CBIG-SCREEN

Working collaboratively with vulnerable women to identify the best implementation gains by screening cervical cancer more effectively in European countries

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A survey of the policies towards broadening coverage of cervical cancer screening to vulnerable populations in 22 European countries in 2022

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PP	Restricted to other programme participants (including Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Executive Summary

CBIG-SCREEN is a project which aims to tackle inequalities in cervical cancer screening (CCS) by developing a Europe-wide knowledge framework around barriers to CCS. Through the running of three pilot interventions in Estonia, Portugal and Romania, the project aims to make screening more accessible and acceptable to vulnerable groups, and to increase screening ratios among vulnerable women.

This study aimed to investigate the status of CC screening implementation by investigating European countries' policies towards broadening coverage of CC screening among vulnerable populations as part of a broader health systems analysis. The aim of the survey of the policies towards broadening coverage of cervical cancer screening (CCS) to vulnerable populations is twofold:

- To identify and rank the six most vulnerable hard-to- reach groups that experts think would benefit from targeted intervention(s);
- To map existing policies to broaden coverage of CCS among vulnerable populations and collect selected performance and outcome data from all European countries where possible.

This document outlines (i) the main objectives of CBIG-SCREEN, (ii) the results of the survey mapping CCS policies in 22 European countries, and (iii) the implications for the interventions to be designed to expand CCS coverage among vulnerable groups within the framework of the CBIG-SCREEN project.

Results indicate that whilst many countries identify lower coverage of CCS amongst vulnerable groups as a public health problem, few countries have developed policies dedicated towards broadening coverage among these populations. The complexity of categorising subgroups of the target population considered to be vulnerable or marginalised is compounded by the intersectionality of such subgroups. Greater clarity on the conceptualisation of vulnerability can help countries to develop and subsequently implement strategies to increase coverage to subgroups of the target population currently underserved with regards to cervical cancer screening.

Background

The CBIG-SCREEN project aims to tackle inequality in the Cervical Cancer Screening (CCS) continuum. Whilst CCS programmes considerably reduce cervical cancer mortality, they remain inaccessible and, therefore, underserve subpopulations of vulnerable women, which further exacerbates inequalities. Reduced coverage of CCS amongst subpopulations at highest risk of developing cervical cancer compounds the existing underserved groups already face to maintain their physical and mental health.

CBIG-SCREEN will develop a Europe-wide knowledge framework around barriers to CCS and run three pilot interventions (in Estonia, Portugal and Romania) with the goal of providing decision-makers with evidence on effective ways to broaden coverage of CCs programmes. The project will generate a range of outputs to meet the needs of underserved women at high-risk of cervical cancer with limited access to healthcare.

The key ambitions of CBIG-SCREEN project are:

- Increase structural knowledge and provide insights into performance and policies of screening vulnerable women;
- Increase early detection and appropriate management of CCS in vulnerable women;
- Create a flexible and responsive evaluation framework of co-constructed implementation models that predict the efficacy and effectiveness of tailored CCS programmes;
- Reduce the burden of CC in the European Union, improve life expectancy and well-being, and reduce health inequities;
- Decrease disease burden by more efficiently targeting vulnerable women and thus accelerate cervical cancer elimination.

To do this, the consortium will work in collaboration with underserved groups to identify and develop strategies to meet their varied and specific needs. The project seeks to explain the value of adopting this evidence-based learning from the co-creation process to policymakers and encourage CCS programmes to use these interventions in practice.

Overall, CBIG-SCREEN pursues the following five missions:

1. Assess current CCS status among vulnerable women, including existing policies, stakeholder landscape, barriers, and preferences for CCS among subgroup of vulnerable women (WP2, 3, 4);
2. Develop tailored intervention models that increase CCS in subgroups of vulnerable

women (WP2, 3);

3. Assess implementation potential and demonstrate scalability of intervention packages (WP6);
4. Assess health benefits and cost-effectiveness of intervention packages (WP5);
5. Disseminate findings and deliver recommendations to EU representatives and policy makers, so they will translate into profound and long-lasting benefits for vulnerable women (WP7).

To achieve the above-stated objectives, the project partners will:

1. Ensure that CBIG-SCREEN is sufficiently well-known among those concerned with cervical cancer and cancer screening issues, so as to attract vulnerable groups, partners, collaborators and supporters;
2. Ensure that CBIG-SCREEN’s outputs, activities and contributions to research and cancer policy as well as the development of relevant strategies and policy recommendations are sufficiently well-known within the EU institutions and other decision-makers, so that to receive an appropriate level of political support;
3. Enable project partners and collaborators to communicate about the project in order to increase the use and uptake of CBIG-SCREEN’s outputs and activities among stakeholders who could make use of them;
4. Build and maintain effective and mutually beneficial relationships with vulnerable groups (and their representatives), national and European decision-makers and the media.

Introduction

Cervical Cancer (CC) is an almost entirely preventable disease. It is also curable if detected early and adequately treated. Yet, it remains a leading cause of death in women globally: in 2020 alone, an estimated 66,821 new cases were diagnosed and the disease claimed over 30,608 deaths in the WHO Europe region (1). Moreover, by 2030 the yearly global burden is projected to increase up to 68,135 cases and 32,725 deaths, respectively (2). The considerable projected increase calls for action to promote cancer prevention generally (3), and especially cervical cancer (4).

Cervical cancer is clearly amenable to screening because its natural history is well understood, and it has a long precancerous state (10–20 years). Widely used methods for screening of precancerous cervical lesions include naked eye visual inspection with acetic acid (VIA) or Lugol’s iodine; visual inspection under a magnifying device with acetic acid; conventional (Papanicolaou [Pap] smear) or liquid-based cytological tests; and HPV DNA testing (5).

Ample evidence exists supporting the accuracy of HPV DNA self-sampled versus clinician-sampled specimens, the acceptability of self-sampling to women, and the significant impact on participation in randomized trials, when self-sampling kits were sent to women (6). A recent meta-analysis observed that direct offer of self-sampling devices to under-screened women in communities generated >75% participation rates (7). Moreover, self-sampling was the preferred option by eligible women in a cross-sectional study in England (8)

The implementation of CC screening with an ‘organized’ approach can significantly reduce mortality among the targeted population, as it is expected to enhance screening participation, decrease disparities, and minimize the harms of screening by ensuring high quality of services across the entire care continuum and reducing over-screening (9). Additionally, the International Agency for Research on Cancer (IARC) defines a population-based screening programme as one with a mechanism to identify the eligible individuals and send personal invitations to them to attend screening (10).

The current European guidelines recommend to perform Pap smear CC screening “*starting not before the age of 20 and not later than the age of 30*” (11). These recommendations are aligned with WHO latest guidance (12), although do not include the need to target CC screening approaches towards vulnerable populations.

Few diseases reflect global inequities as much as cervical cancer. The burden of CC falls disproportionately on economically and socially vulnerable women who bear enormous associated costs, aside from losses to families, communities, and economies. Recent estimates suggest 90% of CC deaths occur in LMIC (13), and the Human Development Index (HDI) and poverty rates have been shown to account for over 52% of global variance in mortality (14). Moreover, the intersectionality with other conditions further aggravates CC burden among certain subgroups; for instance, women living with HIV have a six-fold higher risk of developing CC relative to their counterparts without HIV (15). While the average incidence of CC among the WHO Europe region stands at 10.1 per 100,000 women (1), it is estimated at 66 per 100,000 (95% CI 57-77) among women living with HIV (16).

Therefore, the definition of vulnerability for CC screening is challenging. While Europe approaches WHO CC elimination target as a compact (that is, an incidence below 4 CC cases per 100,000 women (4)), vulnerable subgroups of women remain largely unaddressed within public policy.

To that end, the CBIG-SCREEN project aims to tackle inequality in the CC screening continuum. Whilst CC screening programmes reduce CC mortality, they remain largely inaccessible and, therefore, underserve subpopulations of vulnerable women, which further exacerbates inequalities. Reduced coverage of CC screening amongst subpopulations at highest risk of developing CC compounds the existing underserved groups already face to maintain their physical and mental health. CBIG-SCREEN will develop a Europe-wide knowledge framework around barriers to CC and run three pilot interventions (in Estonia, Portugal and Romania) with the goal of providing decision-makers with evidence on effective ways to broaden CC screening programmes coverage.

This study aimed to add to knowledge in the literature on CC screening implementation by investigating European countries' policies towards broadening coverage of CC screening among vulnerable populations as part of a broader health systems analysis.

Methods

Questionnaire development

A web-based survey was developed to map the health systems approaches that were in place (at national, regional or local level) to identify population subgroups who are considered to be at heightened risk of cervical cancer and are typically underserved in respect of CC screening. The survey was conducted between September 24, 2021, to February 28, 2022.

A 47-item survey was developed and structured into six domains related to CC screening: i) vulnerable women populations identification; ii) policy; iii) financing; iv) monitoring and evaluation; v) programme invitation strategies; and vi) activities for awareness raising and access barrier elimination. Several items, notably those measuring barriers access to CC screening services, were adapted from the Barriers to Effective Screening Tool (BEST), which had been previously validated in a European setting (17). Final questionnaire items underwent an iterative revision process by the co-authors before review and pre-testing with professionals from partner organisations in the CBIG-SCREEN project consortium. Subsequently, the draft survey was shared with experts external to the project in three countries (Cyprus, Denmark and Slovenia) to review the intelligibility and relevance of questions, feasibility to complete and provide the requested data, and to identify gaps, inconsistencies or duplication of items.

Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at IARC. REDCap is a secure, web-based software platform designed to support data capture for research studies, providing an intuitive interface for validated data capture, audit trails for tracking data manipulation and export procedures (18,19).

Target audience

In terms of geographical coverage, as this study was implemented as part of a Horizon 2020 project, all 27 EU member states were included in the scope along with Iceland, Norway, Switzerland and the United Kingdom (UK), totalling 31 countries.

The target recipients of the invitation to complete the survey were CC screening programme coordinators or managers of the screening programme. In countries with several or more regional and local programmes, the idea recipients were professionals involved in nationwide oversight, monitoring or evaluation of the programmes either through a network of screening coordinators or role in a national/federal agency. For countries without an existing CC screening programme, experts in CC prevention from the respective countries were invited to participate.

A snowball sampling method was used whereby initial contacts either responded to the survey or referred to CC screening related stakeholders in both governmental, academia and civil society settings. Both recruitment and periodic reminders were conducted via email.

Statistical analysis

Results were provided as crude data for all responses. Descriptive analyses (relative frequencies) were performed by country and geographic region (North, South, Central Eastern, and West Europe according to EuroVoc (20)). When multiple responses were obtained from one country, a consensus answer was generated to allow for comparison amongst countries. One author pooled the responses per country. Answers in agreement were accepted as a consolidated response. In cases of contrasting answers, the level of governance (regional/national) was taken into account and a second author validated the response.

A qualitative inductive thematic analysis was performed for open-ended questions. Two investigators analysed the content of the interview transcriptions and systematically coded items into conceptually related categories, for review by a third investigator. Discrepancies were agreed upon by a verbal consensus amongst investigators.

Results

Coverage

A total sample of 31 representatives from 22 European countries responded to the survey. This represents a coverage of 70.97% of the n=31 countries within the EEA (including additionally Switzerland and the United Kingdom). Coverage was higher in Central and Easter Europe (n=7/8; 87.50%), followed by Western Europe (n=7/9; 77.78%), Southern Europe (n=4/6; 66.67%) and Northern Europe (n=4/8; 50.00%). Details on the respondent's CC incidence, mortality, and screening program are found in Table 1.

The following nine countries were invited to participate but did not respond: four countries are presently without a national organized CC screening programme (Austria, Cyprus, Greece, and Luxembourg), whilst five countries do currently have a programme of some description (Croatia, Iceland, Latvia, Lithuania, and Sweden).

Descriptive analysis of survey results by domain

Vulnerable women populations identification

A total of 20 respondent countries (90.91%) recognised the presence of vulnerable populations in their territory who were underserved by the CC screening programme (the respondent for Estonia was unsure, and Hungary denied its presence).

The three most common identified groups as such were "*Women living in poverty in socially deprived areas*" (18; 81.82%), "*Migrants from high HPV prevalence areas living in deprived areas*" (15; 68.18%) and "*Homeless people*" (13; 59.09%). Nevertheless, when asked to rank the categories, the latest ("*Homeless people*") was most often ranked first (6; 27.27%). The group for which data was more commonly available, so that specifically targeted interventions could be designed, was "*Women living in poverty in socially deprived areas*" (7; 31.82%), followed by "*Women attending HIV/STI clinics*", "*Prison inmates*" and "*Migrants from high HPV prevalence areas living in deprived areas*" (all of which had a frequency of three; 13.64%). Descriptive analysis of populations of women identified as vulnerable for CC screening by European region are shown in Table 2.

CCS policy

When asked about the existence of a documented policy for CC screening delivery to any of the abovementioned vulnerable populations in their country, only six respondents confirmed its presence

(27.27%). The target population varied by country: Romania included "ethnic minority, unemployed, uninsured, women recently released from penitentiary, low education level, low income, women in the social protection system"; Hungary reported "for women between 25-30 years and 30-65 years"; Estonia focused on "women without health insurance" as of 2021; the United Kingdom included "all underserved, mostly social-economically deprived, learning disabilities and prisons"; Ireland focused on LGBTI and issued some guidance for primary healthcare providers; and France targeted "women who are unscreened or not regularly screened". Two respondents (Estonia and France) provided specific performance indicators regularly monitored for the abovementioned populations, which included screening coverage and invitation coverage.

CCS financing

The most common sources of financing for screening, colposcopy referral, biopsy, and treatment fees, included either a total or partial coverage by the health insurance system (14; 63.64%, and nine; 40.91%, respectively). Two countries reported complete out-of-pocket financing (Bulgaria and Poland).

CCS monitoring and evaluation

The institutions most commonly in charge of CC screening monitoring included national health authorities (11; 50.00%), national cervical cancer screening organizations (n=11; 50.00%), and regional or municipal health authorities (n=10; 45.45%). Notably, none of the respondents reported a lack of monitoring of CC screening in their territory. Nevertheless, only 5 (22.73%) included separate monitoring for vulnerable populations, through population registers (n=2), health insurance registers (n=2), screening registers n=2), and primary care registers (n=1). Variables collected included ethnicity, sex, age, income, occupation, disability, religion, language, geographic area and education.

CCS program invitation strategies

A total of 17 countries reported having CC screening program invitation strategies in place (77.27%), out of which five had specific ones for vulnerable groups (29.41%). Such targeted strategies included letters (France, Hungary and Italy), phone calls (Portugal), prison or institution visits by health workers (Italy), and dedicated screening campaigns by a mobile team (Hungary). Target populations were identified from a variety of sources, included population registries (n=2), lists from primary healthcare providers (n=1), list of insurance companies (n=1), and prison inmates registries (n=1).

When inquired about strategies to maintain women in follow-up and further assessment, 14 (63.64%) countries reported having such for the general population, and none did so separately for pre-identified vulnerable groups.

CCS activities for awareness raising and access barrier elimination

When asked about ongoing or planned initiatives to create awareness about CC screening and increase participation among vulnerable populations, 13 (59.09%) countries mentioned its organization by the governmental bodies, and 9 (40.91%) additionally by NGOs, research institution, and civil society. Activities included mass and small media campaigns, group education, one-on-one education, dedicated websites, and social media platforms. Additional results derived from a qualitative analysis of a dedicated open question can be found in supplementary material.

Moreover, different client-directed interventions were reported to increase access community access to CC screening, including: self-sampling (11; 50.00%); provision of alternative screening centres (distance problem) (7; 31.82%); assisting through the healthcare system (patient navigation) (6; 27.27%); access to screening in mobile units (5; 22.73%); provision to transportation to the screening centre (5; 22.73%); scheduling screening out-of-hours (5; 22.73%); and reduction of out-of- pocket costs through reimbursement, voucher distribution, or increased third party payment for cancer screening (4; 18.18%). Self-sampling was offered either in the entire program (n=2) or as a pilot (n=9), and most-commonly home-based (n=8) or at both the clinic and home (n=2).

The results for each of the survey domains were stratified according to cervical cancer incidence (dichotomised as above or below 9.6/100.000), Human Development Index (HDI), presence of population-based cervical cancer screening programme, and EuroVoc region, in respect of each of the 22 countries covered by the survey (table 3).

Discussion

This study aimed to investigate existing policies towards broadening coverage of CC screening to vulnerable populations in several European countries. Responses were received from 31 data providers representative of 22 European countries.

The results of this survey indicate that whilst the vast majority of respondents acknowledge the necessity to address vulnerable and marginalised groups, few countries have developed a distinct policy towards broadening coverage of cervical cancer screening among them. Four of the six countries with a reported policy were in the northern or western European regions, suggesting the existence of geographical disparities within the continent.

Five of the six countries whose respondents reported the presence of a policy also reported specific monitoring, evaluation and invitation strategies for vulnerable groups. These countries were also reported to have an existing population-based screening programme, which may be a positive contributing factor to the organisation and delivery of dedicated strategies to implement the policy towards vulnerable groups.

Likewise, five out of six countries with a dedicated policy were above the median incidence for cervical cancer, which may indicate that a relatively high cervical cancer burden contributes to the development of the specific policy. Additionally, two-thirds of countries whose respondents reported ongoing awareness-raising activities by non-governmental organisations (NGOs) were countries with higher cervical cancer incidence, which suggests the importance of civil society to inform vulnerable groups in countries with greater incidence. Consequently, the engagement of civil society to broaden coverage in such countries is likely to be of extra importance and value.

Whilst the results of this survey suggest a general agreement that addressing low coverage of cervical cancer screening amongst vulnerable and marginalised groups is an important public health issue, a major obstacle identified was the lack of consensus on how to conceptualise and identify vulnerability as a construct.

Vulnerability in the context of the aim of this survey can be considered in two distinct ways: vulnerability to developing cervical cancer; and vulnerable in regards to exposure to social and economic pressures leading to negative health outcomes. In regards to the development of cervical cancer, vulnerability to the disease is dependent to a large extent on current HPV status and having been vaccinated against HPV (5). In this respect, respondents differed in their interpretation of key term of vulnerability and how this can be operationalised into categories and sub-categories to be addressed by the screening programme in order to broaden coverage. Respondents interpreting vulnerability as, essentially, increased exposure to HPV are applying a health system framework to the issue, which results in the identification of categories according to their access to screening and vaccination services. For instance, a respondent from Bulgaria also reported that as cervical cancer screening is in their opinion not offered in a systematic way to the eligible target group, all women and people with cervix should be considered vulnerable due to the lack of access to the service.

On the other hand, perceiving vulnerability as a social construct led to respondents identifying categories of women and people with a cervix who are marginalised in general terms by the society in the respective countries, such as incarcerated persons. In these instances, a more general social determinants of health framework can be applied to categorise the specific groups of interest according to social and economic level of inequality (14). Therefore, the results from this survey and interaction with data providers demonstrates the importance of providing clarity on broad concepts such as vulnerability.

Although twin approaches to the issue of vulnerability were reported, in many cases this led to the identification of a number of common categories of vulnerable and marginalized groups. These groups are considered to be at elevated risk of cervical cancer and to be socially and economic marginalised, for example, sex workers and homeless people. In such instances, the issue of intersectionality was raised a crucial issue for the identification of categories of vulnerability. In short, this refers to the assignation of multiple categories to particular women e.g. incarcerated, HIV positive, low socio-economic status, HPV unvaccinated, etc (16). Respondents frequently noted that many of the women and people with a cervix who are under-served by cervical cancer screening coverage at present, can be identified according to multiple categories. This observation raises the issue of complexity for creating taxonomies for an abstract term such as vulnerability. However, it should be noted that not all women and people with a cervix are vulnerable to cervical cancer or living in socio-economic inequality. To reduce the complexity, the categorisation could focus on concrete and identifiable factors, for instances, by concentrating on location or on factors that are documented in an accessible data registry such as country of origin, vaccination status, etc.

Limitations

Several important limitations with this study must be acknowledged. Despite the best efforts of authors to achieve responses from all 31 countries covered by this survey, there are nine countries for which a response was not reported. For some countries, such as Cyprus, correspondence from the informants invited to participate in the survey indicated that due to the lack of a cervical cancer screening programme in the country, they did not feel they could respond. Correspondence from the respondents invited to provide a response for the country of Sweden, in place of completing the survey, noted that fewer than 0.01% of the target group for cervical cancer screening are long-term non-attenders and these people are sent directly an HPV self-sampling kit. Thus, this result could not be included for direct comparison with the data by respondents form other countries, but indicates the importance of self-sampling as an intervention to broaden coverage (7,8).

Although efforts were taken to invite experts and professionals best placed to respond to the questionnaire, the data provided relies on the opinion and judgement of the respondents, therefore, care should be taken with generalising the findings beyond the scope of this study. Additionally, data on the existence of an organised cervical cancer screening programme is derived from the Cancer Screening in the EU report published in 2017. Therefore, more data from recent years are not likely to be captured.

Conclusion

This study has reported that whilst many countries identify lower coverage of cervical cancer screening amongst vulnerable groups as a public health problem, few countries have developed policies dedicated towards broadening coverage among these populations. The complexity of categorising subgroups of the target population considered to be vulnerable or marginalised is compounded by the intersectionality of such subgroups. Greater clarity on the conceptualisation of vulnerability can help countries to develop and subsequently implement strategies to increase coverage to subgroups of the target population currently underserved with regards to cervical cancer screening.

Tables and Figures

Table 1. Survey respondent details including country, EUROVOC region, amount of responses and scope of coverage, presence of a population-based cervical cancer (CC) screening program (21), CC age-standardized rate (incidence), CC mortality, and Human Development Index (HDI) (1).

Country	Region	# Responses	Coverage	Population-based CC screening program	CC ASR (100,000 women)	CC mortality (%)	HDI
Belgium	Western Europe	2[1]	National and Regional	yes – regional	7.7	2	0.92
Bulgaria	Central and Eastern Europe	7[2]	National	no program	18	7.1	0.82
Czechia	Central and Eastern Europe	1	National	yes – national	9.3	3.6	0.89
Denmark	Northern Europe	1[3]	Regional	yes – national	10.2	2.2	0.93
Estonia	Northern Europe	1	National	yes – national	18.5	4.3	0.88
Finland	Northern Europe	1	National	yes – national	5.2	1.1	0.93
France	Western Europe	1	National	yes – regional	7	2.2	0.89
Germany	Western Europe	1	National	yes –national[7]	7.6	2.2	0.94
Hungary	Central and Eastern Europe	1	National	yes – national	17.2	4.9	0.85
Ireland	Western Europe	1	National	yes – national	10.7	2.8	0.94
Italy	Southern Europe	1	National	yes – national	6.9	1.6	0.88
Malta	Southern Europe	1	National	yes – national	3.7	1.1	0.89
Norway	Northern Europe	1	National	yes – national[8]	12	1.7	0.95
Poland	Central and Eastern Europe	1	National	yes – national	12.3	5.9	0.87
Portugal	Southern Europe	2[4]	Regional	yes – regional	10.7	3.2	0.85
Romania	Central and Eastern Europe	1	National	yes – national	22.6	9.6	0.82
Slovakia	Central and Eastern Europe	1	National	no – planning national[9]	16.6	5.3	0.86
Slovenia	Central and Eastern Europe	1	National	yes – national	6.7	2.4	0.9

Spain	Southern Europe	1[5]	National	no population-based program	5.4	1.6	0.89
Switzerland	Western Europe	1	National	no population-based program[10]	3.4	1	0.95
The Netherlands	Western Europe	1	National	yes – national	6.9	1.4	0.93
United Kingdom	Western Europe	2[6]	National	yes – national	9.9	1.9	0.92

[1] Response represents the region of Flanders.

[2] Responses submitted by Bulgarian representatives of the Government (n=2), Academia (n=3), WHO (n=1) and UNFPA (n=1).

[3] Response represents the region of Central Denmark.

[4] Responses represent the regions of Lisbon area and Central Zone.

[5] Responses represent the regions of Catalonia and Basque Country.

[6] Response represents the region of North Ireland.

[7] As of January 1, 2020, Germany started rolling out nationwide population-based CC screening programme (21).

[8] As reported by the Cancer Registry of Norway. Data not available in (21).

[9] As reported by the National Oncology Institute of Slovakia. Data not available in (21).

[10] As reported by REF. Data not available in (21).

Table 2. Categories and ranking of vulnerable women for CC screening as identified by respondents in n=22 countries classified by EuroVoc region. Percentages are calculated as per the total of EuroVoc responses indicated in the column headings.

Countries by EUROVOC region	**Central and Eastern Europe (n=7)**		**Northern Europe (n=4)**		**Southern Europe (n=4)**		**Western Europe (n=7)**		**Total (n=22)**	
Proportion of vulnerable groups										
Category	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Women living in poverty in socially deprived areas	6	85.71%	3	75.00%	2	50.00%	7	100.00%	18	81.82%
Women attending HIV/STI clinics	2	28.57%	0	0.00%	0	0.00%	4	57.14%	6	27.27%
Drug or alcohol addicted women attending drop-in centres	3	42.86%	1	25.00%	2	50.00%	4	57.14%	10	45.45%
Sex workers	2	28.57%	1	25.00%	2	50.00%	5	71.43%	10	45.45%
Migrants from high HPV prevalence areas living in deprived areas	2	28.57%	3	75.00%	3	75.00%	7	100.00%	15	68.18%
Prison inmates	2	28.57%	0	0.00%	3	75.00%	4	57.14%	9	40.91%
Homeless people	4	57.14%	1	25.00%	2	50.00%	6	85.71%	13	59.09%
Indigenous populations	1	14.29%	1	25.00%	0	0.00%	3	42.86%	5	22.73%
Women with disabilities	0	0.00%	0	0.00%	1	25.00%	4	57.14%	5	22.73%
LGBTQI+ populations	0	0.00%	0	0.00%	0	0.00%	3	42.86%	3	13.64%
Other[1]	5	71.43%	1	25.00%	2	50.00%	3	71.43%	11	50.00%
Ranking of vulnerable groups										
First place	Women living in poverty in socially deprived areas		*Tie between:* Women living in poverty in socially deprived areas *AND* Sex workers		Prison inmates		Homeless people		Homeless people	
Second place	Homeless people				Migrants from high HPV prevalence		Migrants from high HPV prevalence		*Tie between:*	

		AND Migrants from high HPV prevalence areas living in deprived areas	areas living in deprived areas	areas living in deprived areas	Women living in poverty in socially deprived areas *AND* Migrants from high HPV prevalence areas living in deprived areas
Third place	Drug or alcohol addicted women attending drop-in centres		*Tie between:* Homeless people *AND* Women with disability	Women living in poverty in socially deprived areas	

[1] Respondents reported as "other" in an open field text, including ethnic minorities (including Roma populations), older women, women suffering from mental health disease, women living in rural areas or low access to primary healthcare centres, and victims of gender-based violence.

Table 3. Stratified analysis of survey domains by EuroVoc region, presence of population-based cervical cancer screening programme, cervical cancer incidence, and Human Development Index.

	Presence of vulnerable groups (VG) (Q1)		Existence of a policy for VG (Q7)		Dedicated CCS M&E among VG (Q6.1)		Invitation strategy for VG (Q9.1)		Awareness raising governmental (Q12)		Awareness raising non-governmental (Q13)		Client-directed interventions (Q14)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
EuroVoc Region (total category)														
Central and Eastern Europe (n=7)	6	85,71%	2	28,57%	2	28,57%	1	14,29%	4	57,14%	3	42,86%	5	71,43%
Northern Europe (n=4)	3	75,00%	1	25,00%	0	0,00%	0	0,00%	1	25,00%	2	50,00%	3	75,00%
Southern Europe (n=4)	4	100,00%	0	0,00%	1	25,00%	2	50,00%	3	75,00%	0	0,00%	3	75,00%
Western Europe (n=7)	7	100,00%	3	42,86%	2	28,57%	2	28,57%	5	71,43%	4	57,14%	5	71,43%
Presence of a population-based program														
Yes (n=18)	16	88,89%	5	27,78%	4	22,22%	5	27,78%	12	66,67%	7	38,89%	14	77,78%
No (n=4)	4	100,00%	1	25,00%	1	25,00%	0	0,00%	1	25,00%	2	50,00%	2	75,00%
Cervical cancer incidence (median 9.6)														
Below median (n=11)	11	100,00%	1	9,09%	2	18,18%	2	18,18%	6	54,55%	3	27,27%	7	63,64%
Above median (n=11)	9	81,82%	5	45,45%	3	27,27%	3	27,27%	7	63,64%	6	54,55%	9	81,82%
Human Development Index														
Very high (0.8-0.9) (n=12)	10	83,33%	4	33,33%	4	33,33%	4	33,33%	7	58,33%	5	41,67%	10	83,33%
Very high (=>0.9) (n=10)	10	100,00%	2	20,00%	1	10,00%	1	10,00%	6	60,00%	4	40,00%	6	60,00%
TOTAL (n=22)	**20**	90,91%	**6**	27,27%	**5**	22,73%	**5**	22,73%	**13**	59,09%	**9**	40,91%	**16**	72,73%

Supplementary material

Supplementary material 1 - **Qualitative analysis of open-ended questions from a survey on broadening coverage of cervical cancer screening to vulnerable populations.**

We have analysed the open text from the question *"Please provide any other information related to ongoing activities and planned initiatives targeting vulnerable populations (including ongoing research initiatives)"* in the stakeholder survey runed by ECL from September 24, 2021, to February 28, 2021.

We performed an inductive thematic analysis.

Over the 30 respondents, 12 gave an answer regarding ongoing activities or planned action targeting vulnerable population. These answers were given by respondents from 12 countries: Spain, Belgium, Bulgaria, Slovenia, Norway, Ireland, UK, Hungary, Netherland, Poland, Malta and Slovakia.

One respondent belonged to the subnational level and the 13 others belonged to institution at the national level.

Eight types of activities/actions have been identified and are presented in the table 1 below.

Table 1 – Type of activities related to cervical cancer screening among vulnerable populations identified and their timeline

Actions/activities	Number of answers mentioning them	Ongoing activities	Planned activities	Past activities	Identified as a gap or solution
HPV Self-sampling[a]	7	X	X		
Health mediation[b]	1				X
Needs assessment [a]	1		X		
Training programme aimed at improving access to care[b]	1		X		
Research studies[c]	2	X	x	X	
Policy change[c]	2	X			
Fees removal[a]	1	X			
Personalized screening programme with a focus on improving women cancer awareness[a]	1				X

a. Actions/activities targeting vulnerable women directly; b. Actions/activities targeting health providers directly, c. Actions/activities targeting both health providers and vulnerable women directly

The immediate target of the above-mentioned actions is either vulnerable women or healthcare providers. Four types of actions focused directly on vulnerable women, two focused solely on health providers and two aimed at both vulnerable women and health providers.

The actions related to health providers focused on training and collaboration between different health providers. However, all respondents stated that these measures are planned and have not been implemented yet or identified them as potential solutions without any implementation plan.

> *A training programme will be developed for community health care workers in the Irish Traveller population to aid them to support Travellers to access screening (Ireland, national respondent)*

> *In Bulgaria, health mediators serve an important role in communication between health professionals and local communities […] esp. Roma community (Bulgaria, national respondent)*

Most actions found target vulnerable women and are related to screening services: fees removal, needs assessment or self-sampling option for women.

Self-sampling is a strategy either already ongoing (in the entire country or as a pilot programme), considered as a future option or planned to be implemented. It has been mentioned by seven over 12 respondents.

However, details regarding its use have been found only on three responses: UK, Belgium and Netherland. In these cases, self-sampling is either considered as an alternative to GPs appointment (UK, Netherland) or actively distributed through GPs (Belgium). Moreover, Netherland provide insights on potential improvement in their strategy to reach vulnerable women

> *Self-sampling is now offered to all non-responders (opt-in, so they have to order a kit). In the future, it will be actively sent out, to lower the barrier (opt-out). (Netherland, national respondent)*

Additionally, except for two respondents (Norway and Netherland), it seems that self-sampling is at the pilot phase or will be implemented partially and not at as a large-scale programme.

> *We are planning self-sampling projects in the programme. No available in private care (Poland, national respondent)*

Research studies have served as evidence-based to implement, scale-up or adapt the screening strategy to the vulnerable population needs.

> *We have conducted a large-scale HPV self-sampling pilot among non-responders to cervical screening (N = 25.556) in 2015. We will decide if organized cervical cancer screening programme will be upgraded with HPV self-sampling in the near future, during the process of the renewal of screening policy. (Slovenia, national respondent)*

Likewise, research studies and evaluation conducted by the national level are stated as mean to better understand needs and gaps in screening for vulnerable women.

> *Qualitative research is being planned by University College Dublin to assess barriers to accessing screening for people with severe mental illness. (Ireland, national respondent)*

> *We are planning a whole nation evaluation of self-sampling as an alternate to clinician taken samples. (UK, national respondent)*

Only two answers mentioned a change in policy either directly or through a change in screening strategy at the national level (Hungary and Ireland). Both respondents informed that these changes are already ongoing with a deadline either in 2022 or 2023.

> *We are working on a new screening policy right now in Hungary and the decision of the new policy might be accepted in 2022-2023. (Hungary, national respondent)*

One action was focusing on individual approach for vulnerable women without considering specifically self-sampling.

> *Right communication, special continuous program and personal approach for vulnerable population is missing. (Slovakia, national respondent)*

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