# CBIG-SCREEN

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

Grant Agreement No. 964049
Start date: 01. March 2021
Duration: 60 Months

## Deliverable No 4.3
## *Discrete Choice Experiment results*

Nature: Report
Planned delivery date: 31/08/2023
Revised delivery date: 31/01/2025
Lead Beneficiary: PSE, *Lise Rochaix*
Partners involved: P1-INSERM, P2-RHR, P5-ISPUP, P6-TARTU, P8-UBB, P11-PSE, P12-HPRC

| **Dissemination level** | | |
|---|---|---|
| **PU** | Public | **x** |
| **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) | |

*The CBIG-SCREEN project has received funding from the EU Horizon 2020 research and innovation programme under Grant Agreement No 964049.*

# Executive summary

H2020 CBIG-SCREEN is a European project aimed at tackling inequalities in cervical cancer (CC) prevention in Europe by improving access to screening in underserved populations. In the context of this research project, the term 'vulnerable women' indicates women who do not fully adhere to CC screening recommendations (periodic screening and follow-up in case of an HPV positive sample) because they face various barriers to CC prevention. Therefore, these women are exposed to a higher risk of HPV infection and a poorer prognosis in case of illness. Disadvantaged women living in rural or isolated areas, women of low socioeconomic status, women living with sexually transmitted diseases (STDs), incarcerated women, sex workers and migrants constitute some of the most underserved groups by current prevention policies.

The project brings together several partners with the objective to create a European-wide knowledge framework on barriers to cervical cancer screening (CCS) by involving all stakeholders, including - especially - vulnerable women. By offering a structured overview of current policies, and evaluating new, tailored interventions, the consortium will ultimately be able to produce scientifically sound recommendations to guide current national approaches towards vulnerable women (VW).

The overall objective of Working Package 4 (WP4) is to inform the design of context-specific targeted interventions by deepening our understanding of the preferences of vulnerable hard-to-reach women. The research will provide multidisciplinary reviews of current evidence and debates on targeted interventions and will implement qualitative (individual and group interviews) and quantitative (Discrete Choice Experiments) methods to help determine which type of targeted intervention will improve CCS management among VW.

Deliverable 4.3 aims at eliciting VW's preferences regarding the screening method used (self-sampling versus screening by a health professional) and the impact of non-financial incentives aimed at improving adherence to prevention policies. We do so by building an online Discrete Choice Experiment (DCE) distributed to vulnerable women. The initial target countries for this WP were France and Romania, but due to data collection difficulties in Romania, two other countries have been targeted: Portugal and Estonia. In so doing, we extend the range of analysis to cover the existing wide variations in CCS design and coverage among EU Member States, due to different socio-economic and organizational contexts. Adding Portugal and Estonia also ensures that 2 of the 3 exemplar countries chosen by the C-Big Screen Consortium are covered in this WP.

The main contribution of this preference study is primarily methodological. It demonstrates the feasibility to use behavioral and experimental methods in economics to directly engage with vulnerable populations, who are often marginalized in policy consultations because they are deemed too difficult to reach. By conducting an initial survey with field workers in contact with vulnerable populations and accustomed to working alongside them, we were able to design a preference study that was informative on vulnerable women's preferences and on how they may differ from those from the rest of the population. By using mixed experiment distribution methods (online and support from third-parties), this study succeeded in collecting preferences from a substantial number of vulnerable and non-vulnerable women in France, Estonia and vulnerable women in Portugal. Sensitivity analyses have shown the lack of variations in results due to the definition of vulnerability. Further exploration of the data in both France and Estonia should help refine the notion of vulnerability based on the results of other WPs of the CBIG-SCREEN project.

Results from the preference elicitation study show that:

(1) Contrary to expectations, there seems to be no significant difference in preferences between vulnerable and non-vulnerable women. This challenges the current efforts to develop

customized interventions for particular underserved groups. Although carefully chosen, based on results of other CBIG-SCREEN WPs and extensively piloted, it is possible that the choice of attributes and levels in the DCE study has not allowed revealing these specificities. We chose for instance to frame all interventions as free but some of the respondents' comments suggest that it was not clear this was the case and that the fear of having to face out-of-pocket payments may have influenced some of their choices;

(2) Self-sampling, often identified in the literature as a strategy to enhance participation rates across populations and already integrated in some of the nationally organized screening initiatives, did not emerge as the preferred option within our French, Estonian and Portuguese samples, compared to the conventional smear test administered by a healthcare professional;

(3) Findings from task 2 in WP4 has shown that when it comes to CCS, women, whether vulnerable or not, face two main concerns: 1. Apprehension towards the traditional smear test and discomfort with physical interaction with healthcare providers, and 2. Anxiety about their ability to conduct self-sampling independently, fearing either physical discomfort or uncertainty about providing an adequate sample. Comments following DCE choice tasks show that introducing self-screening under the guidance of a healthcare provider, even remotely, could potentially address both issues and increase CCS uptake. Our study thus highlights the importance of information when introducing self-sampling so as to increase the probability of screening uptake;

(4) The optimal method for inviting women to screening, as well as sending potential reminders, logically varies, depending on the country and is contingent upon prior investments made by public policies. Consequently, in Estonia, where there has been substantial investment in digital literacy among the population, electronic invitations such as emails SMS, or through the E-portal are considered more effective. Conversely, in France, respondents indicate a preference for traditional postal invitations, with other methods perceived as intrusive or impractical, while in Portugal's vulnerable respondents tend to reject digital invitations.

(5) Respondents from both countries reject information campaigns that imply their active participation and are therefore time consuming, namely door-to-door campaigns and free prevention workshops. In some of the comments, respondents support the possibility of mixing non-digital solutions such as leaflets in public places with social media campaigns as a way to reach all generations.

# TABLE OF CONTENT

# Introduction

H2020 CBIG-SCREEN is a European project aimed at tackling inequalities in cervical cancer (CC) prevention in Europe by improving access to screening in underserved populations. In the context of this research project, the term 'vulnerable women' indicates women who do not fully adhere to CC screening recommendations (periodic screening and follow-up in case of an HPV positive sample) because they encounter various barriers to CC prevention. Therefore, these women are exposed to a higher risk of HPV infection and a poorer prognosis in case of illness. Disadvantaged women living in rural or isolated areas, women of low socioeconomic status, women living with sexually transmitted diseases (STDs), incarcerated women, sex workers and migrants constitute some of the most underserved groups by current prevention policies.

The project brings together several partners with the objective to create a European-wide knowledge framework on barriers to cervical cancer screening (CCS) by involving all stakeholders, including - especially - vulnerable women. By offering a structured overview of current policies, and evaluating new, tailored interventions, the consortium will ultimately be able to produce scientifically sound recommendations to guide current national approaches towards vulnerable women.

The overall objective of Working Package 4 (WP4) is to inform the design of context-specific targeted interventions by deepening our understanding of the preferences of vulnerable hard-to-reach women. The research will provide multidisciplinary reviews of current evidence and debates on targeted interventions and will implement qualitative (individual and group interviews) and quantitative (Discrete Choice Experiments) methods to help determine which type of targeted intervention will improve CCS management among vulnerable women (VW).

Task 4.3, which is the focus of this report, aims at eliciting VW's preferences regarding the screening method used (self-sampling versus screening by a health professional) and the impact of non-financial incentives aimed at improving adherence to prevention policies. We do so by building an online Discrete Choice Experiment (DCE) which we distributed to VW.

The initial target countries for this WP were France and Romania. Despite major efforts and time from both Romanian and French research teams, data collection in Romania did not succeed in collecting enough valid answers to support meaningful econometric analyses of the DCE. Two other countries were therefore chosen for this WP in place of Romania: Estonia and Portugal. In so doing, we extend the range of analysis to cover the existing wide variations in CCS design and coverage among EU Member States, due to different socio-economic and organizational contexts. Beyond, adding Portugal and Estonia ensures that 2 of the 3 exemplar countries chosen by the C-Big Screen Consortium are also covered in this WP.

This report is organized as follows: Section 1 presents the background for the quantitative analysis of VW's preferences. Section 2 presents results from the qualitative analysis aimed at optimizing the DCE, with issues raised in the literature review regarding surveys in vulnerable populations and answers collected from healthcare professionals and field workers through an ad-hoc questionnaire. Section 3 presents the research hypotheses, the DCE design and the methods. Section 4 provides and discusses DCE results respectively for France, Estonia and Portugal.

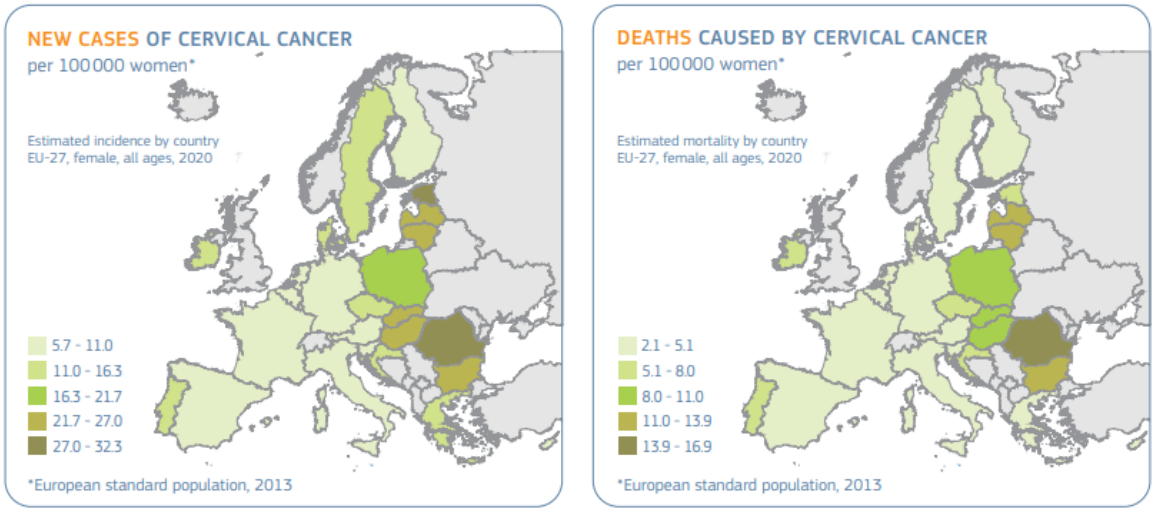
# 1. Background to the preference elicitation study

## 1.1. Inequalities in CC incidence and prevalence

Cervical cancer (CC) is the 4th most frequent cancer in women worldwide (World Health Organization (2022)) and the 11th in the European Union (European Union, 2021). The great majority of CCs (more than 95%) is caused by the human papillomavirus (HPV), which is mainly transmitted through sexual contact. While most HPV infections clear up without treatment, some are likely to induce precancerous lesions that might then turn into cancerous lesions. For instance, HPV 16 and HPV 18 account for about 70% of all cervical neoplasia cases (Todor et al., 2021). Immunodeficiency also increases the risk for CC: women living with HIV are 6 times more likely to develop CC

compared to women without HIV, and, according to WHO, an estimated 5% of all CC cases are attributable to HIV. Other factors, such as smoking, sexual behavior or chlamydia infections, can also contribute to an increased risk of CC, but in much lower proportions (World Health Organization (2022), Institut National du Cancer (2019)).

**Figure 1. Incidence and mortality rates of CC in the EU, 2020**




*Source: European Union, 2021*

Among the Member States of the European Union (EU), stark inequalities in incidence and mortality rates exist (Ritchie et al., 2022). Figure 1 shows a clear discrepancy in annual age-standardized incidence and mortality rates between Western Europe and Central and Eastern Europe (Arbyn M and al., 2018).

### 1.1.1. The French case

In 2018, France ranked 8th in terms of CC incidence and 15th in terms of mortality among EU Member states. Since 1990, both incidence and mortality rates have been steadily decreasing by on average 2% per year, but the trend has slowed down since 2005. Around 3000 new cases were detected in 2018 and more than 1000 deaths were due to CC (Hamers & Woronoff, 2020). Moreover, according to the French National Cancer Institute (Institut National du Cancer, INCA), CC is one of the few cancers for which the prognosis is deteriorating in France, with a decreasing 5-year survival rate (INCA, 2020).

Since May 2018, CC screening in France is based on a nationally organized program, as a part of the 2014 - 2019 Cancer Plan . Prior to this date, some locally organized screening programs were already in place in some departments, including La Martinique (since 1990) and La Réunion (since 2010). The objective of the OCCS program is to reduce the incidence and number of deaths caused by CC by 30% within 10 years, with the goal of reaching 80% of the target population by 2028 (Santé Publique France, 2022). According to the latest HAS recommendations, from July 11th, 2019, asymptomatic women aged between 25 and 29 years should receive two PAP tests (cytologic exams) when entering the OCCS for the first time (at one-year intervals) then every 3 years if the first two tests did not reveal any anomalies. Women aged 30 and older should undergo HPV testing 3 years after their last cytologic exam, then every 5 years if the previous test is negative. Invitation to screening is sent by post from the Regional Centers for Coordination of Cancer Screening (Centres Régionaux de Coordination des Dépistages des Cancers, CRCDS), who invite them to consult a health care professional for screening. A reminder (either by letter and by SMS) is sent 6 months after the first invitation to women if they have not yet been screened. In this context, screening is reimbursed at 100%, even though some out-of-pocket payments might have to be paid in advance by the women (C. Audiger, 2022). The operational implementation of OCCS is under the responsibility of CRCDS, organizing programs at the regional level in support of the corresponding regional health agencies (Agences Régionales de Santé, ARS).

### 1.1.2. The Estonian case

Cervical Cancer is the 5th most common cancer in Estonia, and the most common gynecological cancer (WHO, 2021). Estonia has experienced high CC rates ever since the 1960s, compared to its neighbors. Between 1968 and 1987, the age-standardized incidence rate per 100 000 women has significantly decreased but less rapidly than in Finland for instance (from 22.8 in 1968 to 14.0 in 1987 versus 13.6 to 3.8 in Finland (Aareleid et al., 1993). Yet, this decrease was followed, starting from the 1980s, by an increase at a rate of 0.8% per year (Ojamaa and al, 2014). Age-standardized incidence was estimated at 18.5 per 100 000 women in 2020 (WHO, 2021).

In Estonia, the first pilot study of OCCS started in 2003 with the mailing of 12 960 invitations to randomly selected women aged 30 to 40 years old with health insurance. Only 21.7% of targeted women (n = 2800) responded to the invitation and had a Pap-smear taken, with 6.7% abnormal Pap-Tests. Specially trained midwives were in charge of collecting the test and then informing participants of their results by phone. The program was extended in 2004 to all Estonian regions with a different strategy for the invitation. Emails were replaced by multimedia advertising campaigns inviting women in the 35 to 40-year age-group to undergo CCS. More than 5200 women attended and the rate of abnormal Pap-Tests decreased to 5.6%.

A second pilot study was conducted in 2005, with the introduction of personal invitations sent to women aged 35 to 40 years old living in six Estonian districts, which increased participation by attracting 6500 additional women (of whom 19% received a personal invitation).

After these pilot studies, the first national OCCS was launched in 2006: personal invitations were sent to all women between 30 and 59 years old with health insurance whose last negative test was 5 years prior and it excluded women diagnosed with CC, without health insurance - more than 8% of women in 2010 (Kivistik et al., 2011)- or who had a Pap test reimbursed in the last 12 months. The OCCS is organized via trained midwives in 19 clinics all over Estonia with all cytological analyses performed in 7 laboratories. In order to obtain their results, women have to contact the clinic at a given date and time. Overall, the participation rates in CCS remain quite low (41% of women aged 30 to 55 who received an invitation were screened in 2020) but have been increasing steadily since the introduction of the OCCS (20.7% of attendance in 2006).

Despite the OCCS, Estonia still had one of the highest incidence rates in Europe (16.59 per 100 000 compared to the EU mean rate of 12.8 per 100 000 in 2020 and 16.51 in 2022 **https://statistika.tai.ee/pxweb/et/Andmebaas/Andmebaas__02Haigestumus__04PahaloomulisedKasvajad/PK30.px/table/tableViewLayout2/)**. This led health authorities to refine the criteria allowing participation in the OCCS. Since 2021, the OCCS introduced HPV testing as the primary test and has included women aged up to 65 and women without health insurance (Rigby and all, 2024).

### 1.1.3. The Portuguese case

In Portugal, CC ranks as the 8th most frequent cancer among women and the 3rd most frequent among women aged 15 to 44 years old (HPV Information Center, 2023). The age standardized rates of incidence and mortality were 10.8 and 3.20 respectively in 2022. A decrease in those rates has been observed between 2016 and 2020 among younger women but there is no evidence of a decreasing mortality for women aged 50+ (Texeira et al., 2022).

In Portugal, organized CC screening (OCCS) has gradually been implemented by the various regions since 2008 – except in the Autonomous Region of Madeira- (Marques, 2022). In 2016, the OCCS program was covering 70% of eligible women and adherence rates increased between 2014 and 2016 from 50% to almost 90%. Yet, there are great differences between regions, with for instance the adherence rate at its lowest in Northeast Portugal (around 60%) (Teixeira et al., 2022). The programs vary across regions in terms of primary screening test (HPOV test, cytology…), periodicity (every 3 or 5 years) and target age groups (women aged 25-60 or 25-65 or 30-65) (Marques, 2022).

On average, non-attendance to OCCS is around 22%, but by including opportunistic screening, non-attendance drops to 13%.

### 1.1.4. Reasons for non-inclusion of Romania

Recruitment among Romanian women proved challenging due to the highly vulnerable populations targeted, which are notoriously difficult to reach for survey purposes. To address this, several strategies were implemented, including distributing the survey through social media channels and hiring a social worker and health mediator to conduct face-to-face interviews by going door-to-door in specifically targeted communities. However, despite these efforts, only 30 complete questionnaires were collected, an insufficient sample size for meaningful statistical analysis. Regular discussions with the teams in Romania were organized to explore additional distribution options and mitigation strategies.

Furthermore, considering recent political reforms and the end of organized cervical cancer screening in Romania announced end of December 2023, the design of our DCE no longer seemed appropriate. Indeed in our experiment, screening is assumed free of charge as part of the OCCS, which as of December 2023 is no longer available for Romanian women. It thus seemed ethically questionable to inquire about women's preferences for a service that was no longer widely and freely accessible to them. We are thus unable to provide a DCE analysis for Romania and to study women's preferences for different CCS programs.

## 1.2. Barriers to CCS

### 1.2.1. Evidence of a social gradient in CCS

There is global evidence indicating that the incidence and mortality rates of cervical cancer are socially stratified (Singh et al., 2011). A study of 182 countries has highlighted the fact that emerging countries have two-fold higher CC incidence rates and three-fold higher mortality rates than developed countries. Among the indicators under study, the Human Development Index and the poverty rate account for 52% of the variance of those rates. (Singh et al., 2012). These disparities are also highly correlated with HPV prevalence and to a lesser extent to HIV prevalence.

CC is thus characterized by a strong socioeconomic gradient between- and within- countries, which primarily reflects inequalities in the availability, access and uptake of effective screening programs. The risk of dying from CC for highly educated women is almost similar across all European countries, whereas precariousness and a lack of education is shown to be the determining factor for geographical differences (Franceschi et al., 2009)

Disparities are important within countries. By analyzing data from the French cancer registries network (Francim) and the European Deprivation Index (EDI) developed by Pornet et al. (2012), Bryère et al. (2017) brought attention to the fact that social deprivation - measured through the European Deprivation Index (EDI) - in France is strongly linked to higher incidence rates of several types of cancer. More specifically, the study estimates that 21% of CC cases can be attributable to social deprivation. In Estonia, Suurna et al. (2022) highlight the relationship between lower lifetime uptake of Pap smear and sociodemographic and socioeconomic factors: being younger, non-Estonian, having lower education or being unemployed decreases the uptake of CCS.

### 1.2.2. Barriers to CCS in vulnerable populations

Fuzzell et al. (2021), in their review of CCS uptake in the US identify the following populations as particularly vulnerable: racial and ethnic groups, rural populations, sexual and gender minorities, religious populations, non-English-proficient populations and populations with existing health problems. Furthermore, they identify three types of barriers inherent to those populations which are responsible for lower screening rates: a low literacy of the health system, financial barriers and a logistical one.

#### *Financial Barriers*

A study by Vanthomme et al. (2017) conducted in Belgium found that unemployed women show consistently higher cancer mortality compared to employed women. There are also inequalities in mortality rates among

employed women, which vary, based on their occupation. Indeed, women in low qualification and income groups experience higher mortality rates compared to those who are highly qualified.
Preventive behavior is also affected by socio-economic differences: a deteriorated economic situation affects the prevalence of HPV vaccination among young girls (Maness et al., 2019; N. Mansfield et al., 2022, Alarcão and Zdravkova, 2022, Hanguehard et al., 2022), and, in adulthood, the regularity of screening tests (Kurani et al., 2020). According to Binder-Foucard et al. (2013), based on an analysis of data from the French National Institute of Health and Medical Research (Inserm), unvaccinated young women exhibit a socioeconomic profile similar to that of women who do not participate in the OCCS. The article lists the following characteristics: i) the least screened women and unvaccinated young women live in a low-income family; ii) a low level of education is associated with lower PAP test rates; and iii) mothers' lack of PAP testing in the last 3 years is associated with lower HPV vaccination rates in their daughters. A similar correlation between participation in CCS and level of education and unemployment has been identified in Estonia through a cross sectional study from 2004 to 2020 (Suurna et al., 2022)
Uninsured women are also less likely to get screened, for they are already economically vulnerable and fear having to pay for the CCS (Andreassen et al., 2017; Tisler et al., 2021), despite OCCS being free for all in most countries.

#### *Geographical Barriers*

A correlation of socioeconomic status and uptake in CCS has consequences on the geographical disparities in CCS. Indeed, in urban areas, more deprived neighborhoods have lower CCS rates (Grillo et al., 2012; S. Barré et al., 2017) as well as lower HPV vaccination coverage. Rural areas tend to also have lower CCS rates (Furtunescu et al., 2021; Ouanhnon et al., 2022). These results are correlated with the lower socioeconomic status of the population living in those areas but also with the lack of medical facilities to undergo HPV vaccination or CCS (Mansfield et al., 2021; Ouanhnon et al., 2022). Living in a rural or remote area implies a lower availability of nearby healthcare services and thus higher travel and time costs to undertake screening.
In Estonia, Kivistik and al (2011) has highlighted the difference in screening uptake among Estonian- and Russian-speaking populations, the latter being less aware of the need for CCS.

#### *Health Conditions and Health Literacy*

Women with chronic conditions, although already frequently engaged with the healthcare system, have lower rates of preventive care than women without comorbidities, especially in terms of cervical cancer screening (Liu et al., 2014). This can be explained by the focus on medical care in relation to the comorbid condition, as well as the fact the specialists these women are in contact with do not perform cervical cancer screening (Fuzzell et al., 2021)

One of the least screened populations, – and yet one of the most likely to develop CC, - is the HIV positive population. CC incidence among HIV positive women is 4 times higher than that of HIV negative women, with an incidence rate of 26 and 6 per 100 000 respectively worldwide. In Estonia, less than 50% of HIV positive women are undergo CCS and 30% of them, being uninsured (0.2% for the general population), were not invited to be tested by the program (Tisler, 2021).

In addition, lack of awareness of CCS and low health literacy constitute important barriers to screening uptake (Larenjeira, 2017; Todor et al, 2021).

### 1.3. Levers to improve CCS in vulnerable populations

WHO launched a global initiative to tackle CC as a public health problem and thus tried to identify targeted interventions to reach under-screened populations. One of the main approaches put forward is the generalization of self-sampling as a way to increase participation in screening (WHO, 2022). Indeed, self-sampling offers more

flexibility, allows to reach populations living in rural areas or low resources settings (Hawkes et al., 2020) and reduces considerably travel and time costs for vulnerable populations (Nakalembe et al., 2020).

Self-sampling can be implemented in different ways to increase CC screening uptake in never- or under-screened populations, such as sending kits directly to the woman's home address, a method which has been shown to generate a higher response rate than standard sampling by a healthcare professional in under-screened populations (Arbyn et al., 2018).

Yet, if sending kits directly to the woman's home address can be beneficial to screening, the strategy for sending it might have different effects. Indeed, Tranberg et al. (2018) have studied two different self-sampling invitations in under-screened population: a self-sampling kit mailed directly to their homes or sending a first invitation to enable targeted women to order the kit (opt-in option). These two self-sampling techniques were compared to a control group with standard screening during a medical appointment. If sending directly the kits has been found to significantly increase uptake in screening, specifically in groups with low socioeconomic status and immigrants, there were no significant differences between the opt-in option and the control group. Thus, self-sampling kits should to be sent directly to the targeted population in order to increase screening uptake.

Another strategy implies using mobile units, particularly in rural and remote areas. (Fuzzell et al., 2021). These units that can either offer standard screening performed by a healthcare professional, or distribute self-sampling kits to physically isolated communities. Mobile units have been implemented in Romania, in the Cluj County, to increase the CCS uptake of Roma women. Andreassen et al.'s (2017) observations of the targeted communities' behavior have shown increases in CCS uptake associated with the mobile unit provided the unit visit was announced beforehand, so that women could be ready for screening.

Self-sampling, however, also presents its own set of challenges (Serrano et al., 2022): it requires training healthcare professionals to explain the procedure appropriately, ensuring the transportation of the collected specimens and the ability to adequately manage follow-up for positive women.

Another strategy is to increase awareness of VW on CC and OCCS. In order to increase outreach for self-sampling initiatives, community campaigns are useful to raise awareness such as door-to-door campaigns, community outreach and media support. (Hawkes et al., 2020). Fuzzell et al. (2021), in their review of screening among different types of vulnerable populations in the US, identify several key factors to increase screening according to the type of vulnerability. Among others, they mention the importance of patient navigation in the health care system for ethnic groups (Alimena et al., 2020) as well as for populations with limited English proficiency (Genoff et al., 2016). They also mention the necessity of community-based interventions, such as faith-increasing targeted initiatives to increase uptake in the religious populations.

# 2. Feasibility study

In this section, we present results from a qualitative analysis aimed at ensuring the feasibility of using a DCE to elicit preferences in vulnerable populations. We first survey issues raised in the literature review regarding data collection in these populations. We then present the answers to these issues offered by healthcare professionals and field workers, using a questionnaire specifically built for this purpose. Our primary aim was to identify the most appropriate way to design and distribute the DCE and to identify the possible challenges in addressing vulnerable populations, specifically in terms of literacy, adequate phrasing and respondents' involvement.

## 2.1. Findings from the literature review

### 2.1.1. Paper vs online questionnaires to vulnerable populations

Due to the scale of the CBIG-SCREEN project, conducting the preference study by distributing paper questionnaires in 4 countries and 6 languages would have required dedicated teams on site. Additionally, since the target population is about a hundred respondents per country, manual transcription of the responses would have entailed a significant time investment. In comparison, distributing the questionnaire online allows for efficient data collection and faster processing, with a wider range of respondents, for instance rural populations.

Furthermore, the anonymity and privacy allowed by an online distribution might reduce the fear of discrimination and stigmatization that vulnerable populations might be susceptible to feel (Liamputtong, 2007).
Yet, despite the advantages of an online distribution, some obstacles need mentioning: a study by Aschbrenner et al (2018) highlighted for instance the importance of physicality in a paper survey for populations with mental disabilities. Some studies seem to mitigate this effect; for instance, a study by Yii et al. (2020) by comparing the use of online and paper surveys in a sample of older adults, found that a web-survey is a feasible alternative in studies targeting people in the retirement age-range. However, they highlight the risk of losing a small part of the targeted population. Considering the target age for CBIG-SCREEN, in line with CCS targeting (25-65 years), respondents are likely to have some experience with online technologies, which should mitigate the risk of losing respondents.

### 2.1.2. Digital literacy in vulnerable populations

Before electing an online distribution of the questionnaire, a first task was to check its feasibility, notably by ensuring that the target population is sufficiently equipped with technological devices. Indeed, vulnerable populations might have limited access to the technologies needed to fill the questionnaire (Aschbrenner et al. 2018, Yii et al. 2020), as well as low digital literacy which might hinder adequate responses.
Overall, considering the targeted population and the scale of the study, an online DCE has been elected for it ensures the possibility of contacting a wide range of respondents, notably through social media, especially in countries where there are no distribution-devoted teams. Furthermore, when possible, electronic tablets have been used to assist the targeted population in answering the DCE survey, ensuring availability of technological devices and cognitive support when required.

### 2.1.3. Challenges related to online studies among vulnerable populations

An online DCE study can be a valuable method for investigating the preferences of vulnerable populations for different healthcare interventions and services by providing valuable insights into the unique challenges faced by these populations and can help develop effective interventions to support them. Its feasibility has initially been questioned, since DCEs among vulnerable populations are usually carried face to face, with a third-party assisting with the choices (Trebich, 2016). In order to be successful, the online study must therefore be fully adapted to the characteristics of the target population.

#### *Adaptation to a low income and low literacy setting*

The main challenges associated with using DCEs with vulnerable populations are the difficulty to understand the scenarios presented in the DCE, due to 1) limited health literacy or numeracy skills; 2) limited access to the platforms needed to fill the DCE survey; 3) language or cultural barriers that might affect the ability to participate in an online study. Very few studies have focused on the methodological challenges of constructing DCEs in low-income and low education settings. One such study by Umar et al. (2020) found, using qualitative research methods, that low levels of literacy and numeracy were a major barrier to understanding the DCE tasks. The study recommended that DCEs for low-income populations should use simple language and graphics, and should be administered by trained interviewers.

#### *Addressing population heterogeneity*

The notion of vulnerability is multi-faceted and thus, it is important to consider the heterogeneity of the targeted population. Indeed, some vulnerable populations might need specific survey features in order to answer a questionnaire (Khantzian, 1997, Pullyblank et al., 2022, Coast et al., 2008). In addition, since vulnerable populations may come from diverse cultural backgrounds, they may have different experiences and beliefs that influence their understanding and choices which may differ from those of the general population (Coast et al. 2008). Avoiding language that reinforces stereotypes or negative attitudes towards vulnerable populations and using language that is non-judgmental and respectful is a pre-requisite while running a survey with vulnerable populations, due to the fact that they may face stigma related to their health condition or social status. It is also

necessary for researchers to ensure full transparency about the study purpose, procedures, and potential benefits and risks in order to build trust with the targeted vulnerable population.

#### *Addressing ethical concerns*

Behavioral studies with vulnerable subjects have raised ethical concerns, related, for instance to obtaining a fully-informed consent to participate. Researchers need to ensure that participants fully understand the nature of the study and the rights they have as participants (Gehlert et Mozersky, 2018). If the personal circumstances of the vulnerable populations compromise their full understanding of the study, such as low literacy, the informed consent from a legal guardian or representative will be necessary.

Another ethical concern is the potential harm to which such studies might expose vulnerable populations, placing them in situations of discomfort or distress, especially for children or individuals with mental or physical disabilities. Behavioral studies among vulnerable populations must therefore include ethical guidelines to guarantee vulnerable populations' rights and to ensure their participation in future studies (Gehlert et Mozersky, 2018).

## 2.2. Building on field workers' experience

In order to maximize DCE outreach and participation among vulnerable populations, we chose to collect information and experience among those who regularly work with vulnerable populations. We designed an original questionnaire, aimed at field workers (mostly social and NGOs workers) and researchers, in order to: 1) inform the possibility of reaching vulnerable populations through an online study and to choose the best modalities to do so, and 2. identify key specificities related to different types of vulnerability and ways to address them in a DCE.

To design this questionnaire, a literature review was first carried out on behavioral studies and internet-based studies among vulnerable populations. The questionnaire was piloted and subsequently distributed to 500 contacts across Europe, its results providing useful information for the design of the DCE.

### 2.2.1. Design of the field workers' questionnaire

The questionnaire was divided into three sections:

1. **Maximizing the outreach of the DCE**: this section aims at understanding the potential barriers to an online distribution and how these barriers could be overcome;
2. **Maximizing participation in the DCE**: this section aims at understanding the cultural, social and economic dynamics that might be specific to the targeted populations and that might have an impact on their willingness and capability to answer the DCE;
3. **Maximizing understanding of the DCE:** this section aims at determining the key features that might increase DCE understanding.

The statistical analysis was conducted by using both univariate and bivariate analyses. The questionnaire is composed of categorical variables, both nominal (job title, level of education, etc.) and ordinal (Likert scales on a 5-point scale) as well as interval quantitative variables (age, level of internet access, level of literacy, etc.) and ratio variables (rates on a 5 or 7-point scale). It was distributed via the online survey platform 'Qualtrics', which allowed to send survey invitations directly from the Qualtrics email server to targeted respondents.

A total of 42 professionals in contact with different types of vulnerable women answered the questionnaire among whom, one third worked as researchers, the rest being mostly NGOs employees and volunteers and social workers. 80% of respondents were working in France, while the 20% remaining were from Denmark, Estonia, Romania, Greece and Bulgaria.

Respondents were mostly in contact with migrant women, with women with STI, female sex workers and homeless women. Less frequently mentioned categories included victims of sexual violence in childhood or adulthood, victims of domestic violence, women living in rural areas or isolated women, living in remote locations,

ethnic minorities, members of the LGBTQIA+ community and refugees. Almost all respondents (95%) considered that these women were of low socio-economic status.

### 2.2.2. Main findings

#### *Maximizing DCE outreach and participation*

Regarding literacy, numeracy and digital skills, respondents indicated that the population they work with has a basic literacy level (i.e. ability to read and understand simple sentences) (80%) and numeracy level (i.e. ability to make simple operations from written data) (75%) and that their digital skills meet the requirements for filling out the DCE (see Figure 2 below).

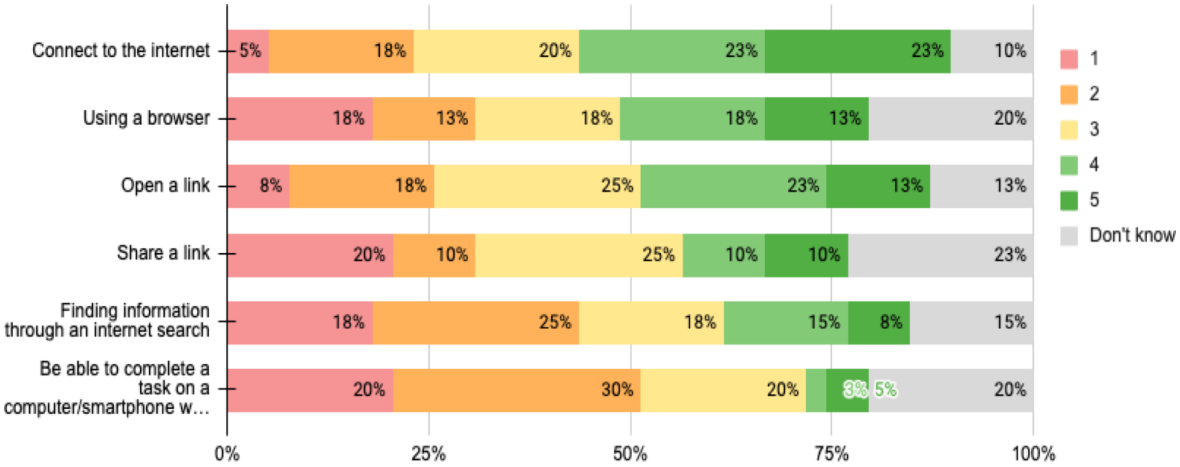



*Figure 2: Women's digital skills - Likert Scale from 1 (no skills) to 5 (acquired skill)*

According to most of the respondents (59%), more than half of vulnerable women have access to an internet connection and connect via a smartphone.

Some respondent recommended providing clear, yet non-alarming information on CC, and suggested stressing out the fact that vulnerable populations are being offered an opportunity to voice their needs and preferences regarding CCS, which can be seen as empowering and de-stigmatizing.

Most respondents recommended NGO volunteers as mediators. Distributing the questionnaire in places frequently visited by vulnerable populations and/or posting the questionnaire on social media were also considered as good options to maximize outreach and participation.

#### *Maximizing understanding of the DCE.*

Given that most respondents assessed the numerical and literacy skills of the populations they work with as basic, the complexity and length of a DCE was considered as an important issue to address upfront. We tested different ways to improve understandability, such as the use of graphic materials (icons) and an introductory video, which respondents saw as appropriate media solutions to increase participation, together with adequate wording.

#### *Key Implications for the DCE*

These findings guided the design of the DCE:

- The phrasing was adapted to be both simple and informative;
- The DCE was made available in 6 languages: French, Portuguese, Estonian, Russian, and Romanian as well as in English, to increase participation of allophone migrants;
- A French social worker checked both the validity and understandability of questions. In the other countries, members of the Consortium provided context specific information;
- The DCE was pilot-tested in each of the four countries to improve understandability and participants' comments led to its improvement;
- An introductory video was made providing a brief explanation of CCS and a presentation of the DCE;

- To make DCE completion more flexible, respondents were given the possibility to exit the DCE at any time and resume later;

Finally, considering the emphasis placed by field workers on providing assistance with filling the questionnaire, the online DCE distribution was doubled with a reliance on third-parties (NGO volunteers, researcher) assistance when needed.

# 3. Discrete choice experiment: methods

Discrete Choice Experiments (DCEs) are increasingly used in health economics to elicit stakeholders' preferences, as a way to inform policies. The DCE implemented in this study aims at identifying interventions that are likely to improve CCS uptake rates in underserved populations, i.e. vulnerable women.

DCEs have been used in a few studies in the context of CCS. Respondents are being questioned on the testing the modalities they prefer, including the possibility of self-sampling (Chamot et al., 2015; Campbell et al., 2019, Oberlin et al., 2019), characteristics of the examiner, including gender (Fiebig et al., 2009; Chamot et al., 2015), the travel distance to the clinic (Chamot et al., 2015), the wait time to receive the results (Chamot et al., 2015, Li et al., 2019, Wordsworth et al., 2006), screening location (Li et al., 2019, Oberlin et al., 2019), out-of-pocket payments (Li et al., 2019, Oberlin et al., 2019; Fiebig et al., 2009), cost for the social health insurance (Campbell et al., 2019), percentage of death reduction (Li et al., 2019), frequency of screening (Wordsworth et al., 2006; Fiebig et al., 2009).

## 3.1 Research hypotheses

The following research hypotheses guided the analysis of the data:

1. A general hypothesis positing that preferences would generally vary based on the vulnerability status of respondents;
2. Vulnerable populations may prefer self-sampling over screening by a health professional due to the access barriers they have experienced or expect;
3. Non-vulnerable populations may also favor self-sampling for its potential to offer greater flexibility, particularly for women facing significant time constraints;
4. Preferences regarding CCS invitation modes are likely to be dependent on countries existing infrastructures;
5. CCS Information strategies are more likely to be chosen if they minimize time and effort from participants

## 3.2. DCE design

In a DCE, participants' preferences are elicited by asking them to choose between different hypothetical scenarios defined by a selection of attributes and their corresponding levels. In our study, respondents are asked to choose which intervention would be most acceptable between two hypothetical CCS interventions which differ, in terms of their organisation (see Figure 3 for an example of choice set).

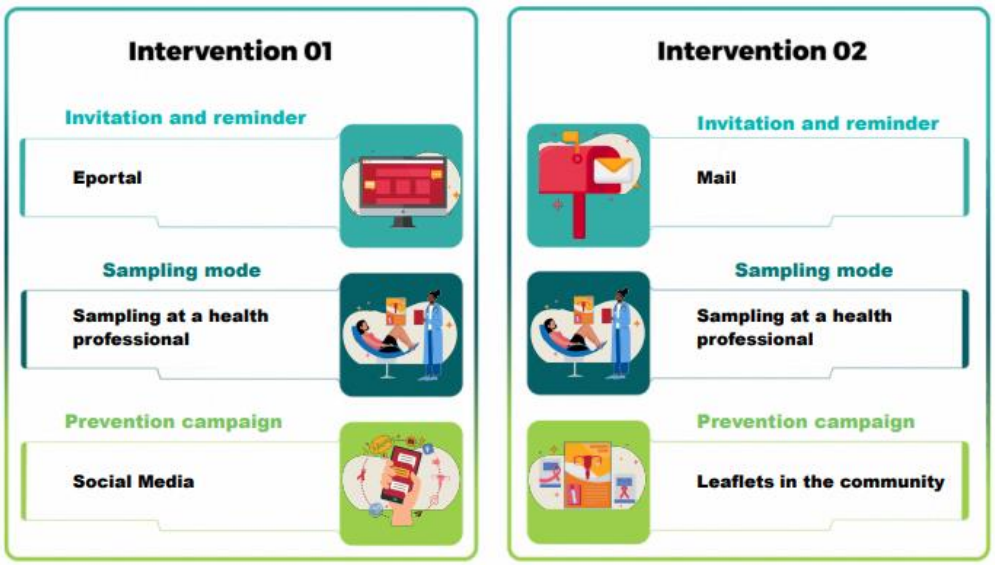



*Figure 3: Example of a choice set*

The structure of the experiment follows a two- stage decision-making process. In the first stage, and for each choice set (CS), participants are forced to choose between two alternative interventions (*conditional preference elicitation task*). In the second stage, participants can choose whether they are willing to undergo screening or not, in case the intervention they preferred in the previous stage were to be implemented (*willingness to be screened*). This two-stage approach is also named dual response choice experiment or sequential choice in the literature (Traets et al. [2022], Soekhai et al. [2019]) and it is particularly well suited to the context of our study. The value of this approach is to enable respondents to abstract from the CCS status quo (i.e. the CCS organisation that prevails in their own country and which they have not adhered to) and to reconsider their decision to undergo screening, were the current CCS organisation changed to better fit their preferences.
The content of scenarios (optimal combination of attributes' levels) was obtained using an efficient fractional design using STATA. A total of 9 pairwise choice sets was estimated necessary for the model to converge.

### 3.2.1. Choice of attributes and levels

When selecting attributes, the aim was to select screening features **that could then realistically be tested in the tailored interventions.** In order to keep a unique DCE across countries, the selected levels were identical in all countries, although adapted to specific contexts (Illustrations of E-portal used in the introduction were for instance 'Ameli.fr' in France and patient portal 'Terviseportaal' in Estonia (https://www.terviseportaal.ee/). Attributes and their corresponding levels (see table 1 below) were defined and selected in discussion with the members of the Consortium and in accordance with their findings, notably from the CUBs.

Three attributes were chosen:

- **Invitation and Reminder:** Lack of awareness of CCS programs has been highlighted in many studies (Greenley et al., 2023). An efficient way of reaching out and inviting to participate in CCS programs is thus key to increasing uptake. Considering that vulnerable populations might have specific characteristics (notably regarding their housing situation, or their access to digital technologies), the way they would like to receive their invitation to participate in screening might differ from the general population;
- **Sampling Method**: Self-sampling has been shown to be an efficient way to improve participation in CCS among non-compliant women (Parker et al., 2023; Lozar et al., 2023); it offers notable advantages such as ease of use and heightened privacy (Serrano et al., 2022; Kirkegaard et al., 2023), and could improve access to screening for vulnerable women who are remote from the health care system;

- **Information Campaign**: Lack of knowledge on CCS and on the associated risks also constitutes a barrier to CCS uptake; there is thus an interest in analyzing the best way to increase awareness and information about CCS.

| Attribute | Description | Levels |
|---|---|---|
| *Invitation and Reminders* | "Refers to the way you would like to get invited to screening (as well as receive any reminder in case a follow-up is needed) | Mail |
| | | Email |
| | | SMS |
| | | Digital Portal (E-portal) |
| *Sampling Method* | "Refers to the way you would like to get screened" | Smear Test at a Health Professional |
| | | Self-sampling |
| *Information Campaign* | "Refers to the way you would like to receive information on cervical cancer, as well as the screening programs" | Social Media |
| | | Leaflets and Posters in your community |
| | | Door-to-Door Health Mediators |
| | | Free Prevention Workshops |

*Table 1: Attributes and levels*

### 3.2.2. DCE distribution strategy

An online questionnaire was designed using Qualtrics software. The questionnaire was adapted and translated in several languages:

- For France, a questionnaire in French and in English for non-French speaking respondents;
- For Estonia, the questionnaire was translated both in Estonian and in Russian, due to the large community of Russian-speaking persons.
- For Portugal, the questionnaire was available in Portuguese and English.

An introductory video [around 5 minutes] was designed, aimed at informing participants on cervical cancer, briefly introducing the possibility of self-sampling and the sequence of the discrete choice experiment. At any point during the presentation of the choice sets, participants had the possibility to access the video and/or a PDF file to be remined of the attributes and their different levels. In order to make the intervention characteristics as easily identifiable as possible, icons were also designed and used systematically.
The questionnaire was structured in 5 blocs:

1. Participation and eligibility
2. Knowledge about CCS and participation
3. Choice Sets
4. Relevance of attributes
5. Socio-demographic questions

The main challenge to the DCE study completion is to effectively reach the vulnerable population, the definition of which varies across countries. As a result, the DCE distribution in the chosen countries has been left to the

responsibility of Consortium partners who have sought different networks or pre-existing contacts through participation in other CBIG-SCREEN working packages.

For France, the distribution strategy relied on the networks of associations and NGOs active on the French territory, both metropolitan and overseas. To proceed, a directory of NGOs was established, specifically targeting women or different types of vulnerable groups (migrants, homeless persons, HIV positive persons, sex workers…). This directory contains more than 600 associations that have all been contacted either by mail or by phone. Of these, 76 associations accepted to distribute the DCE survey to their members and the population they are in contact with. Refusals were motivated by the fact that the association considered that: i) their population was not adapted to our study; ii) their members had other priorities or would not be able to answer the DCE questionnaire due to language barriers and iii) they lacked the means and resources to distribute the DCE.

Secondly, leaflets and posters were distributed in different places, such as pharmacies and hospital waiting rooms. These documents briefly presented the aim of the DCE and provided a QR code that participants could scan to access the questionnaire.

Finally, following field workers' recommendations on how to tackle difficulties linked to a self-administered questionnaire and how to increase outreach in populations with low-literacy or with language difficulties, two digital tablets were used by two part-time interviewers, hired between November and December 2023, who went to different participating associations in Paris and Marseille to offer women their assistance to fill the DCE questionnaire.

The DCE survey was also distributed in the general population through social media and snowball sampling.

Our final sample for the French population is composed of 203 complete answers.

In Estonia, the DCE was distributed online to 26 000 email addresses from either Estonian-speaking or Russian-speaking target respondents. Two reminders were sent three weeks apart in order to increase participation.

In Portugal, participants were recruited through institutions that support specifically vulnerable population groups (associations, charity institutions, non-governmental organizations). Part of the questionnaires were conducted face to face by a professional of the institution or by a member of the CBIG SCREEN Consortium. In some institutions, a poster was displayed on which women could scan the QR code to fill the questionnaire by themselves; the poster was also shared via email in some institutions

## 3.3. Vulnerability measurement

The CBIG-SCREEN project aims at reducing the social gradient in CC prevention and prevalence by specifically targeting vulnerable populations. The concept of vulnerability has been extensively used over the last few years in order to assess "exposure to shocks" and differs from precariousness for it is a "forward-looking and predictive quality" (Rigg et al., 2016). According to these authors, vulnerability is associated to "political and social marginalization, physical and environmental exposure, spatial isolation, limited human and social capital and inadequate physical and financial assets".

### 3.3.1. Existing measures of vulnerability

The notion of vulnerability has been mostly used in relation to climate change and the exposure of certain populations to the forthcoming changes of their environment as well as their resilience (Adger, 2006; Burton, 2015) and has only recently been used in health. There are a number of existing vulnerability indexes, such as the SDoH (social determinant of health) defined by WHO or the Social Vulnerability Index (developed by the USA Centers for Disease Control and Prevention). The SDoH encompasses several variables such as income and social protection, education, unemployment and job insecurity, working life conditions, food insecurity, housing, basic amenities and the environment, social inclusion and non-discrimination, access to affordable health services of

decent quality[1]… The social vulnerability index (SVI) for its part was originally designed to assist public health officials and emergency response planners to identify and target communities that would most likely need support in case of hazardous events. It covers four main categories: socioeconomic status (below poverty unemployment, income, no high school diploma), household composition and disability (age 65 or older, aged 17 or younger, older than age 5 with a disability, single-parent household), minority status and language (minority, speak English "less than well") and housing and transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters). Expanding on the SVI, the social vulnerability metric (Saulsberry et al., 2023) introduces health care related variables and covers 5 key domains: demographic (age, race), education, economic context (unemployment rate), physical infrastructure (housing and transportation) and health care. Another extension of the SVI is the Minority Health Social Vulnerability Index (Saelee et al., 2022), that adds two new items on healthcare access and medical vulnerability in order to obtain a composite measure.

### 3.3.2. Vulnerability in the context of the CBIG-SCREEN Project

The CBIG-SCREEN consortium has produced several publications regarding the identification of vulnerable population in the context of CCS.

Mallafre-Larrosa et al. (2023) (WP2) surveyed European CCS managers and experts, who identified and ranked the sub-population they deemed underserved regarding CCS. The three main sub-population identified are: 1) women living in poverty in socially deprived areas, 2) migrants from high HPV prevalence areas and living in deprived areas and 3) homeless people. Other groups are also identified such as women attending HIV/STI clinics or prison inmates.

A scoping review by Greenley et al. (2023) on barriers and facilitators of CCS uptake in underserved groups in Europe identifies several populations, namely immigrant and migrant groups, ethnic minorities and to a lesser extent, women who inject drugs, women with physical disabilities, women who have experienced sexual abuse, women with lower school education and older women.

In the context of CBIG-SCREEN, WP3 identified several groups of vulnerable women and the Collaborative User Boards (CUBs) used for the co-construction of the qualitative analysis included, at the micro level, vulnerable women. These were defined as women from ethnic minorities, women with substance use disorder, women with low socioeconomic status, sex workers, homeless women, women with physical disability. More specifically, in the two countries covered in this report, specific populations have been identified:

- In Estonia, two regions have been specifically targeted: North East Estonia, where 90% of the population speaks Russian, and women in Ida Viru County, where studies have shown less trust in institutions. Furthermore, women who inject drugs have also been identified as vulnerable;
- In France, targeted women are those living in poor or deprived areas, women with low socio-economic status, women living with HIV, incarcerated women, sex workers, drug or alcohol-addicted women, homeless women, migrant women that are "far from or outside the health system (lack of social security), women who do not have enough information on their rights or prevention recommendations, women experiencing language or socio-cultural barriers, women lacking trust in their relationship with healthcare providers, or women giving a low priority to health related issues.

The main contribution of these studies is to underline the complexity and multi-layered aspect of vulnerability; this notion needs to be understood in an intersectionality perspective, at the interplay of multiple dimensions of precariousness and of social vulnerability.

### 3.3.3. Vulnerable population in the DCE Analysis

The pre-existing literature and the contributions from other WPs in the C-BIG SCREEN project, based on the co-construction of results, has provided the criteria needed to define the DCE target population, based on a shared

[1] https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1

definition of vulnerability and its application to the chosen countries. The main stake when defining the DCE target population was to use criteria that would be relevant to these countries while remaining close to the definition adopted by the C-BIG SCREEN Consortium and more generally, to the standard definition of vulnerability in the international literature.

To adopt an intersectional perspective of vulnerability, a number of variables were used to better circumscribe the vulnerable part of our sample of respondents, based on several socio-demographic questions from Block 5 of the questionnaire. To target the population as conceptualized by the Consortium, we specifically selected a subset of questions:

- reported financial difficulties
- health insurance
- renouncement to care
- reported experience with the healthcare system
- migration status
- housing situation
- employment
- educational background

Drawing from the existing vulnerability indexes which are multifaceted and the barriers to cervical cancer screening identified by the CBIG-SCREEN consortium and in the literature, we identified a series of questions likely to indicate some vulnerability towards CCS. Our aim was to incorporate several dimensions to encompass the complexity of the notion of vulnerability and as much as possible, to keep the same dimensions across countries, so as to ensure comparability between results.

| **Category** | **Corresponding Question** | **Corresponding Answer** |
|---|---|---|
| Self-reported financial vulnerability | Q5.11 "Do you sometimes have difficulties making ends meet?" | "Every Month"<br>"Often" |
| No or subsidized access to free healthcare | Q5.16 "Do you currently have any subsidized health care?" : | "No" |
| Renouncement to care | Q5.18 "Have you forgone care in the last 12 months?" | "Yes" |
| Experience with the healthcare system | Q5.19 "How would you judge your experience with the healthcare system?" | **"**Bad" |
| Migration status | Q5.3 "How long have you been living in [X]" | "Less than a year" |
| No permanent housing | Q5.5 "Do you live … ?" | - "In a shelter or emergency shelter"<br>-"At a hotel"<br>-"In informal living quarters"<br>-"In the street" |
| No job and low education | Q5.9.1. "Are you currently employed?" | "No" |
| | Q5.9.2 "Are you… " | "Unemployed or inactive"<br>"Invalid" |
| | Q5.8 "When did you leave school?" | "I never went to school"<br>"Primary School"<br>"Secondary School" |

*Table 2: Vulnera*ble *respondents' sub-sample construction*

To ensure accuracy in the definition of vulnerability, we conducted sensitivity analyses by adjusting various variables. These analyses consistently yielded similar preferences, validating our vulnerability approach. Further methodological research will be conducted to identify the variables that best proxy vulnerability, as defined in the CBIG-SCREEN project.

## 3.4. Econometric model specification: a two-stage design

Two-stage choice models have increasingly been used over the past decade, spanning various fields of application including health economics, public health, and medical decision-making. These models aim to relax certain constraints inherent in traditional discrete choice frameworks, such as multinomial logit models, particularly the assumption of Independence of Irrelevant Alternatives (IIA) and the notion that all individuals choose from an identical set of options available in the marketplace.

Compared to conventional single-stage discrete choice models, two-stage models offer a more nuanced representation of the decision-making process individuals undergo, which is particularly relevant in the health care sector.

Typically, in the initial stage of a two-stage choice model, individuals are assumed to construct a subset of potential treatment options, known as the choice set. This construction process may involve recalling or recognizing treatments capable of addressing their healthcare needs, filtering out options deemed unsuitable, or a combination of both strategies. Subsequently, in the second stage, individuals choose from this refined set of treatment options using a compensatory analysis approach, similar to traditional multinomial logit models.

Behaviorally, several rationales support the adoption of two-stage models in healthcare decision-making. Firstly, in scenarios where individuals rely on memory to make healthcare choices (e.g., selecting a treatment provider), they may not be able to recall all available options. This limitation in recall results in a choice set that is smaller than the complete set of available treatments. Additionally, individuals may encounter healthcare options but fail to recognize them as viable choices, due to various factors such as lack of awareness or relevance.

Secondly, even when individuals are aware of the existence of potential treatments, cognitive limitations or constraints may hinder their ability to process all relevant information. Researchers have suggested that individuals adopt phased decision strategies, whereby they initially screen treatments using simplified criteria before engaging in a more comprehensive analysis of the remaining options.

Lastly, the costs associated with exhaustive search and information processing may render such activities suboptimal. Economic theories of information suggest that individuals may limit their search efforts to a subset of available treatments, taking the costs associated with acquiring and processing information into account. Empirical evidence and theoretical models have provided support for this notion, emphasizing the role of cost-benefit considerations in shaping individuals' choice sets and decision-making processes in healthcare contexts.

In a Discrete Choice Experiment (DCE), the first and second stages represent distinct aspects of the decision-making process, each contributing uniquely to the observed outcomes. In the first stage, individuals are presented with a set of alternative choices and are typically asked to make forced decisions, indicating their preferences among the given options. These preferences are then captured within the utility function, where the measured utility of each intervention reflects the individual's subjective evaluation of its attributes. On the other hand, the second stage revolves around the probability of adopting the revealed preference, where individuals select the alternative that maximizes their utility. While both stages aim to elucidate decision-making behavior, they do so from different perspectives: the first stage captures individual preferences in a controlled setting, while the second stage predicts actual choices based on the calculated utilities. Consequently, discrepancies between results from the two stages may arise due to conceptual distinctions: the first stage measures stated preferences, which may not always align with actual choices, whereas the second stage accounts for behavioral factors influencing choice implementation, such as risk aversion or external constraints. Thus, understanding and interpreting differences between stages in a DCE provides comprehensive insights into decision-making dynamics.

### 3.4.1. Econometric model specification: First stage

The choice data are analyzed within a random utility maximization framework i.e., assuming a random utility function for each hypothetical scenario (including a systematic and unobserved portion of utility) and assuming utility maximization decision rule (McFadden 1974). A mixed multinomial logit (MIX**L**) model specification was used, allowing the preference parameters to be randomly distributed across the sample and thus accounting for (i) unobserved preference heterogeneity and (ii) correlation of choices between participants (McFadden and Train, 2000).

For respondent "n", alternative "j", and choice situation, "t"), utility $\boldsymbol{U}$ is given by:

$$\boldsymbol{U_{n,j,t}} = \boldsymbol{V_{n,j,t}} + \boldsymbol{\varepsilon_{n,j,t}}$$

The utility function $\boldsymbol{U_{n,j,t}}$ has two components:

- A deterministic component $\boldsymbol{V_{n,j,t}}$ which includes the specification of the combination of attributes and levels. The specification is linear without interactions :

$$\begin{aligned} V_{n,j,t} = {} & \beta_{1,n} Inviation_{SMS} + \beta_{2,n} Invitation_{Eportal} + \beta_{3,n} Invitation_{Email} + \beta_{4,n} SelfSampling \\ & + \beta_{5,n} PreventionCampaign_{Leaflets} + \beta_{6,n} PreventionCampaign_{Workshops} \\ & + \beta_{5,n} PreventionCampaign_{DoorToDoor} \end{aligned}$$

Therefore, the parameters $\boldsymbol{\beta_{1,n}}$ , $\boldsymbol{\beta_{2,n}}$ , $\boldsymbol{\beta_{3,n}}$ measure the part-worth utility compared to the reference category "Invitation: Postal service", which is omitted. Similarly, $\boldsymbol{\beta_{4,n}}$ represents the part-worth utility of self-sampling with respect to sampling conducted by a healthcare professional. Finally, $\boldsymbol{\beta_{5,n}}$, $\boldsymbol{\beta_{6,n}}$, $\boldsymbol{\beta_{7,n}}$ capture the effect of the prevention campaign method with respect to the reference category "Social media".

- The second component of the utility function is given by a random component $\boldsymbol{\varepsilon_{n,j,t}}$ which is assumed to be an independently, identically distributed extreme Value Type I function (Hensher et al. [2005]; Manski [2001]), thus leading to the multinomial logit choice specification (McFadden et al. [1973]).

A MIXL (using 200 Halton draws for the French data and 100 for the Estonian data) was estimated with correlated random coefficients between all 3 attributes' levels, assuming normal distribution for each parameter $\beta_{k,n}$. Though particularly computationally intensive, this model is known to be most flexible (Hess and Train, 2017). In particular, it allows accounting for scale heterogeneity, i.e., various degrees of consistency of decisions across respondents (Hess and Rose, 2012).

In order to visually represent the degree of preference heterogeneity, individual-level coefficients from the MIXL model (i.e. $\hat{\beta}_{k,n}$ , $k = 1, \dots, 3$) were predicted using the methodology detailed in (Revelt and Train, 1998).

### 3.4.2. Econometric model specification: Second stage

To analyze the second stage of the decision-making process, a panel data approach was used where each individual is followed through different choice sets.

We begin by specifying our dependent variable, denoted as willingness to participate in the screening campaign which represents the binary outcome indicating whether the respondent will adopt a specific campaign.

We estimate the following model using a logistic regression:

$$\begin{aligned} & \boldsymbol{Pr}\left(\boldsymbol{AdoptCampgain_{jn}} = \boldsymbol{1}\right) \\ & = \boldsymbol{logit^{-1}}\left(\beta_{1,n} Inviation_{SMS} + \beta_{2,n} Invitation_{Eportal} + \beta_{3,n} Invitation_{Email}\right. \\ & + \beta_{4,n} SelfSampling + \beta_{5,n} PreventionCampaign_{Leaflets} \\ & \left. + \beta_{6,n} PreventionCampaign_{Workshops} + \beta_{5,n} PreventionCampaign_{DoorToDoor}\right) + \alpha_j + \varepsilon_{jnt} \end{aligned}$$

Where $\alpha_j$ is a individual fixed effect, capturing any unobserved heterogeneity at individual level.

# 4. DCE results

## 4.1. France

### 4.1.1. Descriptive statistics

The final sample is composed of 203 respondents among whom 112 (55%) are identified as vulnerable, based on the selection process outlined in the previous section. This high proportion of vulnerable respondents in the total sample is the result of the DCE distribution strategy, with a mix of online and face to face distribution through associations and NGOs' support.

In both sub-samples (vulnerable women – VW- and non-vulnerable women -NVW-), there is a notable overrepresentation of women under 50, with only 7.9% of respondents aged 50 and above. This demographic bias could influence findings, particularly regarding CCS modalities such as E-portals, Email invitations and reminders, and Information Campaigns through Social Media. Younger populations with greater digital proficiency may indeed express a preference for these methods. Hence our findings for France cannot be applied to the current generation of women aged 50 or above, although they are targeted for CCS until age 65.

The initial part of the DCE questionnaire focused on respondents' knowledge about CC and CCS. Among respondents, 29% reported being vaccinated against HPV, which corresponds to the national level (between 24% for a full vaccination schedule and 29% for girls who have received at least one dose of vaccine according to the French Haute Autorité de Santé[2]). Interestingly, between 88% (for VW) and 98% (for NVW) of respondents reported awareness of a CCS campaign, with nearly all indicating familiarity with a smear test. However, despite this high level of awareness, approximately 10% of respondents stated uncertainty regarding whether they had ever undergone a smear test, while 18% reported never having done so. Furthermore, 63.5% of the sample declare being up to date in their screening (screening was done in the last 5 years), which drops to 58.1% among the VW sub-sample.

Overall and despite exhibiting low rates for HPV vaccination, respondents declared a high level of information on CCS, both knowing how it is performed and being aware of CCS programs. Details can be found in Tables A1 and A2 in the Annex.

Respondents were requested to evaluate the questionnaire's difficulty. 90% of participants reported finding it easy or relatively easy, indicating promising prospects for task comprehension and the credibility of responses.

### 4.1.2. Description of choice sets and frequencies

In the first stage of the DCE, respondents are forced to choose between two interventions. Table 3 below illustrates, for each of the nine choice sets (CS), the proportion of respondents who chose the first intervention. The distribution of choices shows a lack of uniformity, with notable differences in preferences, ranging from 29.1% for CS 2 to 77.3% for CS 5.

| CS | Intervention 1 | | | Intervention 2 | | | Full Sample N = 203 |
|---|---|---|---|---|---|---|---|
| | Invitation and Reminder | Sampling Method | Information Campaign | Invitation and Reminder | Sampling Method | Information Campaign | Intervention 1 chosen |
| 1 | E-portal | Sampling at a health professional | Social Media | Mail | Sampling at a health professional | Leaflets and Posters | 36.5% |

[2] https://www.has-sante.fr/jcms/p_3147966/fr/papillomavirus-la-vaccination-recommandee-pour-tous-les-garcons

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **2** | E-portal | Sampling at a health professional | Leaflets and Posters | Email | Sampling at a health professional | Social Media | 29.1% |
| **3** | SMS | Sampling at a health professional | Free Prevention Workshops | E-portal | Self-Sampling | Leaflets and Posters | 63.1% |
| **4** | Mail | Sampling at a health professional | Social Media | Email | Sampling at a health professional | Door to Door Health Mediators | 73.4% |
| **5** | Email | Self-sampling | Social Media | SMS | Self-sampling | Door to Door Health Mediators | 77.3% |
| **6** | SMS | Self-sampling | Free Prevention Workshops | Mail | Sampling at a health professional | Door to Door Health Mediators | 57.6% |
| **7** | SMS | Self-sampling | Social Media | E-portal | Sampling at a health professional | Free Prevention Workshops | 54.7% |
| **8** | Mail | Self-sampling | Free Prevention Workshops | SMS | Self-sampling | Social Media | 42.4% |
| **9** | Mail | Sampling at a health professional | Door to Door Health Mediators | Email | Self-sampling | Leaflets and Posters | 43.9% |

*Table 3: Description of the choice sets and frequency of choices*

In the second stage, respondents' willingness to undergo screening is measured based on the intervention they chose in the first stage (stage 2 of the DCE: "*Would you be willing to be screened under your chosen intervention*"). Table 4 below shows that for all choice sets, the willingness to undergo screening is consistently high, exceeding 80%. However, there is a significant decrease in respondents' willingness for CS 5 and CS 8, which exclusively offer the self-sampling option as screening method.

| **Choice Set** | **% of respondents willing to undergo CCS under their chosen intervention** | | |
|---|---|---|---|
| | *Vulnerable* | *Non-vulnerable* | *Full sample* |
| 1 | 87.5% | 96.7% | 91.6% |
| 2 | 87.5% | 97.8% | 92.1% |
| 3 | 91.1% | 95.6% | 93.1% |
| 4 | 87.5% | 98.9% | 92.6% |
| 5 | 80.4% | 84.6% | 82.3% |
| 6 | 92.9% | 91.2% | 92.1% |
| 7 | 87.5% | 92.3% | 89.7% |
| 8 | 81.3% | 83.5% | 82.3% |
| 9 | 92.9% | 96.7% | 94.6% |

*Table 4: Willingness to undergo CCS (France)*

### *Offering the assistance of a health professional for self-sampling*

In CS 3 and CS 7, respondents who opted for the intervention involving "sampling at a health professional" were subsequently prompted with the question: "Would the possibility of conducting self-screening in the presence of a professional who can guide you alter your decision?" This question aimed at establishing whether the reluctance to self-sample stemmed from fears about performing the procedure incorrectly.

Results indicated that 40.3% (CS 3) and 45% (CS 7) of respondents who initially declined interventions offering self-sampling expressed a willingness to reconsider if provided with the support of a health professional to guide them through the self-sampling process. These findings suggest that despite the initial reluctance towards self-sampling, its acceptance rate could potentially be increased by offering professional guidance to women, even possibly remotely.

### *Receiving/Sending back the self-sampling kit*

In CS 4 and CS 8, where respondents were faced with two self-sampling options, they were subsequently asked about their preferences for receiving and returning their self-sampling kit. Among those indicating a willingness to self-sample, a majority (53.1%) expressed a preference for receiving the kit directly at home via mail or from a nearby location such as a pharmacy or an association.

Regarding the 'returning the sample' question, 60.5% preferred to do so at a nearby location, such as a pharmacy or an association, while 23.4% preferred returning it by mail.

In both cases, the option least favored was involving a health professional (such as a GP, midwife, or gynecologist), possibly due to various anticipated barriers such as scheduling appointments, travel distances, and potential out-of-pocket expenses.

## 4.1.3. Results from the First Stage

Table 5 below shows the part-worth utilities for each attribute/level in the forced choice task among French responders. Column I reports the results for the overall population, while column II and column III show the results for the vulnerable and non-vulnerable sub-samples.

Although there are some differences in the coefficients reported in the full sample and in the vulnerable population, the standard errors suggest that these differences might not be statistically significant and hence we cannot conclude that women may prefer a particular communication channel. Preferences among non-vulnerable women suggest that women are 4.4% more likely to prefer a screening campaign when the invitation is sent via SMS, compared to using traditional mail.

| | **Full sample (I)** | **Vulnerable (II)** | **Non-Vulnerable (III)=** |
|---|---|---|---|
| **Invitation and Reminder** | | | |
| SMS | 0.026<br>(0.020) | 0.013<br>(0.031) | 0.044*<br>(0.025) |
| E-portal | -0.003<br>(0.020) | -0.006<br>(0.030) | 0.008<br>(0.026) |
| Email | 0.010<br>(0.018) | 0.006<br>(0.028) | 0.018<br>(0.023) |
| **Sampling Method** | | | |
| Self-sampling | -0.080***<br>(0.015) | -0.044*<br>(0.023) | -0.123***<br>(0.018) |
| **Prevention Campaign** | | | |
| Leaflets and Posters | 0.048***<br>(0.018) | 0.041<br>(0.028) | 0.056**<br>(0.022) |

| | | | |
|---|---|---|---|
| Workshops | -0.004<br>(0.018) | 0.025<br>(0.027) | -0.036*<br>(0.022) |
| Door-to-Door | 0.022<br>(0.021) | 0.031<br>(0.029) | 0.016<br>(0.028) |
| Observations | 1818 | 1008 | 810 |

*Table 5: France: First Stage Results*

In the full sample, self-sampling reduces by 8% points the part-worth utility as compared to standard screening by a health professional. The stratified analysis reveals that, compared to vulnerable women, their non-vulnerable counterpart are almost 3 times less likely to prefer self-sampling[3]. Although this result may appear at first counterintuitive, it may suggest that, in the absence of additional information on a new screening method, such self-sampling, women who already experienced a PAP smear test with a professional may prefer to keep the option they are already acquainted with, compared to untested women (mostly the vulnerable women). Table A2 reveals a 10% difference in smear test participation between vulnerable and non-vulnerable women, and hence we could infer that it is this additional exposition to an already known method which explains the above results. A potential way to further test this hypothesis is by running two different regressions, one for women who have been tested before and another for women who have not been tested or do not remember.

The results for the full sample regarding the prevention campaign suggest that women are 4.8% more likely to prefer a campaign where leaflets are distributed in the community over information distributed to social media. We cannot conclude if any method (i.e., leaflets, workshops or door-to-door) is preferred over social media campaigns among vulnerable women. Lastly, non-vulnerable women are 3.6% less likely to prefer workshops and 5.6% more likely to prefer leaflets in community over a campaign in social media.

### 4.1.4. Results from the Second stage

In the second stage, we analyze the impact of each attribute on the willingness to be screened under the chosen intervention, using a random effects linear probability model, with the answer to the question: "Would you be willing to get screened under the chosen intervention?" as dependent variable, and the attributes of the selected option as independent (exogenous) variables. Table 6 shows the results for the question where participants first chose their preferred intervention but then may opt out by saying they would not be willing to get screened under their chosen intervention.

| | **Full sample** | **Vulnerable** | **Non-Vulnerable** |
|---|---|---|---|
| **Invitation and Reminder** | | | |
| SMS | -0.189<br>(0.153) | -0.001<br>(0.213) | -0.970*<br>(0.503) |
| E-portal | -1.013***<br>(0.187) | -0.491**<br>(0.225) | -6.452***<br>(1.919) |
| Email | -0.006<br>(0.166) | 0.209<br>(0.220) | -0.422<br>(0.686) |
| **Sampling Method** | | | |
| Self-sampling | -0.775***<br>(0.265) | -0.661*<br>(0.344) | -3.716***<br>(1.171) |
| **Information Campaign** | | | |
| Leaflets and Posters | -0.245<br>(0.181) | -0.070<br>(0.204) | 0.150<br>(0.726) |

[3] Further testing is needed to determine whether there is a significative difference between coefficients.

| | | | |
|---|---|---|---|
| Workshops | -0.475***<br>(0.166) | -0.326<br>(0.229) | -2.056**<br>(0.801) |
| Door-to-door | -1.760***<br>(0.255) | -1.151***<br>(0.390) | -7.914***<br>(2.075) |

*Table 6 France, Stage 2 results*

Note. The estimates are interpreted as marginal effects on the probability to "be willing to get screened". For instance, introducing self-sampling would decrease the probability to be willing to get screened compared to a screening procedure with a smear test by 77.5 percentage points for the full sample
Statistical significance: ***: 1% **: 5%; *: 1%

#### *Invitation mode*

Respondents in the non-vulnerable group exhibit a lower responsiveness to SMS invitations compared to emails. No clear conclusions can be drawn for the vulnerable sub-sample. An overall decline of 100% in screening willingness is observed when inviting women via an E-portal versus mail. This reduction is particularly notable among non-vulnerable respondents, showcasing heightened variability. In France, starting January 2024, screening invitations are directed through Ameli.fr for women without prior opportunistic screenings, with postal invitations sent to those without an Ameli.fr account. In the vulnerable women sub-sample, those benefiting from the "AME" (*Aide Médicale d'Etat*) are likely missing an account on this French E-portal.

#### *Sampling mode*

Self-sampling would overall decrease uptake compared to a smear test at a health professional by 78% in the full sample, rejection being much stronger in the non-vulnerable group. These findings do not validate our hypothesis that self-sampling could be preferred notably by vulnerable women, for it might help bridge the gap to the health care system and the entry barriers (such as time to schedule appointments, for instance) they may face.

#### *Information distribution*

Unsurprisingly, options that require high time investments are strongly rejected by respondents: such is the case for free prevention workshops and even more so for door-to-door campaigns, both of which are not seen as convincing alternatives to an information campaign on social media. Considering that our sample is mostly composed of women aged below 50 years old (92% of the sample), a preference for a digital information campaign is not surprising.

### 4.1.5. Participants' comments on their choices

Participants were invited to provide feedback after each set of choices. The subsequent section presents a summary of the comments relating to the different interventions.

#### *Invitation and reminders*

The majority of comments pertained to the E-portal, which was generally regarded as impractical by respondents. Many expressed uncertainties regarding its purpose and form.

#### *Sampling method*

Regarding reluctance to self-sampling, respondents typically cited fears about executing the test themselves or doubting its reliability, compared to a smear test administered by a healthcare professional. Additionally, some participants valued the interaction with a healthcare professional during an appointment for a smear test. Despite this, self-sampling was considered by some respondents as a convenient solution, particularly in cases of appointment delays or for women who have had negative experiences with appointments for smear tests in the past.

*Information campaigns*

Many comments strongly opposed door-to-door campaigns, citing concerns about privacy and logistical challenges. Only one participant expressed a positive statement towards door-to-door prevention, due to her own literacy limitations.

Prevention workshops were not characterized as intrusive like door-to-door campaigns but rather as time-consuming and impractical. Several participants indicated that even if invited, they would not likely attend, though reasons were not elaborated upon. However, it was noted in several comments that these workshops could be beneficial when initiating screening at the recommended age of 25, in order to provide comprehensive information on cervical cancer. One participant highlighted the potential for workshops to educate attendees about self-sampling.

### 4.1.6. Main findings for France

Our results for France highlight several aspects:

1- Overall, there are no significant differences in preferences between vulnerable and non-vulnerable women in France. This does not corroborate our first hypothesis that preferences would vary, based on the vulnerability status of respondents**.** Variations in the intensity of preference between the two sub-samples (as indicated by the absolute values of the coefficients) are not statistically significant.

2 – Neither do our findings corroborate the second and third hypotheses, i.e. that the introduction of self-sampling could potentially enhance uptake among vulnerable populations or non-vulnerable populations. Instead, we observe a widespread rejection by both subsamples of this alternative compared to undergoing a smear test administered by a healthcare professional. Additional information collected from respondents' comments on their choices indicates that fear of pain or of not performing the self-test adequately are the two main reasons for not choosing self-sampling. The choice made in the DCE design to provide very little information on the CCS sample kit itself enables us to measure the importance of providing information if this strategy is to be further developed.

3 - Time-consuming information campaigns, such as free prevention workshops and door-to-door campaigns, are generally rejected, while social media emerge as the most efficient method for disseminating information on CCS. These preferences, however, may be influenced by the composition of our sample, which predominantly consists of women under 50 years old.

4 - Finally, what we find is that an invitation through an E-portal is strongly rejected by the full sample, which is not a surprising result for its use is not widespread in the population, and access to the French health portal Ameli.fr is not common and also not feasible for the more vulnerable population, namely for beneficiaries of the "*Aide Médicale d'Etat*".

## 4.2. Estonia

In Estonia, the DCE distribution relied on a directory of 26000 email addresses of women, living in Ida Viru County and North East. While this directory targets the general population, additional questions in the DCE were used to identify the sub-sample of vulnerable women. The invitation was sent to all addresses, followed by two reminders sent two weeks apart.

Respondents had the option to answer in either Estonian or Russian. A total of 4980 answers were collected, with 3261 in the Estonian-speaking population and 1719 in the Russian-speaking population respectively. In the Estonian-speaking sample, 347 (10.6%) respondents were identified as vulnerable compared to 223 (13%) in the Russian-speaking sample. Compared to the French case, the proportion of vulnerable women in the total sample is lower and this is due to a distribution strategy which relied solely on a directory of email addresses in the general population.

The presentation of results separates out Estonian- and Russian-speaking populations. While targeted interventions based on origins or language are not feasible, this approach enables us to identify potentially different needs or preferences within each population.

### 4.2.1. Descriptive statistics

In Estonia, the target group for organized CCS is women aged 30 to 65, compared to France where it starts for women aged 25. There is no substantial difference in age distribution between vulnerable and non-vulnerable populations, both for Estonian- and Russian-speaking respondents. In terms of residential area, Estonian vulnerable women report living in rural areas slightly more often than the rest of the population, questioning their ease of access to the health system. This difference is not manifest in the Russian sub-sample, where residential areas are similar among vulnerable and non-vulnerable populations.

Overall, both respondents in the Estonian- and Russian-speaking samples (over 90%) found the questionnaire easy or relatively easy, irrespective of their level of vulnerability, which suggests a good understanding of the tasks involved. Details can be found in the Annex.

HPV vaccination rates are around 5.2% among the vulnerable population and 6.8% among the non-vulnerable population in the Estonian-speaking sample. These rates are lower among the Russian-speaking population, with 2.7% of the vulnerable sub-sample declaring being vaccinated against HPV and 4.4% among the non-vulnerable sample. In Estonia, the HPV vaccination program was introduced in 2021 explaining the low rates of vaccination among the population so far. There is a high awareness of the existing screening program among both Estonian- and Russian-speaking respondents. The knowledge of what a smear test (PAP) implies is higher among the Estonian-speaking sample compared to the Russian-speaking sample by around 10 percentage points (from around 95% to 83%), exhibiting different levels of knowledge among the population regarding the test used for CCS. For all samples and sub-samples, more than 80% of respondents said they had already undergone a smear test, although these proportions are higher among the non-vulnerable population. This is consistent with findings from the ICO/IARC HPV information center, showing that around 83% of women aged 25 to 65 have undergone screening at least once[4]. Details can be found in tables A4 and A6 in the annex.

### 4.2.2. Description of choice sets and frequencies

Table 7 displays the proportion of respondents who opted for the first intervention in each of the 9 choice sets, in both the Estonian-speaking and the Russian-speaking samples. This table shows that there are large variations in the propensity to choose either intervention 1 or 2, from 16.6% of the Estonian sample selecting intervention 1 in task 8 (considered as dominated), to 88% selecting intervention 1 in task 5. There are also disparities between the Estonian- and the Russian-speaking sample with a 20-percentage points difference between CS 8 and CS 9.

[4] https://hpvcentre.net/statistics/reports/EST_FS.pdf

| CS | Intervention 1 | | | Intervention 2 | | | Estonian sample | Russian sample |
|---|---|---|---|---|---|---|---|---|
| | Invitation and Reminder | Sampling Method | Information Campaign | Invitation and Reminder | Sampling Method | Information Campaign | Intervention 1 | Intervention 1 |
| 1 | E-portal | Sampling at a health | Social Media | Mail | Sampling at a health professional | Leaflets and Posters | 67.7% | 47.0% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | profession al | | | | | | |
| **2** | E-portal | Sampling at a health profession al | Leaflets and Posters | Email | Sampling at a health professional | Social Media | 21.19% | 29.4% |
| **3** | SMS | Sampling at a health profession al | Free Prevention Workshops | E-portal | Self-Sampling | Leaflets and Posters | 63.4% | 69.1% |
| **4** | Mail | Sampling at a health profession al | Social Media | Email | Sampling at a health professional | Door to Door Health Mediators | 59.0% | 48.3% |
| **5** | Email | Self-sampling | Social Media | SMS | Self-sampling | Door to Door Health Mediators | 88,6% | 68.2% |
| **6** | SMS | Self-sampling | Free Prevention Workshops | Mail | Sampling at a health professional | Door to Door Health Mediators | 65% | 43.2% |
| **7** | SMS | Self-sampling | Social Media | E-portal | Sampling at a health professional | Free Preventio n Workshop s | 56.6% | 41.9% |
| **8** | Mail | Self-sampling | Free Prevention Workshops | SMS | Self-sampling | Social Media | 16.6% | 37.7% |
| **9** | Mail | Sampling at a health profession al | Door to Door Health Mediators | Email | Self-sampling | Leaflets and Posters | 32.8% | 54.6% |

*Table 7: Description of choice sets and frequencies*

Table 8 shows the willingness to adopt both for the Estonian- and Russian-speaking sample. Overall, the willingness to get screened among participants is high (above 80%), except for CS 5 and CS 8 that are both offering an intervention containing "self-sampling" as the sole method for screening. Willingness to get screened is slightly higher among Estonian-speaking population as they are likely better integrated in the healthcare system.

| **Choice Set** | **% of respondents willing to undergo screening under chosen intervention** | | | **% of respondents willing to undergo screening under chosen intervention** | | |
|---|---|---|---|---|---|---|
| | **Estonian-speaking sample** | | | **Russian-speaking Sample** | | |
| | Vulnera ble | Non-vulnerable | Full | Vulnerable | Non-Vulnerable | Full |
| 1 | 88.5% | 94.2% | 93.6% | 87.7% | 90.0% | 89.7% |
| 2 | 89.1% | 96.0% | 95.2% | 89.9% | 90.0% | 90.0% |
| 3 | 90.4% | 95.1% | 94.6% | 90.6% | 91.1% | 91.0% |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 85.0% | 90.9% | 90.3% | 87.6% | 88.6% | 88.5% |
| 5 | 82.4% | 81.0% | 81.2% | 76.7% | 72.8% | 73.4% |
| 6 | 84.2% | 85.5% | 85.3% | 86.3% | 85.3% | 85.5% |
| 7 | 92.2% | 94.6% | 94.3% | 90.8% | 89.2% | 89.4% |
| 8 | 80.7% | 79.9% | 80.0% | 72.4% | 72.6% | 72.5% |
| 9 | 88.5% | 90.4% | 90.2% | 89.6% | 88.0% | 88.2% |

*Table 8: Willingness to undergo screening for Estonian- and Russian-speaking samples*

#### *Offering the assistance of a health professional for self-sampling*

Results indicated that 18% of the Estonian-speaking respondents and between 22.6% (CS 3) and 24% (CS 7) of the Russian-speaking respondents who initially declined interventions offering self-sampling expressed a willingness to reconsider if provided with the support of a health professional to guide them through the self-sampling process. This percentage is much lower than among French respondents.

#### *Receiving/Sending back the self-sampling kit*

In CS 4 and CS 8, where respondents were faced with two self-sampling options, they were additionally asked about their preferences for receiving and returning their self-sampling kit. Among those indicating a willingness to self-sample, a majority (61.3%) expressed a preference for receiving the kit directly at home via mail.

Regarding sending back the self-sampling kit, the sample is equally split between the three options, with a slight preference for the possibility of sending the kit back by mail (39%). Overall, respondents are not expressing a clear preference between retrieving or handing back the self-sampling kit at a proximity center or at a health professional but in both cases, the mailing option is preferred.

### 4.2.3. Results from the First Stage

#### *Estonian-speaking sample*

Results from the Estonian-speaking sample reveal that virtually all invitation and reminder methods are preferred over traditional post service. Such a result seems to hold for both vulnerable and non-vulnerable women.

| **Estonian-speaking Sample** | **Full sample** | **Vulnerable** | **Non-Vulnerable** |
|---|---|---|---|
| **Invitation and Reminder** | | | |
| SMS | 0.030***<br>(0.006) | 0.030*<br>(0.018) | 0.030***<br>(0.006) |
| E-portal | 0.030***<br>(0.005) | 0.038**<br>(0.016) | 0.029***<br>(0.006) |
| Email | 0.016***<br>(0.005) | 0.019<br>(0.015) | 0.015***<br>(0.005) |
| **Sampling Method** | | | |
| Self-sampling | -0.112***<br>(0.004) | -0.059***<br>(0.012) | -0.119***<br>(0.004) |
| **Information Campaign** | | | |
| Leaflets and Posters | 0.040***<br>(0.005) | 0.022<br>(0.014) | 0.043***<br>(0.005) |

| | | | |
|---|---|---|---|
| Free Prevention Workshops | 0.005<br><br>(0.004) | 0.013<br><br>(0.014) | 0.004<br><br>(0.005) |
| Door-to-door | -0.033***<br>(0.005) | -0.015<br>(0.016) | -0.035***<br>(0.006) |
| Observations | 29336 | 3120 | 26216 |

*Table 9: Estonian-speaking sample: First stage results*

Similar to the French results, the coefficient for the sampling method indicates a lower inclination among women to favor self-sampling over professional health services. For the full sample, results indicate that, when compared to traditional smear tests administered by healthcare providers, self-sampling is 11.2% less likely to emerge as the preferred choice.

Additionally, the negative coefficient in the non-vulnerable sample is significantly higher - twice as much - compared to that of the vulnerable sample. Table A4 in the annex provides evidence to support the hypothesis that known technologies are usually preferred to unknown ones: we observe an 8% difference in smear test participation between vulnerable and non-vulnerable women. As was the case for France, we could infer that it is this additional exposition to an already known method which explains the above result. A potential way to further test this hypothesis is by running two different regressions, one for women who have been tested before and another for women who have not been tested or do not remember.

The information campaign indicates that distributing leaflets within the community increases the likelihood of preferring that option by 4%, compared to a campaign disseminated through social media. Conversely, door-to-door mediation reduces this likelihood by 3.3%.

### *Russian-speaking sample*

Results for the Russian-speaking sample display a strong preference for various invitation and reminder methods over traditional postal services. This finding appears consistent across both vulnerable and non-vulnerable women.

| **Russian-speaking Sample** | **Full sample** | **Vulnerable** | **Non-Vulnerable** |
|---|---|---|---|
| **Invitation and Reminder** | | | |
| SMS | 0.036***<br>(0.008) | 0.060***<br>(0.019) | 0.030***<br>(0.009) |
| E-portal | 0.035***<br>(0.008) | 0.042**<br>(0.018) | 0.034***<br>(0.009) |
| Email | 0.028***<br>(0.007) | 0.037**<br>(0.017) | 0.026***<br>(0.008) |
| **Sampling Method** | | | |
| Self-sampling | -0.126***<br>(0.006) | -0.101***<br>(0.014) | -0.132***<br>(0.007) |
| **Prevention Campaign** | | | |
| Leaflets and Posters | 0.045***<br>(0.007) | 0.041**<br>(0.017) | 0.046***<br>(0.008) |
| Workshops | 0.012*<br>(0.007) | 0.006<br>(0.016) | 0.014*<br>(0.008) |

| | | | |
|---|---|---|---|
| Door-to-door | -0.001<br>(0.007) | 0.008<br>(0.017) | -0.003<br>(0.008) |
| Observations | 12700 | 2345 | 10355 |

*Table 10: Russian-speaking sample: First stage results*

In line with findings among women in France and non-Russian speakers in Estonia, the self-sampling approach diminishes the part-worth utility by 12.6% compared to campaigns involving health professional sampling. Additionally, we note that this aversion is more pronounced among non-vulnerable women than among vulnerable ones, although the disparity is slight compared to French and non-Russian speakers in Estonia.

Lastly, the coefficients for various prevention campaign levels within the complete sample indicate that distributing leaflets within the community enhances the part-worth utility by 4.5% compared to social media campaigns. This result seems to be found among both vulnerable and non-vulnerable women. In addition, distribution through workshops increases the part-worth utility by 12% compared to social media campaigns. This result, however, appears to be valid only for non-vulnerable women.

### 4.2.4. Results from the Second Stage

Preferences among the Estonian-speaking and Russian-speaking populations exhibit similarity, as evidenced in tables 11 and 12. Similarly, akin to France, there are no significant differences in preferences between vulnerable and non-vulnerable populations.

However, there are noticeable differences from the French case. Across all levels of the invitation and reminder attributes, there exists a positive and statistically significant impact on the willingness to undergo screening, with the most favored option being email invitations.

Akin to the French case, the introduction of self-sampling reduces the likelihood of screening uptake across the Estonian- and Russian-speaking populations and between vulnerable and non-vulnerable sub-samples.

Notably, social media emerge as the preferred option for prevention campaigns. Estonia having massively invested in the online provision of public services and being a leader in Europe in e-health, connected solutions (emails, SMS, E-portal) or social media are preferred to “classical” solutions. In Estonia, over 96% of the population hold an identification card that enables digital authentication for government services[5]

| **Estonian-speaking Sample** | **Full sample** | **Vulnerable** | **Non-Vulnerable** |
|---|---|---|---|
| **Invitation and Reminder** | | | |
| SMS | 1.006***<br>(0.055) | 0.735***<br>(0.182) | 0.966***<br>(0.058) |
| E-portal | 0.376***<br>(0.054) | 0.216*<br>(0.126) | 0.349***<br>(0.058) |
| Email | 1.404***<br>(0.053) | 1.045***<br>(0.212) | 1.404***<br>(0.058) |
| **Sampling Method** | | | |
| Self-sampling | -1.061***<br>(0.079) | -0.862***<br>(0.215) | -1.050***<br>(0.083) |
| **Prevention Campaign** | | | |

[5] https://www.oecd-ilibrary.org/docserver/a6c1caa5-en.pdf?expires=1712747615&id=id&accname=guest&checksum=E34474FF760AC832D60BE8D96D8932EF

| | | | |
|---|---|---|---|
| Leaflets and Posters | -0.760***<br>(0.050) | -0.634***<br>(0.145) | -0.798***<br>(0.056) |
| Workshops | -1.047***<br>(0.046) | -1.099***<br>(0.153) | -1.049***<br>(0.048) |
| Door-to-door | -2.197***<br>(0.064) | -2.459***<br>(0.299) | -2.254***<br>(0.072) |

*Table 11 Estonian-speaking sample: Second stage results*

| **Russian-speaking Sample** | **Full sample** | **Vulnerable** | **Non-Vulnerable** |
|---|---|---|---|
| **Invitation and Reminder** | | | |
| SMS | 0.367***<br>(0.060) | 0.422***<br>(0.125) | 0.180***<br>(0.067) |
| E-portal | -0.248***<br>(0.060) | -0.203<br>(0.177) | -0.254***<br>(0.068) |
| Email | 0.757***<br>(0.076) | 0.928***<br>(0.173) | 0.684***<br>(0.089) |
| **Sampling Method** | | | |
| Self-sampling | -1.548***<br>(0.113) | -0.661**<br>(0.287) | -1.527***<br>(0.117) |
| **Prevention Campaign** | | | |
| Leaflets and Posters | -0.161***<br>(0.059) | 0.032<br>(0.170) | -0.184***<br>(0.065) |
| Workshops | -0.175***<br>(0.057) | -0.053<br>(0.140) | -0.400***<br>(0.067) |
| Door-to-door | -0.655***<br>(0.085) | -0.231<br>(0.191) | -0.731***<br>(0.103) |

*Table 12: Russian-speaking sample: Second stage results*

In Estonia, respondents prefer all options to regular mail, with varying degrees of preference. SMS, email, and the health e-portal are all favored, with email being the most popular choice. Although all Estonians have access to the Terviseportaal health portal, through which they can access their electronic health records, prescriptions, referrals, ambulance services, consultations, and book specialist appointments, this option is considered less convenient by Estonian-speaking respondents than email. Indeed, although invitations through Terviseportaal are active during a year and that almost all of our sample (between 93% and 98%) declare having logged on this Patient Portal at least once in the past 12 months, participants still felt, in the open questions, that they risk missing their CCS invitation. On the other hand, Terviseportaal decreases the probability of undergoing screening for the Russian-speaking sample compared to invitations send by mail. To be efficient, the invitation through the E-portal should be accompanied with an automatic email notification, which would be more easily noticed by participants, thus being the preferred option.

Self-sampling does not increase the likelihood of being screened, compared to the standard of care. This finding, similar to the French results, is interpreted as an issue of information. Indeed, considering that most of our Estonian sample (around 89%) has undergone standard screening at least once, they have knowledge of the smear test whereas they never experienced self-sampling. Introducing a new and unknown method without information thus seems to lead to a rejection of that option, compared to a known and previously experimented method.

Social media is the preferred prevention campaign compared to all other options. That result does not come as a surprise, considering that the Estonian sample is rather young (around 85% below 60 years old, and 58% below 50 years old) and that Estonia is a e-country, where there is a strong emphasis placed on digital literacy. In the additional comments, respondents mention that combining leaflets and social media would be the most appropriate solution, so as to reach all age groups.

### 4.2.4. Main findings for Estonia

Our results in Estonia highlight several aspects:

- Overall, there are no significant differences in preferences between vulnerable and non-vulnerable sub-samples. Further investigations will determine if the variations in preference intensity (as indicated by the absolute values of the coefficients) between the two groups are or not statistically significant.
- Furthermore, there are no difference in preferences between the Estonian- and the Russian-speaking sample, except regarding the Patient Portal Terviseportaal. Otherwise, preferences are similar for all other attributes and their corresponding levels.
- Similar to the French results, offering self-sampling would not increase the likelihood of being screened compared to the standard of care. This rejection is due both to a "resistance to change", since most of respondents feel more comfortable with a smear test that they have experienced at least once in their life and since there is a lack of information regarding the self-sampling kit and its use.
- Unsurprisingly social media is the preferred prevention campaign compared to leaflets in the community, prevention workshops and door-to-door mediation. Due to the high level of digital literacy in Estonia and the high proportion of relatively young people in our sample, a social media campaign is likely to generate greater engagement in CCS.
- An invitation by postal mail would decrease, for the whole sample, the likelihood of uptake. The Estonian-speaking sample prefers all options to this one, with stronger coefficients for emails, although significance between the different coefficient needs to be investigated. On the other hand, the Russian-speaking sample rejects the possibility of being invited through the Patient Portal.

## 4.3 PORTUGAL

### 4.3.1. Descriptive Statistics

Our final sample for Portugal consists of 156 completed responses, of which 135 (86.5%) are identified as vulnerable, based on the same selection process used for the other countries. This proportion, significantly higher than in France and Estonia, is due to data collection being almost entirely targeted at highly vulnerable populations. Responses were collected directly through the support institutions that participated in Phase I of the implementation of CBIG-SCREEN. Most responses were gathered face-to-face by partners within these institutions, ensuring a good understanding of the questionnaire.

Due to the small number of respondents identified as non-vulnerable (21), it is not possible to differentiate preferences between vulnerable and non-vulnerable individuals in Portugal because of convergence issues in the econometric model. Therefore, we present results only for the vulnerable sub-sample. Details of the descriptive statistics can be found in Annex A7 and A8.

The screening age window in Portugal is 25–65. Our respondents are well distributed across age groups, with a slight overrepresentation (34%) in the 50–59 age group. Unsurprisingly, and due to the distribution through support institutions, our sample mostly resides in urban areas.

HPV vaccination, although introduced in 2008 in Portugal, appears to be limited, with only 19% of respondents reporting being vaccinated. Awareness of screening campaigns is moderate, with 53% of respondents indicating they are aware of such initiatives.

Yet, secondary prevention seems to reach the population widely: a significant majority (93%) are aware of what a smear test is, and an equally high proportion (95%) report having undergone a smear test at some point. Among those who have had a smear test, 81% have done so in the past five years, reflecting a relatively good adherence to regular screening recommendations. These proportions are higher than the national average (around 82% ), probably due to the fact that the respondents, although socially vulnerable, are in regular contact with medical staff able to recommend and ensure regular screening.
The DCE questionnaire appears to have been easily understood with 29% of respondents finding it “easy” and 69% “quite easy”, which is consistent with an almost exclusive face-to-face data collection.

### 4.3.2. Description of choice sets and frequencies

In the first stage of the DCE, respondents are forced to choose between two interventions. Table 13 below illustrates, for each of the nine choice sets (CS), the proportion of respondents who chose the first intervention. The distribution of choices is more uniform than in the two other countries, ranging between 41% to 65%.

| **CS** | **Intervention 1** | | | **Intervention 2** | | | **Portugal N=135** |
|---|---|---|---|---|---|---|---|
| | **Invitation and Reminder** | **Sampling Method** | **Information Campaign** | **Invitation and Reminder** | **Sampling Method** | **Information Campaign** | **Intervention 1** |
| **1** | E-portal | Sampling at a health professional | Social Media | Mail | Sampling at a health professional | Leaflets and Posters | 44% |
| **2** | E-portal | Sampling at a health professional | Leaflets and Posters | Email | Sampling at a health professional | Social Media | 58% |
| **3** | SMS | Sampling at a health professional | Free Prevention Workshops | E-portal | Self-Sampling | Leaflets and Posters | 65% |
| **4** | Mail | Sampling at a health professional | Social Media | Email | Sampling at a health professional | Door to Door Health Mediators | 61% |
| **5** | Email | Self-sampling | Social Media | SMS | Self-sampling | Door to Door Health Mediators | 41% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | SMS | Self-sampling | Free Preventions Workshop | Mail | Sampling at a health professional | Door to Door Health Mediators | 41% |
| **7** | SMS | Self-sampling | Social Media | E-portal | Sampling at a health professional | Free Prevention Workshops | 43% |
| **8** | Mail | Self-sampling | Free Prevention Workshops | SMS | Self-sampling | Social Media | 52% |
| **9** | Mail | Sampling at a health professional | Door to Door Health Mediators | Email | Self-sampling | Leaflets and Posters | 62% |

Table 13: Description of choice sets and frequencies

In the second stage, respondents' willingness to undergo screening is measured based on the intervention they chose in the first stage (stage 2 of the DCE: "Would you be willing to be screened under your chosen intervention"). Table 14 below shows that for all choice sets, the willingness to undergo screening is consistently high, exceeding 88%, except for CS5 and CS8, which exclusively offer the self-sampling option as screening method.

| **Choice Set** | **% of respondents willing to undergo screening under chosen intervention** |
|---|---|
| | *Vulnerable Sample* *N=135* |
| 1 | 96% |
| 2 | 88% |
| 3 | 89% |
| 4 | 89% |
| 5 | 67% |
| 6 | 90% |
| 7 | 88% |
| 8 | 76% |
| 9 | 90% |

Table 14: Willingness to undergo screening for Portuguese respondents

When asked if being provided with assistance by a health professional could change their decision regarding self-sampling, 46% and 44% for CS3 and CS7 respectively answered "yes". This proportion, similar to that found in the French sample, shows that despite initial rejection of self-sampling, this reluctance might be due to a fear of the unknown technic and could be overcome through adequate support.

Receiving/Sending back the self-sampling kit

Respondents indicated they would prefer collecting their sampling kit from a health professional (43%), then at a proximity center like a pharmacy (30%), with the least preferred option being receiving the kit by mail (27%). This corroborates the need for support by the health professional to introduce self-sampling among the population. Similarly, respondents express a clear preference for giving their sample back to a health professional, mostly their doctor (60%) followed by pharmacists or laboratories (27%).

### 4.3.3. Results from the First Stage

Table 15 below shows the effect of each attribute and levels on respondents' utility.

Portuguese respondents show a preference for Mail over Email in order to receive their invitations to screening. Nothing can be concluded for SMS and E-Portal for lack of significance.

Similarly to France and Estonia, the introduction of self-sampling would decrease the utility of respondents by 1.05 compared to screening performed by a health professional. This shows that reluctance towards self-sampling is shared in the three countries under study.

Nothing can be concluded regarding the preferred information campaign, due to a lack of statistical significance.

| | **Vulnerable Sample** ***N=135*** |
|---|---|
| **Invitation and Reminder** | |
| *Ref == Mail* | |
| SMS | 0.047<br>(0.155) |
| E-portal | -0.259<br>(0.146) |
| Email | -0.526**<br>(0.174) |
| **Sampling Method** | |
| *Ref == Sampling at a health professional* | |
| Self-sampling | -1.050***<br>(0.269) |
| **Information Campaign** | |
| *Ref == Social Media* | |
| Leaflets and Posters | 0.046<br>(0.152) |
| Free Prevention Workshops | 0.075<br>(0.150) |
| Door-to-Door | -0.103<br>(0.155) |
| Observations | 2430 |

Table 15: First stage results

### 4.3.4. Results from the Second Stage

The second stage provides insights on the impact of the adoption of the different attributes and levels on the probability of adopting the screening campaign.

Adopting invitation and reminder sent by E-portal would reduce by 6.3% the probability of adhering to the screening program compared to an invitation through postal mail. Considering there are no existing E-portal in Portugal, this rejection is not surprising.

Introducing self-sampling as the reference method for screening would drastically decrease (by 19.4%) CCS uptake, which confirms results from the 1st stage and a strong preference for screening to be performed by a health professional.

Information campaigns through leaflets in the community, rather than social media would likely increase screening uptake (by 6.1%). This is consistent with the fact that respondents are vulnerable, with low digital literacy, thus preferring receiving information through non-digital channels.

| | **Vulnerable Sample N=135** |
|---|---|
| **Invitation and Reminder** | |
| *Ref == Mail* | |
| SMS | -0.007<br>(0.211) |
| E-portal | -0.063**<br>(0.023) |
| Email | -0.019<br>(0.023) |
| **Sampling Method** | |
| *Ref== Sampling at a health professional* | |
| Self-sampling | -0.194***<br>(0.021) |
| **Information Campaign** | |
| *Ref == Social Media* | |
| Leaflets and Posters | 0.061**<br>(0.020) |
| Free Prevention Workshops | 0.033<br>(0.019) |
| Door-to-Door | -0.021<br>(0.020) |
| Observations | 2430 |

Table 16: Second stage results

### 4.3.5. Main findings for Portugal

- Due to a limited number of answers, our results do not allow to compare vulnerable and non-vulnerable population. Nevertheless, the collection of data was organized among women with the same characteristics as the target population of the implementation phase of CBIG-SCREEN, thus providing useful insights on the preferences of the population of interest.
- Although we cannot conclude towards a preferred method of invitation to screening, our results indicate that the vulnerable sub-population does not prefer digital communication such as Email or Eportal. This seems consistent with the lower rates of technological equipment found in socially vulnerable populations.

- Similarly to France and Estonia, self-sampling does not emerge as a preferred solution compared to screening by a health professional. Yet its acceptability would increase if the self-sampling kit were handed over by a health professional with the possibility of being assisted while performing the test.
- Leaflets and posters seem to be preferred over social media as an information campaign, due to the low level of digital equipment of vulnerable populations and the difficulties to reach them through digital means.

# General Conclusion

The main contribution of this preference study is primarily methodological. It demonstrates the feasibility to use behavioral and experimental methods in economics to directly engage with vulnerable populations, who are often marginalized in policy consultations because they are deemed too difficult to reach. By conducting an initial survey with field workers in contact with vulnerable populations and accustomed to working alongside them, we were able to design a preference study that was informative on vulnerable women's preferences and on how they may differ from those from the rest of the population. By using mixed experiment distribution methods (online and support from third-parties), this study succeeded in collecting preferences from a substantial number of vulnerable and non-vulnerable women in France and Estonia, while targeting led to recruiting an exclusively vulnerable population in Portugal.

Sensitivity analyses have explored possible variations in results due to heterogeneity in the definition of vulnerability, but results remain stable. Further exploration of the data in both France, Estonia and Portugal should help refine the notion of vulnerability based on the results of other WPs of the CBIG-SCREEN project.

Results from the DCE study show that:

1- Contrary to expectations, there seems to be no significant difference in preferences between vulnerable and non-vulnerable women. This challenges the current efforts to develop customized interventions for particular underserved groups. Although carefully chosen, based on results of other CBIG-SCREEN WPs and extensively piloted, it is possible that the choice of attributes and levels in the DCE study has not allowed revealing these specificities. We chose for instance to frame all interventions as free but some of the respondents' comments suggest that it was not clear this was the case and that the fear of having to face out-of-pocket payments may have influenced some of their choices;

2- Self-sampling, often identified in the literature as a strategy to enhance participation rates across populations, particularly among hard-to-reach women, and already integrated in some of the nationally organized screening initiatives, did not emerge as the preferred option for neither of the three countries, compared to the conventional smear test administered by a healthcare professional;

3- Findings from task 2 in WP4 has shown that when it comes to CCS, women, whether vulnerable or not, face two main concerns: 1. Apprehension towards the traditional smear test and discomfort with physical interaction with healthcare providers, and 2. Anxiety about their ability to conduct self-sampling independently, fearing either physical discomfort or uncertainty about providing a valid test. Comments following DCE choice tasks show that introducing self-screening under the guidance of a healthcare provider, even remotely, could potentially address both issues and increase CCS uptake. Our study thus highlights the importance of information when introducing self-sampling so as to increase the probability of screening uptake;

4- The optimal method for inviting women to screening, as well as sending potential reminders, logically varies, depending on the country and is contingent upon prior investments made by public policies. Consequently, in Estonia, where there has been substantial investment in digital literacy among the population, electronic invitations such as emails, SMS, or through the E-portal are considered more effective. Conversely, in France, respondents indicate a preference for traditional postal invitations, with other methods perceived as intrusive or impractical, while Portuguese respondents also tend to reject digital methods;

5- Respondents from both countries reject information campaigns that imply their active participation on the ground that they are time consuming, namely door-to-door campaigns and free prevention workshops. In some of the comments, respondents support the possibility of mixing non-digital solutions, such as leaflets in public places with social media campaigns as a way to reach all generations.

**Acknowledgements**

We would like to acknowledge the contributions of the members of CBIG-SREEN Consortium to this study, in particular researchers from Estonia, Portugal and Romania, as well as researchers at Hospinnomics, PSE, who worked on this project, namely Violette Delisle, Camilla Fiorina, Ivan Tzintzun and Camille Naudy.

**Ethical Approvals**

Ethical approvals were obtained in France from the CEEI/IRB in June 2023, in Estonia from the Research Ethics Committee of the University of Tartu in October 2023 and in Portugal from ISPUP's Ethics Committee in May 2023 to distribute the questionnaire and collect the data.

**References**

Aareleid, T., Thomson, H., Pukkala, E., & Hakama, M. (1993). Cervical cancer incidence and mortality trends in finland and estonia: a screened vs. an unscreened population. European Journal of Cancer, 29(5), 745–749. https://doi.org/10.1016/S0959-8049(05)80359-4

Adger, W. N. (2006). Vulnerability. Global Environmental Change, 16(3), 268–281. https://doi.org/10.1016/j.gloenvcha.2006.02.006

Alarcão, V., & Zdravkova, B. (2022). Attitudes and Practices towards HPV Vaccination and Its Social Processes in Europe: An Equity-Focused Scoping Review. Societies, 12(5), 131. https://doi.org/10.3390/soc12050131

Alimena, S., Manning-Geist, B., Pena, N., Vitonis, A. F., & Feldman, S. (2021). Outcomes by Race Among Women Referred to an Academic Colposcopy Clinic with a Patient Navigation Program. Journal of Women's Health, 30(6), 902–909. https://doi.org/10.1089/jwh.2020.8381

Andreassen, T., Weiderpass, E., Nicula, F., Suteu, O., Itu, A., Bumbu, M., Tincu, A., Ursin, G., & Moen, K. (2017). Controversies about cervical cancer screening: A qualitative study of Roma women's (non)participation in cervical cancer screening in Romania. Social Science & Medicine, 183, 48–55. https://doi.org/10.1016/j.socscimed.2017.04.040

Arbyn, M., Rebolj, M., De Kok, I. M. C. M., Fender, M., Becker, N., O'Reilly, M., & Andrae, B. (2009). The challenges of organising cervical screening programmes in the 15 old member states of the European Union. European Journal of Cancer, 45(15), 2671–2678. https://doi.org/10.1016/j.ejca.2009.07.016

Arbyn, M., Smith, S. B., Temin, S., Sultana, F., & Castle, P. (2018a). Detecting cervical precancer and reaching underscreened women by using HPV testing on self samples: updated meta-analyses. BMJ, 363, k4823. https://doi.org/10.1136/bmj.k4823

Arbyn, M., Smith, S. B., Temin, S., Sultana, F., & Castle, P. (2018b). Detecting cervical precancer and reaching underscreened women by using HPV testing on self samples: updated meta-analyses. BMJ, 363, k4823. https://doi.org/10.1136/bmj.k4823

Aschbrenner, K. A., Naslund, J. A., Grinley, T., Bienvenida, J. C. M., Bartels, S. J., & Brunette, M. (2018). A Survey of Online and Mobile Technology Use at Peer Support Agencies. The Psychiatric Quarterly, 89(3), 539–548. https://doi.org/10.1007/s11126-017-9561-4

Audiger, C. (2022). Dépistage organisé du cancer du col de l'utérus: déterminants de recours et inégalités sociales. Le programme de Dépistage Organisé du Cancer du Col de l'Utérus sur le site pilote du Val-de-Marne. Sorbonne Université.

Barré, S. et al. (2017). Evaluation médico-économique du dépistage du cancer du col de l'utérus en France. Bulletin Épidémiologique Hebdomadaire, 48–58.

Binder-Foucard, F., Belot, A., Delafosse, P., Remontet, L., Woronoff, A. S., & Bossard, N. (2013). Estimation nationale de l'incidence et de la mortalité par cancer en France entre 1980 et 2012 : étude à partir des registres des cancers du réseau Francim. Partie 1 - Tumeurs solides. Institut de veille sanitaire. https://hal.science/hal-02084700

Bryere, J. et al. (2017). Environnement socioéconomique et incidence des cancers en France. Santé Publique France, Bulletin Épidémiologique Hebdomadaire, 4.

Burton, A. (2015). Vulnerability. Frontiers in Ecology and the Environment, 13(1), 64–64. https://doi.org/10.1890/1540-9295-13.1.64

Campbell, H. E., Gray, A. M., Watson, J., Jackson, C., Moseley, C., Cruickshank, M. E., Kitchener, H. C., & Rivero-Arias, O. (2020). Preferences for interventions designed to increase cervical screening uptake in non-attending young women: How findings from a discrete choice experiment compare with observed behaviours in a trial. Health Expectations, 23(1), 202–211. https://doi.org/10.1111/hex.12992

Chamot, E., Mulambia, C., Kapambwe, S., Shrestha, S., Parham, G. P., Macwan'gi, M., & Mwanahamuntu, M. H. (2015). Preference for Human Papillomavirus–Based Cervical Cancer Screening: Results of a Choice-Based Conjoint Study in Zambia. Journal of Lower Genital Tract Disease, 19(2), 119–123. https://doi.org/10.1097/LGT.0000000000000081

Cast, J., Flynn, T. N., Natarajan, L., Sproston, K., Lewis, J., Louviere, J. J., & Peters, T. J. (2008). Valuing the ICECAP capability index for older people. Social Science & Medicine, 67(5), 874–882. https://doi.org/10.1016/j.socscimed.2008.05.015

Fiebig, D. G., Haas, M., Hossain, I., Street, D. J., & Viney, R. (2009). Decisions about Pap tests: What influences women and providers? Social Science & Medicine, 68(10), 1766–1774. https://doi.org/10.1016/j.socscimed.2009.03.002

for the International Agency for Research on Cancer Multicentric Cervical Cancer Study Groups and the International Agency for Research on Cancer Human Papillomavirus Prevalence Surveys Study Group, Franceschi, S., Plummer, M., Clifford, G., De Sanjose, S., Bosch, X., Herrero, R., Muñoz, N., & Vaccarella, S. (2009). Differences in the risk of cervical cancer and human papillomavirus infection by education level. British Journal of Cancer, 101(5), 865–870. https://doi.org/10.1038/sj.bjc.6605224

Furtunescu, F., Bohiltea, R. E., Neacsu, A., Grigoriu, C., Pop, C. S., Bacalbasa, N., Ducu, I., Iordache, A.-M., & Costea, R. V. (2021). Cervical Cancer Mortality in Romania: Trends, Regional and Rural–Urban Inequalities, and Policy Implications. Medicina, 58(1), 18. https://doi.org/10.3390/medicina58010018

Fuzzell, L. N., Perkins, R. B., Christy, S. M., Lake, P. W., & Vadaparampil, S. T. (2021). Cervical cancer screening in the United States: Challenges and potential solutions for underscreened groups. Preventive Medicine, 144, 106400. https://doi.org/10.1016/j.ypmed.2020.106400

Gehlert, S., & Mozersky, J. (2018). Seeing Beyond the Margins: Challenges to Informed Inclusion of Vulnerable Populations in Research. The Journal of Law, Medicine & Ethics : A Journal of the American Society of Law, Medicine & Ethics, 46(1), 30–43. https://doi.org/10.1177/1073110518766006

Genoff, M. C., Zaballa, A., Gany, F., Gonzalez, J., Ramirez, J., Jewell, S. T., & Diamond, L. C. (2016). Navigating Language Barriers: A Systematic Review of Patient Navigators' Impact on Cancer Screening for Limited English Proficient Patients. Journal of General Internal Medicine, 31(4), 426–434. https://doi.org/10.1007/s11606-015-3572-3

Greenley, R., Bell, S., Rigby, S., Legood, R., Kirkby, V., McKee, M., & the CBIG-SCREEN Consortium. (2023). Factors influencing the participation of groups identified as underserved in cervical cancer screening in Europe: a scoping review of the literature. Frontiers in Public Health, 11, 1144674. https://doi.org/10.3389/fpubh.2023.1144674

Grillo, F., Vallée, J., & Chauvin, P. (2012). Inequalities in cervical cancer screening for women with or without a regular consulting in primary care for gynaecological health, in Paris, France. Preventive Medicine, 54(3–4), 259–265. https://doi.org/10.1016/j.ypmed.2012.01.013

Hamers, F. F., & Woronoff, A. S. (2020). Cancer du col de l'utérus en France: tendances de l'incidence et de la mortalité jusqu'en 2018. Revue de Biologie Médicale, N, 353(75).

Hanguehard, R. et al. (2022). Couverture vaccinale contre les infections à papillomavirus humain des filles âgées de 15 à 18 ans et déterminants de vaccination, France, 2021. Bull Épidémiol Hebd, 24–25.

Hawkes, D., Keung, M. H. T., Huang, Y., McDermott, T. L., Romano, J., Saville, M., & Brotherton, J. M. L. (2020). Self-Collection for Cervical Screening Programs: From Research to Reality. Cancers, 12(4), 1053. https://doi.org/10.3390/cancers12041053

INCA. (2020). Le dépistage du cancer du col de l'utérus en pratique. Collection Outils pour la pratique.

Khantzian, E. J. (1997). The Self-Medication Hypothesis of Substance Use Disorders: A Reconsideration and Recent Applications. Harvard Review of Psychiatry, 4(5), 231. https://www.academia.edu/26878358/The_Self_Medication_Hypothesis_of_Substance_Use_Disorders_A_Reconsideration_and_Recent_Applications

Kirkegaard, P., Larsen, M. B., & Andersen, B. (2023). "It's cancer screening after all". Barriers to cervical and colorectal cancer screening and attitudes to promotion of self-sampling kits upon attendance for breast cancer screening. Journal of Medical Screening, 30(2), 74–80. https://doi.org/10.1177/09691413221137852

Kivistik, A., Lang, K., Baili, P., Anttila, A., & Veerus, P. (2011). Women's knowledge about cervical cancer risk factors, screening, and reasons for non-participation in cervical cancer screening programme in Estonia. BMC Women's Health, 11(1), 43. https://doi.org/10.1186/1472-6874-11-43

Kurani, S. S., McCoy, R. G., Lampman, M. A., Doubeni, C. A., Finney Rutten, L. J., Inselman, J. W., Giblon, R. E., Bunkers, K. S., Stroebel, R. J., Rushlow, D., Chawla, S. S., & Shah, N. D. (2020). Association of Neighborhood Measures of Social Determinants of Health With Breast, Cervical, and Colorectal Cancer Screening Rates in the US Midwest. JAMA Network Open, 3(3), e200618. https://doi.org/10.1001/jamanetworkopen.2020.0618

Laranjeira, C. A. (2013). Portuguese Women's Knowledge and Health Beliefs about Cervical Cancer and Its Screening. Social Work in Public Health, 28(2), 150–157. https://doi.org/10.1080/19371918.2011.592042

Liamputtong, P. (2006). Researching the Vulnerable : A Guide to Sensitive Research Methods. Researching the Vulnerable, 1–256. https://www.torrossa.com/en/resources/an/4913092

Liu, B. Y., O'Malley, J., Mori, M., Fagnan, L. J., Lieberman, D., Morris, C. D., Buckley, D. I., Heintzman, J. D., & Carney, P. A. (2014). The Association of Type and Number of Chronic Diseases with Breast, Cervical, and Colorectal Cancer Screening. The Journal of the American Board of Family Medicine, 27(5), 669–681. https://doi.org/10.3122/jabfm.2014.05.140005

Lozar, T., Nagvekar, R., Rohrer, C., Dube Mandishora, R. S., Ivanus, U., & Fitzpatrick, M. B. (2021). Cervical Cancer Screening Postpandemic: Self-Sampling Opportunities to Accelerate the Elimination of Cervical Cancer. International Journal of Women's Health, Volume 13, 841–859. https://doi.org/10.2147/IJWH.S288376

Mallafré-Larrosa, M., Ritchie, D., Papi, G., Mosquera, I., Mensah, K., Lucas, E., Bøje, R. B., Kirkegaard, P., Andersen, B., Basu, P., the CBIG-SCREEN Consortium, Bardou, M., Andersen, B. S., Kirkegaard, P., Bøje, R. B., Tranberg, M., Legood, R., Sun, L., McKee, M., … Dascher-Nadel, C. (2023). Survey of current policies towards widening cervical screening coverage among vulnerable women in 22 European countries. European Journal of Public Health, 33(3), 502–508. https://doi.org/10.1093/eurpub/ckad055

Maness, S. B., & Thompson, E. L. (2019). Social Determinants of Human Papillomavirus Vaccine Uptake: An Assessment of Publicly Available Data. Public Health Reports, 134(3), 264–273. https://doi.org/10.1177/0033354919838219

Mansfield, L. N., Chung, R. J., Silva, S. G., Merwin, E. I., & Gonzalez-Guarda, R. M. (2022). Social determinants of human papillomavirus vaccine series completion among U.S. adolescents: A mixed-methods study. SSM - Population Health, 18, 101082. https://doi.org/10.1016/j.ssmph.2022.101082

Mansfield, L. N., Silva, S. G., Merwin, E. I., Chung, R. J., & Gonzalez-Guarda, R. M. (2021). Factors Associated With Human Papillomavirus Vaccine Series Completion Among Adolescents. American Journal of Preventive Medicine, 61(5), 701–708. https://doi.org/10.1016/j.amepre.2021.04.031

de Melo Marques, P. S. (2022). Cervical Cancer Screening Among Migrant Women in Portugal (Doctoral dissertation, Universidade NOVA de Lisboa (Portugal)).

Nakalembe, M., Makanga, P., Kambugu, A., Laker-Oketta, M., Huchko, M. J., & Martin, J. (2020). A public health approach to cervical cancer screening in Africa through community-based self-administered HPV testing and mobile treatment provision. Cancer Medicine, 9(22), 8701–8712. https://doi.org/10.1002/cam4.3468

Oberlin, A. M., Pasipamire, T., & Chibwesha, C. J. (2019). Exploring women's preferences for HPV-based cervical cancer screening in South Africa. International Journal of Gynecology & Obstetrics, 146(2), 192–199. https://doi.org/10.1002/ijgo.12869

Ojamaa, K., Innos, K., Baburin, A., Everaus, H., & Veerus, P. (2018). Trends in cervical cancer incidence and survival in Estonia from 1995 to 2014. BMC Cancer, 18(1), 1075. https://doi.org/10.1186/s12885-018-5006-1

Ouanhnon, L., Rougé Bugat, M.-E., Lamy, S., Druel, V., Delpierre, C., & Grosclaude, P. (2022). Social and territorial inequalities in breast and cervical cancers screening uptake: a cross-sectional study in France. BMJ Open, 12(2), e055363. https://doi.org/10.1136/bmjopen-2021-055363

Parker, S., Deshmukh, A. A., Chen, B., Lairson, D. R., Daheri, M., Vernon, S. W., & Montealegre, J. R. (2023). Perceived barriers to cervical cancer screening and motivators for at-home human papillomavirus self-sampling during the COVID-19 pandemic: Results from a telephone survey. ELife, 12, e84664. https://doi.org/10.7554/eLife.84664

Pornet, C., Delpierre, C., Dejardin, O., Grosclaude, P., Launay, L., Guittet, L., Lang, T., & Launoy, G. (2012). Construction of an adaptable European transnational ecological deprivation index: the French version. Journal of Epidemiology and Community Health, 66(11), 982–989. https://doi.org/10.1136/jech-2011-200311

Pullyblank, K., Brunner, W., Scribani, M., Krupa, N., Wyckoff, L., & Strogatz, D. (2022). Evaluation of a Peer Led Chronic Pain Self-Management Program in a Rural Population. Journal of Primary Care & Community Health, 13, 21501319221121464. https://doi.org/10.1177/21501319221121464

Rigby S, Greenley R, Uuskula A, Tisler A, Suurna M, Jesse M, Bardou M, McKee M; CBIG-SCREEN Consortium. Expanding eligibility and improving quality of cervical cancer screening in Estonia: The 2021 reforms. Health Policy. 2024 Jun;144:105077. doi: 10.1016/j.healthpol.2024.105077. Epub 2024 Apr 24. PMID: 38678760.

Rigg, J., Oven, K. J., Basyal, G. K., & Lamichhane, R. (2016). Between a rock and a hard place: Vulnerability and precarity in rural Nepal. Geoforum, 76, 63–74. https://doi.org/10.1016/j.geoforum.2016.08.014

Ritchie, D., Arbyn, M., Basu, P., Corbex, M., Fidarova, E., Ivanuš, U., Papi, G., Torode, J., & Zacharopoulou, C. (2022). Europe's path to eliminating cervical cancer as a public health problem. The Lancet Regional Health - Europe, 12, 100276. https://doi.org/10.1016/j.lanepe.2021.100276

Saelee, R., Chandra Murthy, N., Patel Murthy, B., Zell, E., Shaw, L., Gibbs-Scharf, L., Harris, L., & Shaw, K. M. (2023). Minority Health Social Vulnerability Index and COVID-19 vaccination coverage — The United States, December 14, 2020–January 31, 2022. Vaccine, 41(12), 1943–1950. https://doi.org/10.1016/j.vaccine.2023.02.022

Santé Publique France. (2022). Dépistage organisé du cancer du col de l'utérus : Définition des indicateurs de performance et format des données pour l'évaluation du programme national. Saint-Maurice : Santé publique France, mise à jour 2022 du document d'octobre 2020. 102.

Saulsberry, L., Bhargava, A., Zeng, S., Gibbons, J. B., Brannan, C., Lauderdale, D. S., & Gibbons, R. D. (2023). The social vulnerability metric ( SVM ) as a new tool for public health. Health Services Research, 58(4), 873–881. https://doi.org/10.1111/1475-6773.14102

Serrano, B., Ibáñez, R., Robles, C., Peremiquel-Trillas, P., De Sanjosé, S., & Bruni, L. (2022). Worldwide use of HPV self-sampling for cervical cancer screening. Preventive Medicine, 154, 106900. https://doi.org/10.1016/j.ypmed.2021.106900

Singh, G. (2012). Global Inequalities in Cervical Cancer Incidence and Mortality are Linked to Deprivation, Low Socioeconomic Status, and Human Development. International Journal of MCH and AIDS (IJMA), 1(1). https://doi.org/10.21106/ijma.12

Singh, G. K., Williams, S. D., Siahpush, M., & Mulhollen, A. (2011). Socioeconomic, Rural-Urban, and Racial Inequalities in US Cancer Mortality: Part I—All Cancers and Lung Cancer and Part II—Colorectal, Prostate, Breast, and Cervical Cancers. Journal of Cancer Epidemiology, 2011, 1–27. https://doi.org/10.1155/2011/107497

Suurna, M., Orumaa, M., Ringmets, I., & Pärna, K. (2022). Inequalities in reported use of cervical screening in Estonia: results from cross-sectional studies in 2004–2020. BMC Women's Health, 22(1), 545. https://doi.org/10.1186/s12905-022-02123-z

Tisler, A., Ojavee, S. E., Veerus, P., Soodla, P., & Uusküla, A. (2021). Cervical cancer screening patterns among HIV-positive women in Estonia: a population-based retrospective cohort study. BMC Cancer, 21(1), 350. https://doi.org/10.1186/s12885-021-08076-0

Teixeira, C., Antão, C., Anes, E., Gomes, M. J., Versos, A., & Tomé, C. (2022). Use of cervical cancer screening among patients of primary healthcare services: Northeast Portugal. Portuguese Journal of Public Health, 40(2), 61-68. https://doi.org/10.1159/000522666

Treibich C., Lépine A. (2019). Estimating misreporting in condom use and its determinants among sex workers: Evidence from the list randomisation method. Health Economics, Wiley, 28 (1), pp.144-160. 10.1002/hec.3835. https://hal.science/hal-01896914

Todor, R. D., Bratucu, G., Moga, M. A., Candrea, A. N., Marceanu, L. G., & Anastasiu, C. V. (2021). Challenges in the Prevention of Cervical Cancer in Romania. International Journal of Environmental Research and Public Health, 18(4), 1721. https://doi.org/10.3390/ijerph18041721

Tranberg, M., Bech, B. H., Blaakær, J., Jensen, J. S., Svanholm, H., & Andersen, B. (2018). HPV self-sampling in cervical cancer screening: the effect of different invitation strategies in various socioeconomic groups - a randomized controlled trial. Clinical Epidemiology, 10, 1027–1036. https://doi.org/10.2147/CLEP.S164826

Umar, N., Quaife, M., Exley, J., Shuaibu, A., Hill, Z., & Marchant, T. (2020). Toward improving respectful maternity care: a discrete choice experiment with rural women in northeast Nigeria. BMJ Global Health, 5(3), e002135. https://doi.org/10.1136/bmjgh-2019-002135

Vanthomme, K., Vandenheede, H., Hagedoorn, P., & Gadeyne, S. (2017). Evolution of socioeconomic inequalities in site-specific cancer mortality among Belgian women between 1991 and 2008 using a fundamental cause approach. Cancer Causes & Control, 28(8), 829–840. https://doi.org/10.1007/s10552-017-0921-z

WHO. (2022). Cervical Cancer.

Wordsworth, S., Ryan, M., Skåtun, D., & Waugh, N. (2006). Women's preferences for cervical cancer screening: A study using a discrete choice experiment. International Journal of Technology Assessment in Health Care, 22(3), 344–350. https://doi.org/10.1017/S0266462306051245

Yii, V., Palermo, C., & Kleve, S. (2020). Population-based interventions addressing food insecurity in Australia: A systematic scoping review. Nutrition & Dietetics, 77(1), 6–18. https://doi.org/10.1111/1747-0080.12580

# Annexes

*Reminder of Attributes:*

*Descriptive Statistics for France*

| | All | Vulnerable | Non-Vulnerable |
|---|---|---|---|
| **Characteristics** | **N = 203**[1] | **N = 112**[1] | **N = 91**[1] |
| Age group | | | |
| 25-29 | 70 (34%) | 40 (36%) | 30 (33%) |
| 30-39 | 73 (36%) | 36 (32%) | 37 (41%) |
| 40-49 | 44 (22%) | 28 (25%) | 16 (18%) |
| 50-59 | 12 (5.9%) | 6 (5.4%) | 6 (6.6%) |
| 60-65 | 4 (2.0%) | 2 (1.8%) | 2 (2.2%) |
| Residence | | | |
| In a big city | 149 (73%) | 83 (74%) | 66 (73%) |
| In a suburban area | 28 (14%) | 16 (14%) | 12 (13%) |
| Rural Area | 26 (13%) | 13 (12%) | 13 (14%) |
| Did you find the questionnaire difficult? | | | |
| Easy | 114 (56%) | 57 (51%) | 57 (63%) |
| Relatively Easy | 73 (36%) | 42 (38%) | 31 (34%) |
| Relatively Difficult | 13 (6.4%) | 11 (9.8%) | 2 (2.2%) |
| Difficult | 3 (1.5%) | 2 (1.8%) | 1 (1.1%) |

***Table A1: France Descriptive Statistics***

| | All | Vulnerable | Non-Vulnerable |
|---|---|---|---|
| **Characteristic** | **N = 203** | **N = 112** | **N = 91** |
| Are you vaccinated against HPV? | | | |
| Yes | 59 (29%) | 35 (31%) | 24 (26%) |
| No | 128 (63%) | 66 (59%) | 62 (68%) |
| I don’t know | 16 (7.9%) | 11 (9.8%) | 5 (5.5%) |
| Do you know of any screening campaign? | | | |
| No | 15 (7.4%) | 13 (12%) | 2 (2.2%) |
| Yes | 188 (93%) | 99 (88%) | 89 (98%) |
| Do you know what a smear test is? | | | |
| No | 8 (3.9%) | 5 (4.5%) | 3 (3.3%) |
| Yes | 195 (96%) | 107 (96%) | 88 (97%) |
| Have you ever done a smear test? | | | |
| Yes | 144 (72%) | 74 (67%) | 70 (77%) |
| No | 37 (18%) | 22 (20%) | 15 (16%) |
| I don’t know | 20 (10%) | 14 (13%) | 6 (6.6%) |
| Has the smear test been done in the last 5 years? | | | |
| Yes | 129 (90%) | 65 (88%) | 64 (91%) |
| No | 13 (9%) | 7 (9.5%) | 6 (8.6%) |
| I don’t know | 2 (1.4%) | 2 (2.7%) | |

***Table A2: France CCS knowledge and experience***

*Descriptive Statistics for the Estonian-speaking respondents*

| | All | Vulnerable | Non-Vulnerable |
|---|---|---|---|
| **Characteristics** | **N = 3261** | **N = 347**[1] | **N = 2914**[1] |
| Age group | | | |
| 30-39 | 890 (27%) | 100 (29%) | 790 (27%) |
| 40-49 | 986 (30%) | 112 (32%) | 874 (30%) |
| 50-59 | 954 (29%) | 94 (27%) | 860 (30%) |
| 60-65 | 431 (13%) | 41 (12%) | 390 (13%) |
| Residence | | | |
| In a big city | 1678 (51%) | 165 (48%) | 1513 (52%) |
| In a suburb of a big city | 505 (15%) | 47 (14%) | 458 (16%) |
| In another urban area | 345 (11%) | 39 (11%) | 306 (11%) |
| Rural Area | 733 (22%) | 96 (28%) | 637 (22%) |
| Did you find the questionnaire difficult? | | | |
| Easy | 1896 (58%) | 171 (50%) | 1725 (59%) |
| Relatively Easy | 1284 (39%) | 159 (46%) | 1125 (39%) |
| Relatively Difficult | 59 (1.8%) | 13 (3.8%) | 46 (1.6%) |
| Difficult | 16 (0.5%) | 2 (0.6%) | 14 (0.5%) |

***Table A3: Estonian-speaking respondents: Descriptive Statistics***

| | All | Vulnerable | Non-Vulnerable |
|---|---|---|---|
| **Characteristic** | **N = 3261** | **N = 347** | **N =2914** |
| Are you vaccinated against HPV? | | | |
| Yes | 217 (6%) | 18 (5.2%) | 199 (6.8%) |
| No | 2.665 (82%) | 285 (82%) | 2380 (82%) |
| I don't know | 379 (12%) | 44 (13%) | 335 (11%) |
| Do you know of any screening campaign? | | | |
| No | 88 (2.7%) | 17 (4.9%) | 71 (2.4%) |
| Yes | 3173 (97%) | 330 (95%) | 2843 (98%) |
| Do you know what a smear test is? | | | |
| No | 130 (4%) | 26 (7%) | 104 (3.6%) |
| Yes | 3131 (96%) | 321 (93%) | 2810 (96%) |
| Have you ever done a smear test? | | | |
| Yes | 2911 (89%) | 286 (82%) | 2625 (90%) |
| Non | 178 (5.6%) | 34 (9.8%) | 144 (4.9%) |
| I don't know | 172 (5.4%) | 27 (7.8%) | 145 (5.0%) |
| Has the smear test been done in the last 5 years? | | | |
| Yes | 2611 (90%) | 246 (86%) | 2365 (90%) |
| No | 196 (6.7%) | 30 (10%) | 166 (6.3%) |
| I don't know | 104 (3.6%) | 10 (3.5%) | 94 (3.6%) |

***Table A4: Estonian-speaking respondents: CCS knowledge and experience***

*Descriptive Statistics for the Russian-speaking respondents*

| | All | Vulnerable | Non-Vulnerable |
|---|---|---|---|
| **Characteristics** | **N = 1719** | **N = 223**[1] | **N = 1496**[1] |
| Age group | | | |
| 30-39 | 338 (25%) | 69 (29%) | 273 (25%) |
| 40-49 | 436 (33%) | 81 (36%) | 355 (32%) |
| 50-59 | 371 (28%) | 53 (24%) | 318 (29%) |
| 60-65 | 184 (14%) | 24 (11%) | 160 (14%) |
| NA | 390 | | 390 |
| Residence | | | |
| In a big city | 909 (69%) | 144 (65%) | 765 (69%) |
| In a suburb of a big city | 137 (10%) | 35 (16%) | 102 (9.2%) |
| In another urban area | 246 (19%) | 39 (17%) | 207 (19%) |
| Rural Area | 34 (2.6%) | 5 (2.2%) | 29 (2.6%) |
| NA | 393 | | 393 |
| Did you find the questionnaire difficult? | | | |
| Easy | 838 (64%) | 140 (63%) | 698 (64%) |
| Relatively Easy | 441 (34%) | 77 (35%) | 364 (33%) |
| Relatively Difficult | 28 (2.1%) | 5 (2.3%) | 23 (2.1%) |
| Difficult | 2 (0.2%) | 0 (0%) | 2 (0.2%) |
| NA | 410 | 1 | 409 |

***Table A5: Russian-speaking respondents: Descriptive Statistics***

| | All | Vulnerable | Non-Vulnerable |
|---|---|---|---|
| **Characteristics** | **N = 1719** | **N = 223** | **N =1496** |
| Are you vaccinated against HPV? | | | |
| Yes | 71 (4.1%) | 6 (2.7%) | 65 (4.4%) |
| No | 1362 (80%) | 174 (78%) | 1188 (80%) |
| I don't know | 280 (16%) | 43 (19%) | 237 (16%) |
| NA | 6 | | 6 |
| Do you know of any screening campaign? | | | |
| No | 62 (3.6%) | 13 (5.8%) | 49 (3.3%) |
| Yes | 1643 (96%) | 210 (94%) | 1433 (97%) |
| NA | 14 | | 14 |
| Do you know what a smear test is? | | | |
| No | 238 (14%) | 39 (17%) | 199 (13%) |
| Yes | 1465 (86%) | 184 (83%) | 1281 (87%) |
| NA | 16 | | 16 |
| Have you ever done a smear test? | | | |
| Yes | 1473 (87%) | 178 (80%) | 1295 (88%) |
| Non | 115 (6.8%) | 21 (9.4%) | 94 (6.4%) |
| I don't know | 114 (6.7%) | 24 (11%) | 90 (6.1%) |
| NA | 17 | | 17 |
| Has the smear test been done in the last 5 years? | | | |
| Yes | 1237 (84%) | 135 (76%) | 1102 (85%) |
| No | 136 (9.2%) | 24 (13%) | 112 (8.6%) |
| I don't know | 100 (6.8%) | 19 (11%) | 81 (6.3%) |

***Table A6: Russian-speaking respondents: CCS knowledge and experience***

| **Characteristic** | **Vulnerable N = 135** |
|---|---|
| Age group | |
| 25-29 | 12 (9%) |
| 30-39 | 31 (23%) |
| 40-49 | 32 (24%) |
| 50-59 | 46 (34%) |
| 60-65 | 14 (10%) |
| Area of Residence | |
| In a city | 102 (76%) |
| On the outskirts of a city | 23 (17%) |
| In a village or rural area | 10 (7%) |
| Difficulties of the questionnaire | |
| Easy | 35 (26%) |
| Relatively Easy | 93 (69%) |
| Relatively Difficult | 5 (4%) |
| Difficult | 2 (1%) |

***Table A8: Portugal: CCS knowledge and experience***