured mobile services and appointments outside working hours. These responses support practical changes: population-based identification of eligible women, invitations linked to an actual appointment or simple booking route, reminders through more than one channel, flexible opening hours, mobile capacity where geography limits access, and monitoring that can detect local gaps quickly.

The HPV findings point to a second missed opportunity. Even among women who had recent contact with a gynaecologist, vaccination and prevention were not routinely discussed. Evidence summarized in the IHE dashboard shows that clinician recommendation is an important driver of parental acceptance in Serbia, yet last-dose coverage in 2024 remained only 4% among girls and 2% among boys [1,8,9]. Better clinician communication should be combined with digital vaccination records, reminders, and delivery options that make vaccination easier to obtain.

The willingness of more than three-quarters of respondents to share contact details for scheduling screening appointments indicates acceptance of a more proactive model, but implementation must be consent-based, transparent and compliant with data-protection requirements. Patient organizations can support this transition by communicating in accessible language, helping women navigate appointments and feeding implementation barriers back to policymakers. They should complement, not substitute for, a functioning population-based programme.

Strengths and Limitations

A key strength of this study is the combination of detailed patient-

reported experience with publicly available national evidence. The survey also captured practical barriers and preferences that are not routinely visible in administrative statistics.

Several limitations require careful interpretation. The online, voluntary sample was not probability-based and likely overrepresented women with digital access, interest in women's health or prior contact with patient networks. All survey measures were self-reported and may be affected by recall or social-desirability bias. Different questionnaire modules had different denominators, and item-level non-response produced small variations. The survey age bands did not exactly match the eligibility ranges of the national programmes, limiting age-specific comparisons. Published programme-based and self-reported indicators differ in population, period and definition and should not be treated as equivalent. External indicators were used for contextual interpretation and were not merged statistically with the survey dataset.

Policy Implications

- Establish a population-based invitation system using an authoritative list of eligible women.
- Link invitations to direct scheduling, simple rescheduling and reminders through SMS, telephone and other accessible channels.
- Prepare a capacity plan so that increased invitations do not create longer waits or interrupted services.
- Offer flexible appointment times and expand mobile screening where access is limited.
- Modernize cervical screening in line with current evidence, including phased introduction of primary HPV testing and evaluation of self-sampling pilots.
- Strengthen clinician-led communication about HPV vaccination and introduce digital registration and reminder prompts.
- Publish consistent annual indicators with transparent numerators, denominators and geographic coverage.

Conclusion

Women cannot participate in an organized screening programme that does not reliably reach them. In this survey, awareness was found to be high and reported attendance after invitation was strong, yet institutional invitations were uncommon. Read together with published evidence of low programme-based participation, these findings suggest that improving prevention in Serbia requires more than additional awareness campaigns. The immediate priority is to make organized prevention genuinely organized: identify eligible people, invite them proactively, provide an accessible appointment, follow up, and monitor whether the pathway works. Better communication about HPV and vaccination should be embedded in the same patient-centred system.

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Previous presentation

Preliminary findings were presented in poster format at the European Society of Gynaecological Oncology (ESGO) Congress, Copenhagen, Denmark, 26–28 February 2026.

Author contributions

V.B. conceived the survey and campaign, contributed to data collection and interpretation, and drafted the manuscript. T.H. contributed to study framing, interpretation of evidence, critical revision of the manuscript, and approval of the final version. Both authors take responsibility for the integrity of the work.

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