Title: Decision to approve the UK National Screening Committee recommendation on cervical screening HPV self-sampling for under-screened people. **IA No:** **RPC Reference No:** **Lead department or agency:** DHSC **Other departments or agencies:**	**Impact Assessment (IA)** **Date:** 08/05/2025 **Stage:** Final **Source of intervention:** **Type of measure:** **Contact for enquiries:** dhsc.publicenquiries@dhsc.gov.uk

Summary: Intervention and Options

RPC Opinion: RPC Opinion Status

Cost of Preferred (or more likely) Option (in 2024 prices)			
Total Net Present Social Value	**Business Net Present Value**	**Net cost to business per year**	**Business Impact Target Status**
£m	£m	£m	

What is the problem under consideration? Why is government action or intervention necessary?

This IA considers the UK National Screening Committee's (UK NSC's) permissive recommendation to offer high-risk human papillomavirus (HPV) self-sampling to under-screened people (individuals at least 6 months overdue their last screen) within the NHS Cervical Screening Programme (NHS CSP). Screening reduces deaths, improves health outcomes, and saves NHS resource in the future. Coverage in the cervical screening programme has been below the 80% target for many years. The offer of HPV self-sampling for under-screened people, if implemented by NHS England following the UK NSC'S permissive recommendation, has the potential to increase engagement with the offer of cervical screening and therefore have a positive impact in reducing cervical cancer incidence and deaths.

What are the policy objectives of the action or intervention and the intended effects?

To ensure the NHS CSP remains effective in approach. Barriers to participation in cervical screening include embarrassment, pain and discomfort, confidentiality concerns, and practical constraints. Evidence suggests that offering HPV self-sampling could help overcome some of these barriers among under-screened people, leading to improved participation in screening and ultimately preventing ill-health, particularly among high-risk groups, and may reduce health inequalities.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option 0: Do nothing: Government does not support changes to current cervical screening practice, which offers clinician-collected sampling only.

Option 1 (preferred): Government supports the permissive recommendation and NHS England considers offering HPV self-sampling to under-screened people eligible for the NHS Cervical Screening Programme in England, alongside current practice of clinician-collected cervical sampling, where it is considered a useful approach to improving informed participation in the screening programme.

Will the policy be reviewed? It **will/will not** be reviewed. **If applicable, set review date: Month/Year**

Is this measure likely to impact on international trade and investment?		No		
Are any of these organisations in scope?	**Micro** Yes/No	**Small** Yes/No	**Medium** Yes/No	**Large** Yes/No
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)		**Traded:**	**Non-traded:**	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits, and impact of the leading options.

Signed by the responsible SELECT SIGNATORY: Ashley Dale Date: 01/08/25

Summary: Analysis & Evidence

Policy Option 0

Description: Do nothing.

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low:	**High:**	**Best Estimate:**

COSTS (£m)	**Total Transition** (Constant Price)	Years	**Average Annual** (excl. Transition) (Constant Price)	**Total Cost** (Present Value)
Low	0		0	**0**
High	0		0	**0**
Best Estimate	0		0	**0**

Description and scale of key monetised costs by 'main affected groups'

Option 0 is modelled to have no monetised costs as it represents the "do nothing" option and would not require any specific action or change from current practice.

Other key non-monetised costs by 'main affected groups'

In practice the "cost" of Option 0 is unrealised benefits from not permitting the introduction of self-sampling for under-screened people. This is seen in the corresponding estimated benefits for Option 1.

BENEFITS (£m)	**Total Transition** (Constant Price)	Years	**Average Annual** (excl. Transition) (Constant Price)	**Total Benefit** (Present Value)
Low	0		0	**0**
High	0		0	**0**
Best Estimate	0		0	**0**

Description and scale of key monetised benefits by 'main affected groups'

Option 0 is modelled to have no monetised benefits.

Other key non-monetised benefits by 'main affected groups'

Option 0 is modelled to have no non-monetised benefits.

Key assumptions/sensitivities/risks	**Discount rate (%)**	Costs: 3.5%, Benefits: 3.5%

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			**Score for Business Impact Target (qualifying provisions only) £m:**
Costs:	**Benefits:**	**Net:**	

Summary: Analysis & Evidence

Policy Option 1

Description: Self-sampling can be offered to under-screened people eligible for cervical screening.

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low:	High:	Best Estimate:

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low			
High			
Best Estimate			

Description and scale of key monetised costs by 'main affected groups'

If government agrees to support the permissive recommendation, then NHS England may choose to implement self-sampling via one of 3 implementation approaches. The key costs, if implemented, would include self-sampling test kits and colposcopy, biopsy, and pre-cancer treatment for those with positive results. The net lifetime discounted cost of screening via self-sampling for a cohort of 100,000 people aged 26 is estimated to be £234k using a mail-out approach and £57k for an opportunistic approach, within the YouScreen trial. The incremental cost effectiveness ratio (ICER) was £9k and £8k.respectively within the trial.

Other key non-monetised costs by 'main affected groups'

The key non-monetised costs of Option 1, would if implemented, include updating public facing information including multilingual leaflets sent as part of screening invitations, and any IT, administrative, or staff familiarisation costs associated with making changes to the existing NHS Cervical Screening Programme.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low			
High			
Best Estimate			

Description and scale of key monetised benefits by 'main affected groups'

The key monetised benefits, if HPV self-sampling is implemented by NHS England, would be increased cervical screening coverage which would increase earlier detection of precancerous lesions and cervical cancer which would likely reduce mortality compared to late-stage diagnosis. The benefits of the 3 potential implementation approaches are measured in quality adjusted life years (QALYs). The lifetime incremental QALY gains for a cohort of 100,000 people aged 26 are estimated to be 24 for a mail-out and 34 for an opportunistic approach within the YouScreen trial.

Other key non-monetised benefits by 'main affected groups'

There are non-monetised wider societal benefits to averting mortality and morbidity from cervical cancer, where instance rates are highest in women aged 30 to 34. Self-sampling may increase screening coverage for under-screened and high-risk groups, reducing health inequalities.

Key assumptions/sensitivities/risks	Discount rate	**Costs**: 3.5%, **Benefits**: 3.5%

The UK NSC recommendation is permissive, meaning NHS England can choose to implement self-sampling via any of the 3 delivery options considered within the YouScreen trial. There are likely to be differences in the implementation of self-sampling within the trial and a national implementation within the NHS CSP. Self-sampling may be implemented within the same financial year as extending screening intervals for those aged 25 to 49 and workforce impacts should be considered. Moreover, there are uncertainties regarding parameters including the cost of the HPV test kit and the uptake of self-sampling nationally.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	

Summary

1. In England approximately 2,700 people are diagnosed with cervical cancer each year,[1] based on the 2016 to 2018 average, and in 2021 it was the 14th most common cancer among women in the UK.[2] Cervical screening reduces the number of people who develop invasive cervical cancer (incidence), and the mortality rate, through early detection. However, coverage has been below the target coverage of 80% for many years.[3]

2. The recent change from cytology to testing for high-risk HPV (hr-HPV) within the cervical screening programme provides an opportunity to expand the methods of sample collection to include self-collected samples at home via a self-sampling device.[4] Evidence suggests that HPV self-sampling could help overcome some of the barriers to screening, such as anxiety of discomfort and practical barriers, and be an effective way to improve uptake.[5]

3. This impact assessment (AI) considers whether government should support the UK NSC recommendation to permit HPV self-sampling within the NHS Cervical Screening Programme for under-screened people. An under-screened person is defined as an individual who is overdue for their routine cervical screening appointment by at least 6 months or has never attended. Individuals who rarely or never attend their screening appointment are described as 'under-screened' and are at higher risk of undetected cervical abnormalities and associated disease.

4. If government supports this advice, given it is permissive, service commissioners will have autonomy to implement self-sampling according to their specific requirements and resources. NHS England could choose to implement HPV self-sampling via any of the approaches evaluated within the YouScreen trial. NHS England's planned implementation strategy follows a phased rollout using an opt-in mail-out offer.

5. The recommendation was made following the YouScreen trial which evaluated 3 approaches for implementing self-sampling:

    a. **Opportunistic only**: self-sampling kits are offered to under-screened people via an opportunistic offer in primary care.
    b. **Direct mail-out only**: self-sampling kits are offered to under-screened people via a direct mail-out offer.
    c. **Opportunistic and direct mail-out**: self-sampling kits are offered to under-screened people via both an opportunistic and direct mail-out offer.

6. At this stage the HPV self-sampling offer is only being recommended to under-screened individuals. There is uncertainty about whether self-sampling is as good

[1] NHS England » NHS urges women to book a cervical screening as a third don't take up vital offer

[2] Prevalence | Background information | Cervical cancer and HPV | CKS | NICE

[3] Cervical Screening (Annual) - NHS England Digital

[4] Cervical cancer - UK National Screening Committee (UK NSC) - GOV.UK

[5] Exploring the barriers to cervical screening and perspectives on new self-sampling methods amongst under-served groups | BMC Health Services Research | Full Text

as testing with clinician sampling for those who currently attend screening regularly. For those who do not attend their appointments, any test is better than no test.

7. The primary screening costs associated with self-sampling are £19.65 to £25.51 per woman screened for opportunistic and direct mail-out respectively, compared to £38.80 for routine screening with clinician sampling. Thereafter the follow up costs for those who test positive are the same for either screening test and include colposcopy, biopsy and pre-cancer treatment, and cancer treatment following diagnosis.

8. Within the YouScreen trial, self-sampling uptake among the eligible population was 7.7%, and 12.9% for opportunistic and direct mail-out during the trial period. This would increase overall cervical screening coverage to closer to the 80% target coverage. It is estimated that over the lifetime of a single birth year cohort of women, HPV self-sampling via a direct mail-out approach would prevent 26 cervical cancer cases and 9 deaths, and 36 cervical cancer cases and 10 deaths via an opportunistic approach. The YouScreen trial and international evidence show that HPV self-sampling may be acceptable (to participants) and an effective way to improve screening participation particularly among under-screened and high-risk groups, and therefore self-sampling may reduce health inequalities.

9. All 3 implementation approaches assessed within the YouScreen trial were estimated to be cost-effective. The Incremental Cost Effectiveness Ratio (ICER) is below £10,000 for all approaches assessed within the trial:

    - **opportunistic only**: ICER = £2,284
    - **direct mail-out only**: ICER = £9,329
    - **opportunistic and direct mail-out**: ICER = £8,181

10. NHS England is considering implementing HPV self-sampling via an opt-in mail-out process where individuals are first asked if they want to participate in self-sampling prior to receiving a test kit in the mail. This will likely reduce the cost per additional person screened and increase the cost-effectiveness compared to the direct mail-out approach evaluated as part of the trial, due to the reduced wastage costs from test kits being sent out and not returned.

11. In 2023 to 2024, 5.12 million people were offered cervical screening, and 3.25 million individuals were screened.[6] If the remaining 1.87 million unscreened people were offered HPV self-sampling, based on the YouScreen trial screening costs, this would cost an estimated £6 million per year in primary screening costs. There may be additional costs associated with implementing self-sampling within the NHS CSP such as updates to the NHS App and other IT updates required to facilitate self-sampling. Current annual cervical screening programme costs are around £82 million.

12. Overall, offering self-sampling to under-screened women is expected to increase uptake of cervical screening thereby reducing cervical cancer cases and deaths.

[6] Cervical Screening Programme, England - 2023-2024 [NS] - NHS England Digital

It is estimated that it will cost an additional £6m per year in screening costs but within the YouScreen trial it has been estimated to be a highly cost-effective intervention. Therefore, the preferred option is to accept the advice from UK NSC to permit HPV self-sampling in the NHS CSP.

Evidence base

Background

1. In England approximately 2,700 people are diagnosed with cervical cancer each year,[7] based on the 2016 to 2018 average, and in 2021 it was the 14th most common cancer among women in the UK.[8] There were 702 deaths from cervical cancer in England in 2020.[9] It is a cancer that is found anywhere in the cervix, and anyone with a cervix can get cervical cancer. It can be prevented by treatment following early detection at a pre-cancerous stage, diagnosed by attending cervical screening. Cervical cancer is usually a slow growing cancer and can take many years to develop.

2. Cervical screening was introduced in England in 1964,[10] and there have been significant changes in cervical screening over this time period. A centrally organised cervical screening programme was launched in 1988.[11] Women aged 20 to 64 were invited to cervical screening every 3 to 5 years. Cervical cancer deaths significantly reduced following the launch of the national programme[12]. In 2003 the frequency of screening was standardised across the programme with individuals aged 25 to 49 invited every 3 years, and those aged 50 to 64 invited every 5 years.[13]

3. In 2015, UK NSC recommended changing the primary screening test from cytology to high-risk human papillomavirus (hr-HPV) primary testing, and 12-month surveillance for hr-HPV positive individuals.[14] In 2019, UK NSC recommended extending intervals for hr-HPV negative individuals aged 25 to 49 from 3 to 5 years (in line with those aged 50 to 64).[15] Primary hr-HPV testing and 12-month surveillance have already been introduced in England. The recommendation to extend intervals to 5 years is being implemented in 2025. The change to primary hr-HPV screening provides an opportunity to expand the methods of sample collection to include self-collected samples at home using a self-sampling device.

[7] NHS England » NHS urges women to book a cervical screening as a third don't take up vital offer

[8] Prevalence | Background information | Cervical cancer and HPV | CKS | NICE

[9] Cervical cancer mortality in England 2011-2020 | Statista

[10] Cervical screening in England: The past, present, and future - Albrow - 2012 - Cancer Cytopathology - Wiley Online Library

[11] Topic 1: the NHS Cervical Screening Programme (NHSCSP) - GOV.UK (www.gov.uk)

[12] Impact of cervical screening on cervical cancer mortality: estimation using stage-specific results from a nested case–control study - PMC (nih.gov)

[13] Cervical screening in England: The past, present, and future - Albrow - 2012 - Cancer Cytopathology - Wiley Online Library

[14] November_2015_UK_NSC_minutes__approved_.pdf (publishing.service.gov.uk)

[15] UK NSC meeting February 2019 - GOV.UK (www.gov.uk)

4. HPV is a common virus, and high-risk types of HPV can cause cell changes that can lead to cervical cancer if left untreated. Nearly all cases of cervical cancers are caused by hr-HPV.[16] It is usually cleared by the body's immune system, but some infections are persistent and harder to get rid of. Hr-HPV can be cleared within 6 months, and on average clears within 2 years.[17] Smoking or human immunodeficiency virus (HIV) can impact the persistence of hr-HPV infection.[18]

5. If hr-HPV is found in a screening sample the sample is then cytology tested. If cytology negative, the individual will be invited for screening at a reduced interval of 12 months, while cytology positive cases will be referred to colposcopy. After a third consecutive hr-HPV positive test the individual will be referred to colposcopy regardless of the cytology results. Once the individual has a negative hr-HPV test they will be invited for screening at the routine interval. The current 'cervical screening pathway' section of this IA includes further detail on screening practice.[19]

6. Cervical screening coverage has been below the target coverage rate of 80% for many years. Coverage is the proportion of the eligible population who have been screened within a given time period. The target coverage was proposed by Public Health England as part of the service specification and agreed with the Department of Health and Social Care (DHSC) and NHS England as part of the section 7A annual agreement negotiation process.[20] Uptake refers to the proportion of those invited for screening who take up the invitation.

7. Despite previous interventions aiming to increase coverage, cervical screening coverage has decreased since 2014. Cervical screening coverage in 2023 to 2024 was 68.8%[21,22] of those eligible aged 25 to 64. This is a 0.1 percentage point increase from the previous year, however a 5.4 percentage point decrease since 2014. Coverage in 2023 to 2024 was higher for woman aged 50 to 64 at 74.3% compared with 66.1% for woman aged 25 to 49. As of March 2024, around 3 million people have been invited for cervical screening in 2023 to 2024 but never attended.

8. An independent review of adult screening programmes[23] identified the following factors as likely to impact screening coverage and uptake:

    - **acceptability** of the test to the person being screened. Cervical screening has lower uptake than some other screening programmes and sampling can be considered intrusive and uncomfortable
    - **awareness** of the benefits of the screening
    - **convenience** of screening appointments and regularity of screening tests

[16] 2020 WHO Classification of Female Genital Tumors – PMC

[17] Human papillomavirus persistence or clearance after infection in reproductive age. What is the status? Review of the literature and new data of a vaginal gel containing silicate dioxide, citric acid, and selenite - PMC (nih.gov)

[18] Answering common questions about HPV | Jo's Cervical Cancer Trust (jostrust.org.uk)

[19] Cervical screening care pathway - GOV.UK

[20] Report of THE INDEPENDENT REVIEW OF ADULT SCREENING PROGRAMMES in England

[21] NHS England » NHS makes fresh uptake appeal as five million women not up to date with cervical screening

[22] Cervical Screening Programme, England - 2023-2024 [NS] - NHS England Digital

[23] Report of THE INDEPENDENT REVIEW OF ADULT SCREENING PROGRAMMES in England

- **accessibility** of screening appointments
- **reminders and endorsements**: randomised controlled trials have shown text reminders by GPs to be effective in increasing uptake (see figure 2 for the cervical screening pathway which includes reminders)

9. Research from Jo's Cervical Cancer Trust[24] and Local Healthwatch[25] has suggested that barriers specifically to cervical screening attendance may include inaccessibility of appointments, anxiety and fear of discomfort and embarrassment, previous negative experiences of screening, cultural reasons, confidentiality concerns, and practical barriers such as time constraints and lack of transport or childcare.[26] Additional barriers may include gaps in knowledge and perceptions that individuals would not benefit from screening.

10. Evidence suggests that HPV self-sampling could help overcome some of these barriers to screening among the under-screened group,[27] and may be an acceptable (to participants) and effective way to improve uptake. This IA considers the recommendation to permit HPV self-sampling within the NHS CSP for under-screened people.

11. An under-screened person is defined as an individual who is overdue for their routine cervical screening appointment by at least 6 months or has never attended. The offer of HPV self-sampling has the potential to increase engagement with the offer of cervical screening for under-screened people and therefore could have a positive impact in reducing the incidence of cervical cancer and cervical cancer deaths.

UK National Screening Committee recommendation

12. UK NSC provides independent scientific advice to the government relating to all matters regarding national screening programmes.[28] As part of the process of making a recommendation for implementation, alteration or cessation of a screening programme, UK NSC reviews the evidence put forward against a list of criteria appraising the viability, effectiveness and appropriateness of a screening programme.

13. Screening is the process of identifying people who are asymptomatic (have no symptoms) but who have an increased risk of developing a disease or condition. Screening programmes aim to maximise the benefits they bring, while minimising harm including unnecessary testing and the risk of overtreatment. UK NSC sets out in its remit that if there is no possibility of benefit to the person being offered screening, then it should no longer be considered as a potential screening programme.[29] Overtreatment refers to interventions or procedures that do not benefit the patient, or where the risk of harm from the intervention is likely to

[24] Young women's perceptions of cervical screening in the UK: a qualitative study - PMC

[25] Barriers and inequalities in cervical screening | Healthwatch

[26] NHS England — South East » Barriers to participation

[27] Barriers to cervical screening and interest in self-sampling among women who actively decline screening - PMC

[28] About us - UK National Screening Committee - GOV.UK (www.gov.uk)

[29] UK NSC: evidence review process - GOV.UK (www.gov.uk)

outweigh any benefit to the individual. NHS screening programmes are an efficient method for early diagnosis while minimising false positive and negative results.

14. UK NSC commissions cost-effectiveness analysis as part of the evidence presented to its members when making screening recommendations. The framework it has typically used to date is the National Institute for Health and Care Excellence (NICE) health technology appraisal (HTA) methodology.[30] However, UK NSC is not bound by any specific cost-effectiveness methodology in its terms of reference.

15. As cervical screening began in 1964, and UK NSC was established in 1996,[31] the committee has not formally considered the evidence for the initial introduction of a cervical screening programme. It has, however, made several recommendations regarding changes to the cervical screening programme to ensure its continued effectiveness.[32]

16. UK NSC reviewed the starting age for cervical screening in 2013 and recommended it be increased from 20 to 25.[33,34] Evidence showed that cervical screening in people under 25 would do more harm than good; cervical cancer is extremely rare in people under 25 (despite cervical abnormalities being more common), and the number of cervical cancers would not be reduced by screening at age 20 however around 3000 people would receive unnecessary treatment.[35] Repeated treatments for cervical abnormalities can increase the chance of a future pregnancy resulting in a premature birth.

17. In 2015, UK NSC recommended changing the primary screening test from cytology (looking at cervical cells through a microscope to find those which could develop into cancer) to testing for high-risk human papillomavirus (hr-HPV)[36] and introducing 12-month surveillance for positive hr-HPV individuals. Following this, extending intervals for hr-HPV negative individuals aged 25 to 49 from 3 to 5 years was recommended in 2019.

18. The change to primary hr-HPV screening provides an opportunity to expand the methods of sample collection to include self-collected samples at home using a self-sampling device. In 2021, the YouScreen study[37] was established in the NHS CSP in North London and was the first time self-sampling was integrated into the NHS CSP. The aim of the study was to assess whether introducing the offer of

[30] NICE health technology evaluations: the manual

[31] UK NSC code of practice - GOV.UK (www.gov.uk)

[32] Cervical cancer - UK National Screening Committee (UK NSC) - GOV.UK (view-health-screening-recommendations.service.gov.uk)

[33] Cervical cancer - UK National Screening Committee (UK NSC) - GOV.UK (view-health-screening-recommendations.service.gov.uk)

[34] Uniform age for cervical screening across UK recommended | Jo's Cervical Cancer Trust (jostrust.org.uk)

[35] Why a change to cervical screening will offer more accuracy – UK Health Security Agency

[36] Cervical cancer - UK National Screening Committee (UK NSC) - GOV.UK (view-health-screening-recommendations.service.gov.uk)

[37] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

HPV self-sampling to under-screened people would substantially increase screening participation in this group. The trial focused on the under-screened population and the impacts on screening coverage and health outcomes for this population, however, did not assess self-sampling against clinician sampling for those who currently do attend cervical screening. As such, the UK NSC recommendation is specifically in relation to under-screened people.

19. The trial evaluated 3 approaches for implementing HPV self-sampling:

    - **opportunistic only**: self-sampling kits are offered to under-screened people via an opportunistic offer in primary care
    - **direct mail-out only**: self-sampling kits are offered to under-screened people via a direct mail-out offer
    - **opportunistic and direct mail-out**: self-sampling kits are offered to under-screened people via both an opportunistic and direct mail-out offer

20. Following a review of the evidence, UK NSC has made a permissive recommendation on self-sampling. This means that HPV self-sampling can be offered to under-screened people eligible for the cervical screening programme, where it is considered a useful approach to improving informed participation in the screening programme, and implementation should follow the approaches assessed within the YouScreen[38] trial.

21. This IA considers implementing the recommendation to permit self-sampling for under-screened people as part of the NHS CSP, against current practice of clinician-only sampling.

The current cervical screening care pathway

22. All eligible woman who are registered with a GP (as female) automatically receive an invitation by mail. Transgender (trans) men and non-binary people do not receive automatic invitations if registered as male with their GP, but they are still entitled to screening if they have a cervix. The GP needs to arrange a screening appointment for them. The first invitation is sent to eligible people at the age of 24.5 years (figure 1). If no hr-HPV is found, then the individual is invited for routine recall.[39] Figure 1 reflects the screening pathway following the recent change to 5-yearly screening intervals for people aged 25 to 49 who have a negative hr-HPV screen, the same interval as for people aged 50 to 64.

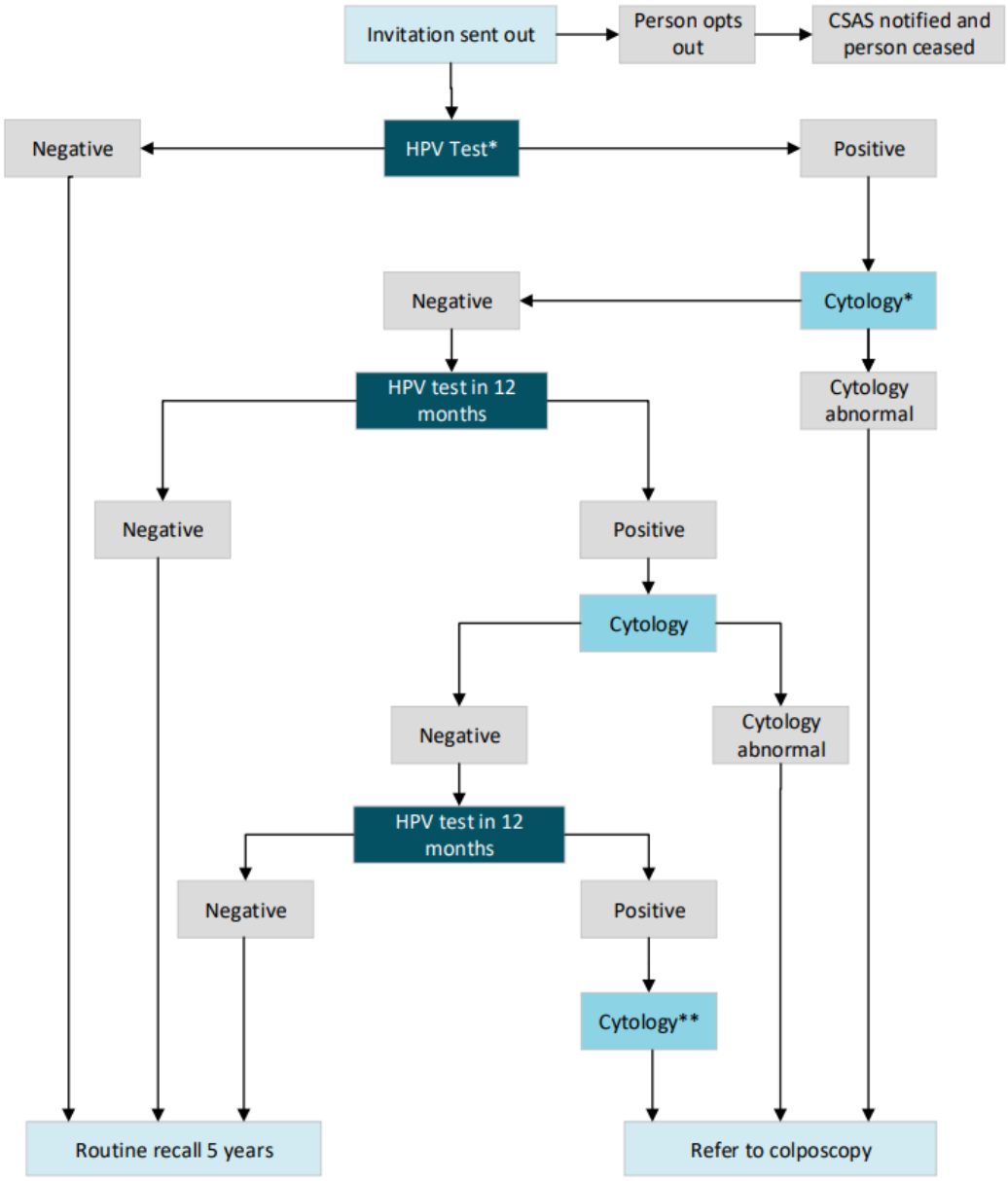
23. Hr-HPV positive samples are sent for a cytology test (carried out by examination of cells under a microscope), to check for any abnormal cells. If no abnormal cells are found a follow up screen is arranged for 12 months' time to check whether the immune system has cleared the virus. Most hr-HPV infections are transient, and slightly abnormal cells often go away on their own when the virus clears.[40]

[38] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

[39] Cevical screening care pathway - GOV.UK (www.gov.uk)

[40] Cervical cancer - UK National Screening Committee (UK NSC) - GOV.UK (view-health-screening-recommendations.service.gov.uk)

Figure 1 Cervical Screening Pathway, under current screening practice



NB: CSAS = Cervical Screening Administration Service

*If test result is unavailable or cytology is inadequate at any stage in the screening pathway, the sample must be repeated in no less than 3 months.

**Whatever the result of this test there is a referral to colposcopy as it is the third consecutive hr-HPV positive test.

24. If abnormal cells are found, the individual will be referred to colposcopy for further investigation.[41] After a third consecutive hr-HPV positive test there is a referral to colposcopy regardless of their cytology result. Those aged 65 and over who have had 3 consecutive negative HPV tests are taken out of the programme's call and recall system.[42]

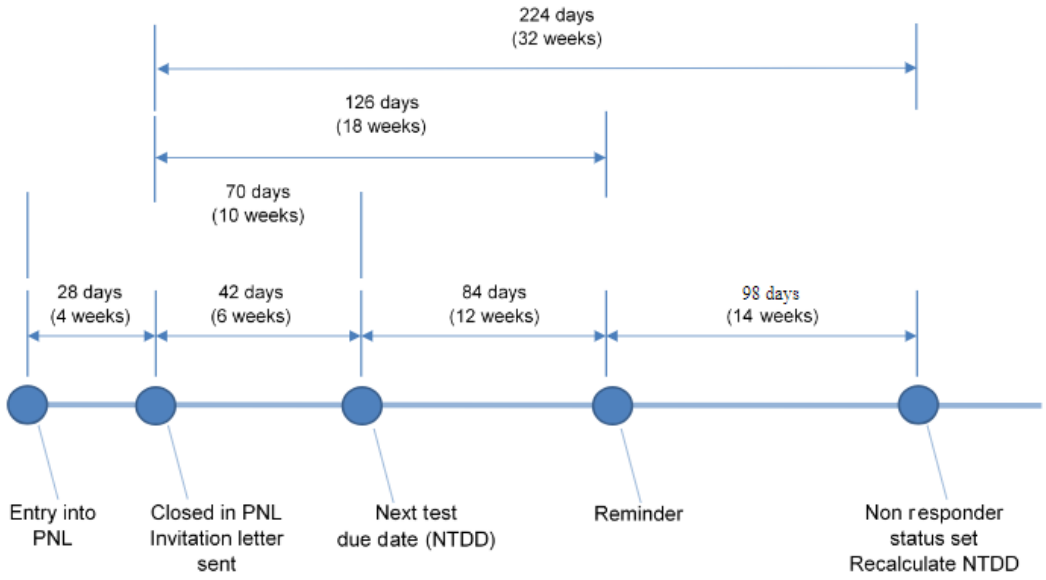
[41] Why it's done - NHS (www.nhs.uk)

[42] Topic 1: the NHS Cervical Screening Programme (NHSCSP) - GOV.UK (www.gov.uk)

25. Hr-HPV can cause cell changes in the cervix which can develop into cancer over time.[43] Not all cell changes will develop into cancer, but any changes are monitored, and treatment given if necessary. Cervical screening is not appropriate for people displaying symptoms of cervical cancer, as it is not a test for cancer. If an individual presents with symptoms, they should be referred for rapid investigation.

26. The screening call and recall guidance sets out that invitation letters should be created and sent around 6 weeks before an individual is due for their next screen,[44] as shown in figure 2. Individuals who are invited but do not attend their first cervical screen should receive a reminder letter. After 32 weeks of the call or recall letter being sent, the individual becomes a 'non-responder', and their GP practice should be notified so they can take any follow up activity that they deem appropriate. Non-responders will continue to be invited at regular 5-year intervals, and their next test due date is reset based on their age and any known screening history.

Figure 2 Call and recall timetable[45]



PNL = prior notification list NTDD = next test due date

27. If an individual decides to officially opt out of screening call and recall, they must submit a request to the NHS Cervical Screening Administration Service (CSAS).[46] They will be removed from the call and recall system, and no further invitations or reminders are sent. Individuals can choose to opt back in for

[43] Cervical Screening Results | Cancer Research UK
[44] Call and recall timetable - GOV.UK (www.gov.uk)
[45] Call and recall timetable - GOV.UK (www.gov.uk)
[46] Patients - NHS Cervical Screening Administration Service (csas.nhs.uk)

cervical screening if they change their mind (and are still in the eligible age range for screening).

28. People who have cervical screening within private healthcare remain eligible for NHS cervical screening. They will be invited for NHS screening at the recommended interval based on their most recent NHS cervical screen. Private screens are considered non-NHS tests and are not recorded as part of the NHS CSP. If an individual is hr-HPV positive at a private screen and attends further treatment such as colposcopy through the NHS, their next test due date will be reset from this point in time.

Rationale for the intervention

29. This IA assesses the cost effectiveness of implementing self-sampling for under-screened people within the NHS CSP.

30. National screening programmes are a public health service which tests individuals who are more likely to be helped than harmed by further tests or treatment to reduce the risk of disease or other complications.[47] There is a positive externality associated with screening by reducing the likelihood of deaths and improving health outcomes through early treatments and by using less NHS resources in the future. Cervical screening reduces the number of people who develop invasive cervical cancer (incidence), and the mortality rate of cervical cancer, through early detection.

31. A market for screening can exist in the private sector. Providing they have the information on the disease risk and the cost and benefits of screening individuals could decide to take up privately provided screening. However, individuals are likely to underestimate the benefits at an individual or population level due to factors including a gap in knowledge on individual and wider NHS impacts.

32. Another rationale for government intervention with screening is social equity. Private screening may be expensive and not affordable for all. These considerations (benefits under-estimation and the positive externalities of screening) suggest that screening programmes should be treated as merit goods and that government should intervene to promote their use.

33. Although cervical screening is already offered at a population level, not everyone who is eligible regularly attends. This may be due to reasons including embarrassment, previous negative experiences or the inability to get to a GP practice (see the ‘background’ section of this IA for further discussion). Individuals who rarely or never attend their screening appointment are described as ‘under-screened’ and are at higher risk of undetected cervical abnormalities and associated disease. HPV self-sampling may reduce barriers to screening leading to improved participation.

[47] About us - UK National Screening Committee - GOV.UK (www.gov.uk)

34. This recommended change ensures that the NHS CSP remains effective through increased screening participation.

Rationale and evidence to justify the level of analysis used in the IA (proportionality approach)

35. The UK NSC recommendation is permissive, and NHS England could implement self-sampling using any of the approaches evaluated within the YouScreen trial.[48] This IA considers the costs and benefits of implementing self-sampling to under-screened people within the NHS CSP via the following implementation approaches which were assessed within the YouScreen trial:

    - an opportunistic offer
    - a direct mail-out offer
    - both an opportunistic offer and direct mail-out offer

36. In 2021, the YouScreen[49] study was established in the NHS CSP in North London. It marked the first time self-sampling was integrated into the NHS. The aim of the study was to assess whether introducing the offer of self-sampling to under-screened people in the NHS CSP would substantially increase screening participation in this group.[50] Further information on the YouScreen study is included in the 'UK NSC evidence' section.

37. The UK NSC reviewed evidence from the YouScreen[51] trial alongside a cost-effectiveness analysis modelling study, and commissioned rapid evidence review of HPV self-sampling. The review explored the published evidence relating to key UK NSC criteria on the:

    - test accuracy of self-sampling
    - effect of self-sampling as a strategy to improve screening participation in under-screened people
    - acceptability of self-sampling to screening participants

38. The review, which was conducted by the Glasgow University National Institute for Health and Care Research Evidence Synthesis Group, concluded that HPV self-sampling is a feasible strategy for reaching under-screened people and should be considered in the national screening programme.

[48] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

[49] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

[50] HPV self-sampling - North Central London Cancer Alliance

[51] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

39. The cost-effectiveness modelling study concluded that offering self-sampling is likely to be cost effective and has the potential to reduce cervical cancer incidence and mortality. Further details are included within ‘UK NSC evidence’ section of this IA.

40. The UK NSC recommendation on HPV self-sampling is permissive. This means that service commissioners may offer self-sampling, via any of the 3 delivery options considered within the YouScreen trial, where commissioners think self-sampling would be a helpful addition to the screening programme. Any alternative approaches should be supported by robust evidence demonstrating their effectiveness and cost-effectiveness.

41. This IA considers the results from the YouScreen cost-effectiveness modelling study on the 3 recommended implementation approaches. The study presents cost-effectiveness results in line with NICE HTA methodology. Further detail can be found in the ‘monetised and non-monetised costs and benefits’ section.

42. Limitations and risks of this approach are outlined within the ‘risks and assumptions’ section.

Description of options considered

43. The options considered are as follows:

Option 0: do nothing. No change to the NHS Cervical Screening Programme, which offers clinician-taken sampling only.

Option 1: (preferred): HPV self-sampling can be offered to under-screened people eligible for the NHS CSP in England, alongside current practice of clinician-taken cervical sampling, where it is considered a useful approach to improving informed participation in the screening programme. Implementation should be based on the delivery options assessed in the YouScreen trial; either as an opportunistic offer, direct mail-out offer, or both.

Policy objective

44. The objective is to ensure the continued effectiveness of the NHS CSP by improving participation in cervical screening and therefore preventing more cervical cancer cases and deaths.

45. NHS screening programmes are key to the prevention of ill-health through the earlier identification and management of health conditions. The NHS CSP in England aims to reduce the number of people who develop invasive cervical cancer and cervical cancer deaths.

46. In November 2020 the World Health Organisation (WHO) launched the Cervical Cancer Elimination Initiative (CCEI), which aims to eliminate cervical cancer as a public health problem worldwide.[52,53] NHS England has also set a pledge to eliminate cervical cancer by 2040.[54] Vaccination and an effective screening programme have been identified as key actions to eliminating cervical cancer.

47. Cervical screening coverage has been below the target of 80% for many years. Approximately 3 in 10 people do not take up the offer of screening. Individuals who are over 6 months overdue their most recent screen or have never attended cervical screening are described as 'under-screened'. They are at higher risk of undetected cervical abnormalities and associated disease.[55]

48. Barriers such as inaccessibility of appointments, anxiety, fear of discomfort and embarrassment, pain, previous negative experiences of screening, cultural reasons, confidentiality concerns, and practical barriers such as time constraints and lack of transport or childcare can prevent people from attending screening.

49. Evidence suggests that offering the option of HPV self-sampling could help overcome some of these barriers among the under-screened group, leading to improved participation in screening and ultimately preventing more cervical cancer deaths.

50. The YouScreen trial and international evidence show that self-sampling may be an acceptable (to participants) and effective way to improve screening participation particularly among under-screened and high-risk groups, and therefore self-sampling may reduce health inequalities. The trial evaluated the reach of the intervention, demonstrating that it engaged with high a proportion of women from ethnic minority groups and those residing in the most deprived areas. This is discussed further in the 'equalities analysis' section.

Summary and preferred option with description of implementation plan

51. The preferred option (Option 1) is that self-sampling can be offered to under-screened people eligible for the NHS CSP in England, alongside current practice of clinician collected sampling, and in line with the UK NSC recommendation on self-sampling. The UK NSC recommendation is permissive, allowing service commissioners autonomy to implement self-sampling according to their specific requirements and resources, within the delivery options that have been assessed within the YouScreen[56] trial.

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[52] Global strategy to eliminate cervical cancer as a public health problem: are we on track? - eClinicalMedicine (thelancet.com)

[53] Cervical Cancer Elimination Initiative (who.int)

[54] NHS England » NHS sets ambition to eliminate cervical cancer by 2040

[55] UK NSC consults on offering HPV self-sampling option to under-screened people in cervical screening programme – UK National Screening Committee

[56] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

52. NHS England's planned implementation strategy follows a phased rollout using an opt-in mail-out offer. Self-sampling will be offered to under-screened people via communication routes including a letter by post, text message, or NHS App notification. Individuals who accept the offer will then receive a self-sampling kit in the mail. This differs to the direct mail-out offer within the YouScreen trial which sent out self-sampling kits to all eligible people. An opt-in approach reduces cost and waste of self-sampling kits.

53. During the phased implementation self-sampling will be offered initially to those who have never attended screening, beginning with older age groups and progressively offering self-sampling to younger age groups until all those eligible have received the offer. Following this, the offer will be extended to individuals who have previously attended screening however are overdue their most recent screen. After the phased implementation subsequent screening is concentrated on new entrants; those aged 25 who have missed their first cervical screening invite and those who have missed their latest screening invite.

54. NHS England identified that there was greater capacity to initially implement an opt-in mail-out offer within the current NHSCSP, and that this would have less impact on services than the opportunistic offer. NHS England may explore offering opportunistic self-sampling within primary care and other delivery options offered once the initial phase has been achieved. This approach considers workforce capacity and operational capability and aligns with UK NSC's permissive recommendation.

UK NSC evidence

55. The YouScreen[57] study was launched in 2021, developed by the North Central London and North-East London Cancer Alliances working in collaboration with King's College London, NHS England/Improvement, Public Health England, University College London (UCL), NHS Digital and Jo's Cervical Cancer Trust.[58] The aim of the study was to assess whether introducing the offer of self-sampling to under-screened people in the NHS CSP would substantially increase screening participation in this group.

56. Cost-effectiveness analysis was commissioned by the YouScreen team to support the evaluation of cervical self-sampling for under-screened people. The Daffodil Centre (a joint venture between Cancer Council New South Wales and the University of Sydney) carried out the primary economic analysis and the Health Economics team at King's College London provided a partial probabilistic sensitivity analysis to assess the impact of uncertainty in input parameters on the model results. Both health economics teams worked with the YouScreen researchers in sourcing costs and other trial data.

[57] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

[58] HPV self-sampling - North Central London Cancer Alliance

57. UK NSC commissioned a rapid evidence review of HPV self-sampling in the under-screened population, to explore published national and international evidence relating to UK NSC criteria relating to the:

    - test accuracy of self-sampling
    - effect of self-sampling as a strategy to improve participation in under-screened people
    - acceptability of self-sampling

YouScreen trial report[59]

58. The YouScreen trial provides evidence on the feasibility and impact of integrating HPV self-sampling into the existing cervical screening programme, focusing on improving coverage among under-screened people within the cervical screening programme in England.

59. The study focused on 5 London boroughs which had lower screening coverage than the national average. Between January and November 2021, self-sampling kits were distributed to those eligible (those aged 25 to 64 and at least 6 months overdue for screening). During the trial they examined the impact of offering self-sampling kits either opportunistically in primary care when people attended for any reason, or through direct mail-out.

60. Women who were at least 6 months overdue for screening were offered self-sampling during GP visits. The GP electronic record system EMIS Web was programmed to display an on-screen message flagging to the GP whether someone was overdue cervical screening. For direct mail-out, the national screening database was queried to identify people each month who were 15 months overdue for screening. These individuals were proactively sent a kit.

61. Within the trial, screening coverage increased under both the opportunistic offering and direct mail-out. The study also evaluated the reach of the intervention, demonstrating that it engaged with high a proportion of women from ethnic minority groups and those residing in the most deprived areas.

62. Within the trial 8338 people provided self-samples between January and November 2021; 6061 out of the 9248 people who were offered a self-sampling kit opportunistically returned a self-sample, and 2777 out of 17,604 people returned a direct mail-out sample. The trial estimated a 1.6% increase in screening coverage associated with the intervention during the study period, (7.5 months) and estimated a potential 7.4% increase over a 3-year screening period.

[59] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

YouScreen cost-effectiveness modelling study

63. In 2024 the Daffodil Centre shared a cost effectiveness analysis paper which evaluates the economic impact of integrating HPV self-sampling into the NHS CSP. Data from the YouScreen trial, supplemented with data from the NHS CSP and the *Policy1-Cervix* model (see 65 below), was used to assess the cost-effectiveness of the potential expansion of the YouScreen trial to under-screened women in England. Several scenarios were developed, and the model was calibrated to HPV prevalence, cervical cancer incidence, treatment and deaths in England based on the previously developed model of natural history and cervical screening.

64. The primary outputs from the trial-based analysis were:

    - additional people screened due to self-sampling
    - percentage increase in screening participation
    - additional high-grade cervical intraepithelial neoplasia (CIN 2+ and CIN 3+) detected
    - additional costs of self-sampling to the screening programme
    - incremental cost per additional person screened, per CIN2+ detected, and per CIN3+ detected

65. *Policy1-Cervix* is a previously developed model of HPV transmission, natural history, and cervical screening and for this analysis simulated cohorts of women in England of various ages, vaccination status, and screening history.

66. The analysis considered costs and benefits for 2 scenarios: the short-term outcomes over 5 years of self-sampling (based on the YouScreen[60] trial which was conducted in 5 London Boroughs), and for a lifetime time horizon considering extension of the trial results to the whole population for a single birth cohort.

67. Results of the second scenario are presented over the lifetime of a single cohort of 100,000 unvaccinated women aged 26 up to age 84 years, with the additional outputs of:

    - incremental cost-effectiveness ratio (ICER)
    - number of cervical cancer cases and deaths by age
    - resource utilisation volumes including the number of HPV tests, cytology tests, colposcopy tests, biopsies and pre-cancer treatments

68. Sensitivity analyses assessed the impact of uncertainty relating to costs, disutility weights, background screening attendance, HPV vaccination and hysterectomy rates on overall costs, QALYs and the ICER. Scenarios were also included for older aged cohorts.

[60] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

69. Results were scaled to the England female population in 2021, allowing an estimate of outcomes that could have occurred in that year if self-sampling had been operating in steady state (that is, for the lifetime duration of all people in the population cohort) and if the population offered YouScreen were representative of England as a whole.

70. The results of the analysis demonstrated that offering both opportunistic and direct mail-out HPV self-sampling was associated with an incremental cost-effectiveness ratio (ICER) of £8,181 per QALY gained compared to current practice. The ICER for offering direct mail-out only was £9,392, and £2,284 for opportunistic only. Sensitivity analysis revealed that the results were robust to variation in key parameters, including the uptake of self-sampling, the cost of kit and self-collected sample sensitivity.

Rapid review

71. The UK NSC commissioned a rapid evidence review of HPV self-sampling in the under-screened population. The review was conducted by the Glasgow University National Institute for Health and Care Research Evidence Synthesis Group.

72. Analysis showed that the sensitivity of self-sampling was lower than clinician sampling for CIN2+ and CIN3+. However, the specificity for CIN2+ was greater for self-sampling for colposcopy referral. The differences in sensitivity and specificity were not statistically significant.

73. The review considered published studies on self-sampling through either opt-in or direct mail-out approaches. Overall, participation was higher in the direct mail-out strategies, and adherence to follow up appointments following self-sampling was high.

74. The review found cervical self-sampling acceptability for under-screened people was 91%; 74.4% expressed preference for self-sampling at home over a healthcare setting, and 59.5% stated a preference for self-sampling over clinician sampling. Overall, 87% found self-sampling to be convenient.

75. The review reported the reasons for preferring self-sampling were ease of use (91%), not embarrassing (91%), privacy (88%), comfort performing self-sampling (88%), ability to do it oneself (69%) and convenience (65%). The most reported reasons for disliking self-sampling was uncertainty of doing it correctly (21%), pain or physical discomfort (10%) and anxiety (15%).

76. The review concluded that self-sampling was a feasible strategy for increasing participation among under-screened people.

Summary of costs and benefits analysis for Option 1

77. This section outlines the costs and benefits of the preferred option (Option 1) against a baseline of current practice. The costs and benefits of Option 0 (do nothing) are defined as zero, with the costs and benefits of Option 1 (preferred) expressed relative to this baseline.

Cost-effectiveness analysis of the YouScreen Trial

78. As the UK NSC recommendation is permissive and NHS England could implement self-sampling via various different approaches, this IA has provided cost-effectiveness estimates for the direct mail-out and opportunistic approaches assessed within the YouScreen trial.

79. In the YouScreen modelling study, cost-effectiveness was assessed considering the incremental cost-effectiveness ratio (incremental cost per QALY gained relative to current practice) at a willingness to pay threshold of £20,000 to £30,000 per QALY gained as per NICE Health Technology Assessment guidelines,[61] and the scope of analysis includes healthcare costs and benefits.

80. The analysis includes the 3 implementation approaches which were assessed as part of the YouScreen[62] trial, compared to current practice of clinician-collected sampling only:

    - **opportunistic only**: self-sampling kits are offered to under-screened people via an opportunistic offer in primary care
    - **direct mail-out only**: self-sampling kits are offered to under-screened people via a direct mail-out offer
    - **opportunistic and direct mail-out**: self-sampling kits are offered to under-screened people via both an opportunistic and direct mail-out offer

81. People who tested hr-HPV negative via self-sampling had their next screening date reset to 3 years (aged 25 to 49) or 5 years (aged 50 to 64 years) in line with routine intervals for clinician-collected sampling at the time of the trial.

82. People with positive hr-HPV self-samples were advised to undergo a clinician-collected follow up screening test. People that tested hr-HPV positive via self-sampling and hr-HPV negative on a follow-up sample were returned to routine screening intervals. In cases where the self-sampling result was invalid or insufficient, a repeat kit was mailed along with a reminder.

[61] NICE health technology evaluations: the manual

[62] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

Table 1 Summary of costs and benefits of increasing cervical screening coverage through self-sampling

Costs	Benefits
• Primary screening, including consumables, personnel, overheads, postage costs and laboratory testing. • Follow up costs, including colposcopy, biopsy and pre-cancer treatment. • Cancer treatment following diagnosis after screening.	• Reduction in cervical cancer incidence through screening and early intervention. • Earlier detection and treatment of cervical cancer. • Reduction in morbidity and mortality.

Test characteristics

83. The assumed test characteristics and underlying test positivity rates are described in Table 2. Assumed HPV and cytology test characteristics were developed and validated against a range of data sources.[63] This shows that, in the base case analysis, the sensitivity and specificity of self-sampling tests are similar to clinician-collected sampling tests.

Table 2 Modelled test characteristics for HPV screening tests

Test Type	Sensitivity/specificity	Test positivity (by underlying unobserved health state)
Primary HPV (clinician collected)	Sensitivity (CIN2+): 96-98% Specificity (CIN2+): 78-98%	Well: 1.4% HPV: 44% CIN1: 84% CIN2: 93% CIN3+: 98%
Primary HPV (self-collected, baseline)	Sensitivity (CIN2+): 95-97% Specificity (CIN2+): 78-98%	Well: 1.4% HPV: 44% CIN1: 83% CIN2: 92% CIN3+: 97%
Primary HPV (self-collected, worst-case uncertainty analysis)	Sensitivity (CIN2+): 77-79% Specificity (CIN2+): 82-98%	Well: 1.4% HPV: 35% CIN1: 67% CIN2: 74%

[63] Simms KT, Keane A, Nguyen DTN, Caruana M, Hall MT, Lui G, et al. Benefits, harms and cost-effectiveness of cervical screening, triage and treatment strategies for women in the general population. Nature Medicine. 2023 Dec 1;29(12):3050–8.

		CIN3+: 79%

Self-sampling uptake

84. Within the YouScreen trial, self-sampling uptake among the eligible population for the opportunistic approach was 7.7%, and 12.9% for direct mail-out. The model assumes that 7.7% of under-screened people every year continue to receive and return self-sampling kits via the opportunistic approach, and 12.9 % of people who were newly 12-months overdue for screening would continue to return self-sampling kits via direct mail-out. This equated to 0.5% of the under-screened population from 2022 onwards, as shown in table 3.

85. In the whole population modelling it is assumed that self-sampling uptake will be the same as uptake within the London boroughs who participated in the YouScreen trial. Cervical screening coverage is lower than the national average in this area, and so uptake may differ in our areas of the country with different demographics and screening coverage. The trial also took place during 2021, so self-sampling uptake may have been impacted by Covid-19.

Table 3 Estimated self-sampling uptake over 5 years (woman aged 25 to 64 in 5 London boroughs)

Sample type:	**2021**	**2022**	**2023**	**2024**	**2025**
Opportunistic	7.7%	7.7%	7.7%	7.7%	7.7%
Direct Mail-out	12.9%	0.5%	0.5%	0.5%	0.5%
Opportunistic + mail-out	20.6%	8.2%	8.2%	8.2%	8.2%

86. The lifetime cohort modelling generated screening coverage estimates for a hypothetical scenario where self-sampling had been implemented and was in steady state in 2021, compared to model-generated screening coverage in 2021 under current screening practice (see table 4).

87. Self-sampling was estimated to increase screening coverage for all age groups across all modelled implementation approaches.

Table 4 Cervical screening coverage estimates under current practice and self-sampling scenarios

Age Group	**No Self-sampling**	**Direct mail-out**	**GP Opportunistic**	**Direct mail-out + GP opportunistic**
25 to 49 years	66.6%	69.8%	70.0%	71.5%
50 to 64 years	70.8%	77.7%	77.9%	79.1%
25 to 64 years	68.12%	72.76%	72.96%	74.35%

Costs

88. Costs were estimated using public tender documentation for the commissioning of laboratory cervical screening services in England. Using the publication of contract award cost information and information from the NHS CSP, the YouScreen team calculated an upper and lower cost estimate for HPV screening test kits. The incremental cost per additional person screened via self-sampling is shown in table 6.

89. In the direct mail-out scenario in the trial, test kits were sent out to all individuals who were identified as under-screened, and 12.9% returned their self-sampling kits. The cost of the test kits that were not returned is included within total screening test kit costs for the mail-out option. Each year, the number of eligible individuals who did not return kit was multiplied with the cost of letter, invitation and test kit, representing wastage cost, added to the overall cost per additional person screened. The cost per test under current practice, and the direct mail-out and opportunistic self-sampling approaches, are shown in table 5.

90. The costs for follow up treatment after a positive screening test, such as colposcopy, biopsy and pre-cancer treatments, are also provided on a 'per additional person screened' basis, as shown in table 6. These costs occur due to the increase in screening coverage. Table 7 shows the cost per additional person screened for cancer treatment, following a diagnosis through screening.

Table 5 Itemised screening costs under current practice and self-sampling approaches (2021 prices)

Parameter description	**Current practice**	**Direct mail-out**	**Opportunistic**
Primary HPV test (Including consumables, personnel, overheads and postage costs where applicable) [64]	**Baseline cost: £38.80** Includes: **£16.09** laboratory cost (unpublished) + **£22.71** sample collection cost (Irenjeet, Yoon Hong et al. 2019)	**Baseline cost: £25.51** Includes: **£16.09** laboratory cost + **£2.38** notification letter and invitation + **£3.56** test kit + **£3.48** for tracked return to the laboratory (all unpublished).	**Baseline cost: £19.65** Includes: **£16.09** laboratory cost + **£3.56** test kit (all unpublished)

[64] The total cost for kits sent but not returned in YouScreen (direct mail-out) scenario was calculated by multiplying the number of women who were eligible for self-samplings (Mail-out kits) and rejected the offer, with the item costs for notification letter invitation and test kit.

Table 6 Incremental cost per additional person screened; follow up costs following positive screening results (2021 prices)

	Direct mail-out	Opportunistic	Both direct mail-out and opportunistic
Primary screening	£27	£24	£25
LBC test	£17	£13	£15
Colposcopy	£26	£20	£22
Biopsy	£20	£15	£17
Pre-cancer treatment	£7	£6	£6
Total	£97	£78	£85

Table 7 Incremental cost per additional person screened; cancer treatment costs (2021 prices)

	Direct mail-out	Opportunistic	Both direct mail-out and opportunistic
Local stage	£0.25	£0.53	£0.47
Regional stage	£0.02	- £0.11	- £0.50
Distant stage	£0.38	- £0.50	- £0.31

NB: Local means the cancer is only in the cervix and has not spread to other parts of the body. Regional means close to the cervix or around it such as the vagina or pelvis. Distant means in a part of the body farther from the cervix and outside of the pelvis.[65]

Health benefits

91. The primary benefits of implementing HPV self-sampling is the potential to increase cervical screening coverage among under-screened people. This in turn may result in earlier detection of precancerous lesions and cervical cancer, and a reduction in cervical cancer incidence and mortality.

92. Cervical screening is effective at detecting high grade cervical intraepithelial neoplasia (CIN), which are abnormal changes of the cells that line the cervix. Earlier identification and treatment of precancerous lesions can prevent progression to invasive cervical cancer. Early detection, when it is at a more localised stage, reduces mortality and improves survival rates compared to late-stage diagnosis.

93. The QALY gains estimated in the study are largely the result of earlier detection of precancerous lesions and cervical cancer which would both improve health outcomes and reduce cervical cancer mortality. The utility weights used for each health state in the model are shown in table 8.

[65] Stages of cervical cancer | Canadian Cancer Society

Table 8 Utility weights by health state

Health state description	Duration (years) applied to the disutility	Baseline utility
Alive, with no screening event that current year	1	1[66]
Negative screening test (reflects the experience of being screened)	1	1[67]
Abnormal test result and/or colposcopy procedure (no treatment for cervical pre-cancer)	1	0.994[68]
Treatment for cervical pre-cancer	1	0.99[69]
Cervical cancer detected at localised stage of disease	1	0.68[70 71]
Cervical cancer detected at regional stage of disease	1	0.56[70 71]
Cervical cancer detected at distant stage of disease	1	0.48[70]
Cervical cancer survivor	1	1[72]

Additional model parameters

94. Age and year-specific all-cause mortality rates from 1950 to 2070 were sourced from the United Nations 2019 World Population Prospects Abridged Life Table, where predictions for mortality from 2020 onwards are based on the medium fertility variant.[73]

95. Age-specific hysterectomy rates for England were not available in the timeframe for this analysis, and so the model assumed underlying age-specific hysterectomy rates consistent with data from Australia (figure 3). In a total hysterectomy the cervix may be removed, reducing the risk of cervical cancer.[74] The hysterectomy rates used in the model may therefore impact the background risk of cervical cancer and the number of cervical cancer cases reduced by

[66] Assumed

[67] Assumed

[68] Drolet M, Brisson M, Maunsell E, Franco EL, Coutlee F, Ferenczy A, et al. The psychosocial impact of an abnormal cervical smear result. Psychooncology. 2012;21(10):1071–81.

[69] Drolet M, Brisson M, Maunsell E, Franco EL, Coutlee F, Ferenczy A, et al. The psychosocial impact of an abnormal cervical smear result. Psychooncology. 2012;21(10):1071–81.

[70] .Gold MR, Franks P, McCoy KI, Fryback DG. Toward consistency in cost-utility analyses: using national measures to create condition-specific values. Med Care. 1998;36(6):778–92.

[71] Kim JJ, Wright TC, Goldie SJ. Cost-effectiveness of alternative triage strategies for atypical squamous cells of undetermined significance. JAMA JID - 7501160. 2002;287(18):2382–90.

[72] Assumed

[73] United Nations Department of Economic and Social Affairs. “Mortality data.” World Population Prospects [Internet]. 2019 [cited 2022 Jun 16]. Available from: https://population.un.org/wpp/Download/Files/1_Indicators%20(Standard)/EXCEL_FILES/3_Mortality/WPP2019_MORT_F17_3_ABRIDGED_LIFE_TABLE_FEMALE.xlsx.

[74] Hysterectomy - Considerations - NHS

screening. To assess the impact of hysterectomy assumptions, in the sensitivity analysis a counterfactual ‘no hysterectomy’ scenario was included.

96. The model estimated the number of people who attend screening each year using an estimate of the number of people who will turn 25 and be eligible to start cervical screening, those who will be invited for their next routine screen 3 or 5 years after their last negative screen. In the single cohort modelling, age-specific rates of women attending for their first screening test are based on published age-specific rates screening uptake in England (2022) and re-attendance behaviour is calibrated to National Health Service estimates of 3-yearly and 5-yearly participation in cervical screening by age group.[75]

97. In the baseline scenarios the modelling assumed that individuals were unvaccinated. HPV immunisation was introduced in England on 1 September 2008, with routine vaccination offered to girls aged 12 to 13 and catch-up programme for people aged up to 18 years over 2008 to 2010.[76] In September 2019 males were added to the HPV vaccination programme.[77]

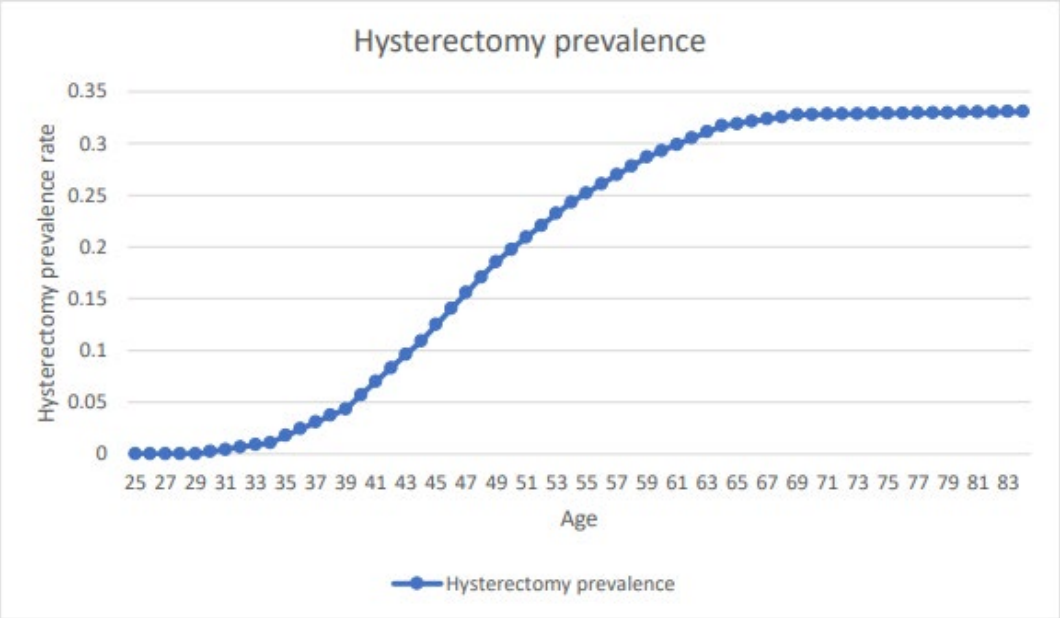
98. While some people attending cervical screening have been vaccinated, the current screening programme and pathway does not change based on vaccination status. However, individuals who have been vaccinated have a lower risk of HPV and cervical cancer. This is explored in the sensitivity analysis.

[75] National Health Service England. Cervical Screening Programme, England - 2021-2022 [NS] [Internet]. 2022 [cited 2023 May 24]. Available from: https://digital.nhs.uk/data-andinformation/publications/statistical/cervical-screening-annual/england-2021-2022

[76] Wagner K, White J, Saliba V. Human Papillomavirus (HPV) Vaccine Coverage in England, 2008/09 to 2013/14. A review of the full six years of the three-dose schedule. [Internet]. 2015 [cited 2022 Nov 28]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774074/HPV_Vaccine_Coverage_in_England_200809_to_201314.pdf

[77] Rai Y, Webster H, Tessier E, White J, Saliba V. Human papillomavirus (HPV) vaccination coverage in adolescent females and males in England: academic year 2019 to 2020 [Internet]. 2020 [cited 2022 Nov 28]. (Health Protection Report Volume 14 Number 19). Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/927 694/hpr1920_HPV-vc.pdf

Figure 3 Australian hysterectomy prevalence. The age-specific probability of benign hysterectomy was derived from the 2001 and 2005 National Health Survey[78,79]



Output summary

99. Cost-effectiveness was assessed considering the incremental cost-effectiveness ratio (incremental cost per QALY gained relative to current practice). The model simulates the lifetime health outcomes and costs for a single birth cohort of 100,000 women aged 26, using values from 2021 as the baseline, shown in table 9.

Table 9 Cost-effectiveness results over the lifetime of 100,000 women aged 26 in 2021, at entry to screening.[80] Costs and QALYs are both discounted at 3.5%.

Strategy	**Costs (£)**	**QALYs**	**Incr. Costs (£)**	**Incr. QALYs**	**ICER (£)**
Option 0: Do nothing	£33,962,012	4,165,933	-	-	-
Option 1 (preferred):					
Self-sampling: mail-out	£34,185,904	4,165,957	£223,892	24	£9,329

[78] Australian Bureau of Statistics. National Health Survey, Summary of Results, Australia, 2001. Canberra, Australia; 2002. Report No.: Cat. No. 4364.0.
[79] Australian Bureau of Statistics. National Health Survey, Summary of Results, Australia, 2004-05. Canberra, Australia; 2006. Report No.: Cat. No. 4364.0.
[80] Discount rate of 3.5% is used for costs and benefits

Self-sampling: opportunistic	£34,019,124	4,165,958	£57,112	25	£2,284
Self-sampling: opportunistic + mail-out	£34,240,178	4,165,967	£278,166	34	£8,181

100. In all 3 scenarios self-sampling is estimated to be cost effective compared to current practice. Direct mail-out on its own was predicted to be both less cost-effective and more costly overall than the opportunistic scenario in the YouScreen trial. A combined scenario of opportunistic and mail-out was also cost effective compared to current practice but was less cost-effective than opportunistic only scenario.

101. As discussed in the 'description of the implementation plan' section, NHS England is considering implementing self-sampling via an opt-in mail-out process where individuals are first asked if they want to participate in self-sampling prior to receiving a test kit in the mail. This will likely reduce the cost per additional person screened and increase the cost-effectiveness compared to the direct mail-out approach, due to the reduced wastage costs from test kits that were sent out and not returned.

102. This base case analysis considers the cost-effectiveness of offering self-sampling to a cohort which is entering the cervical screening programme and so does not have a history of cervical screening and have the possibility of participating in self-sampling for the full duration of the eligibility period for cervical screening. The sensitivity analysis includes scenarios for 2 additional cohorts, those aged 41 and 56 at the time of self-sampling implementation.

103. Additionally, the base case scenario considers the cost-effectiveness of self-sampling within an unvaccinated population. People participating in cervical screening who were born after 1990 will have been offered the HPV vaccine however a greater proportion of the population eligible for self-sampling are likely unvaccinated. Overtime this will shift as each age cohort becomes eligible for cervical screening. This is explored in the sensitivity analysis.

104. Under current practice with current cervical screening coverage levels (approximately 69.6%, from 2022 NHS data), the paper estimates that there would be 380 cervical cancer cases, and 119 cervical cancer deaths over the lifetime of a cohort of 100,000 women turning 26 in 2021. The offer of self-sampling was estimated to prevent cervical cancer cases and deaths under all scenarios, as shown in Table 10.

Table 10 Estimated cervical cancer cases and deaths prevented over the lifetime of a cohort of 100,000 women turning 26 in 2021

Health outcomes	Direct mail-out	Opportunistic	Both direct mail-out and opportunistic
Cervical cancer cases prevented	10 (2.7%)	11 (2.9%)	17 (4.5%)
Cervical cancer deaths prevented	4 (3.0%)	4 (3.4%)	4 (3.4%)

105. The health impacts scaled to the England population are shown in table 11. These estimates assume that self-sampling uptake nationally is consistent with the uptake seen through the YouScreen trial in London.

Table 11 Estimated cervical cancer cases and death prevented, scaled to England female population in 2021*

Health Outcomes	Direct Mail-out	Opportunistic	Both direct mail-out and opportunistic
Cervical cancer cases prevented	26 (2.1%)	36 (2.9%)	65 (5.1%)
Cervical cancer deaths prevented	9 (2.5%)	10 (2.6%)	16 (4.1%)

* Age-specific rates from the results over the lifetime of an unvaccinated cohort of women (with or without an offer of self-sampling as per YouScreen from the age of 26) were scaled by the age-specific population size in England in 2021. These represent outcomes which would have been expected had HPV screening from age 25 (with/without an offer of self-sampling for under-screened women from age 26) been operating in England in 2021 (and reached steady state).

106. For all scenarios, cervical cancer incidence rates are predicted to increase or at least maintain at age 25 to 29, as women initiate cervical screening and prevalent cancers are detected. Following this, cancer detection rates are estimated to fall due to the protective effect of sustained screening, before increasing again following screening cessation. Except for ages 25 to 29, cervical cancer incidence rates were lower in all trial scenarios compared to current practice.

107. DHSC's standard approach to cost effectiveness uses a methodology and criteria that aligns with the HM Treasury Green Book. In table 12 we present the Societal Net Present Value (SNPV) of self-sampling for a cohort of 100,000 people aged 26, where QALYs are valued at £70k and costs are converted into opportunity costs. Total costs and benefits include the direct health costs and benefits monetised within the YouScreen cost-effectiveness modelling only. This modelling discounted costs and benefits at 3.5% in line with NICE HTA guidance. For this IA we have been unable to discount health benefits at 1.5% in line with the HM Treasury Green Book.

108. After accounting for the opportunity cost value of the financial costs to the NHS, it is estimated that the lifetime SNPV for one cohort of 100,000 people aged 26 is £635,171 for the direct mail-out approach, £1,484,000 for the opportunistic approach, and £1,083,000 for both the opportunistic and direct mail-out approach. This suggests that self-sampling would deliver value for money under any of the 3 approaches assessed within the YouScreen trial.

Table 12 Costs and benefits of self-sampling over the lifetime of 100,000 women aged 26 in 2021, at entry to screening

	Further Details	**Value (2021 prices)**
Direct mail-out		
Benefits		
Health benefits	Total estimated QALY gains as a result of increased screening coverage through self-sampling.	Incremental QALYs:24 Total (£): £1,680,000
Costs		
Modelled incremental costs	Includes screening costs via self-sampling, and treatment costs as a result of increased screening coverage.	£224,000
Opportunity cost	£224,000 x (£70,000/£15,000) Value of QALYs forgone due to lost NHS revenue assuming no additional funding is provided for this programme.	£1,045,000
Net Present Value (including opportunity cost)	*Equals* Total benefits *minus* Opportunity Costs	£635,000
Opportunistic		
Benefits		
Health benefits	Total estimated QALY gains as a result of increased screening coverage through self-sampling.	Incremental QALYs: 25 Total (£): £1,750,000

Costs		
Modelled incremental costs	Includes screening costs via self-sampling, and treatment costs as a result of increased screening coverage.	£57,000
Opportunity cost	£57,000 x (£70,000/£15,000) Value of QALYs forgone due to lost NHS revenue assuming no additional funding is provided for this programme.	£266,000
Net Present Value (including opportunity cost)	*Equals Total benefits minus Opportunity Costs*	£1,484,000
Both direct mail-out and opportunistic		
Benefits		
Health benefits	Total estimated QALY gains as a result of increased screening coverage through self-sampling.	Incremental QALYs: 34 Total (£): £2,380,000
Costs		
Modelled incremental costs	Includes screening costs via self-sampling, and treatment costs as a result of increased screening coverage.	£278,000
Opportunity cost	£278,000 x (£70,000/£15,000) Value of QALYs forgone due to lost NHS revenue assuming no additional funding is provided for this programme.	£1,297,000
Net Present Value (including opportunity cost)	*Equals* Total benefits *minus* Opportunity Costs	£1,083,000

Illustrative costs

109. As the UK NSC recommendation is permissive and NHS England could implement self-sampling via various different approaches, this IA has provided cost-effectiveness estimates for the direct mail-out and opportunistic approaches assessed within the YouScreen trial.

110. Currently around 3 million people eligible for cervical screening have never attended screening,[81] and others have previously attended screening however are overdue their most recent screen. This means when self-sampling is initially introduced and offered to those who have never been screened and those who are overdue their most recent screen, it will potentially result in a higher number of people taking up self-sampling initially than in future years. In steady state, those who are overdue their most recent screen will be offered self-sampling.

111. Table 13 shows illustrative costs of self-sampling, using the estimated costs of direct-mail out and opportunistic approaches, and the uptake rates from the YouScreen trial. In 2023 to 2024, 5.12 million people were offered cervical screening, and 3.25 million individuals were screened.[82] If the remaining 1.87 million people were offered self-sampling, based on the YouScreen trial screening costs, this could cost an estimated £6 million via direct mail-out and £3 million via an opportunistic offer. Annually, cervical screening programme costs are around £82 million. This annual estimated cost includes the cost of primary screening only. There may be additional costs to NHS England due to implementing self-sampling such as IT costs.

Table 13 Illustrative costs of implementing self-sampling in 2023 to 2024 (2021 prices)

Screening approach	Assumed uptake	Additional people screened	Cost per test	Cost
Self-sampling	12.9%	241,230	£25.51	£6.15m
Opportunistic	7.7%	143,990	£19.65	£2.83m
Clinician-sampling (current practice)	0%		£38.80	

Unquantified costs and benefits

112. The YouScreen cost-effectiveness modelling study takes a health and social care approach to the assessment of self-sampling. As discussed within this IA, NHS England plan to initially implement self-sampling via a direct mail-out approach through an offer via a letter in the post, text message, or NHS App notification.

[81] Cervical Screening Programme, England - 2023-2024 [NS] - NHS England Digital

[82] Cervical Screening Programme, England - 2023-2024 [NS] - NHS England Digital

There may be additional costs associated with implementing self-sampling within the NHSCSP.

Non-monetised costs

Updating screening programme information

113. A standard English version of the cervical screening programme information leaflet is produced in addition to a small amount of braille versions upon request. Paper leaflets are included within first screening invitation letters. The proposed change to the cervical screening pathway will require updating leaflets and screening invitation letters with the appropriate information. This cost has not been monetised within this IA however is not anticipated to be significant.

Other healthcare costs

114. In addition to the direct costs, there will be additional one-off familiarisation costs for healthcare professionals in relation to changes in the screening pathway.

115. There will also be costs associated with NHS App updates to facilitate the self-sampling offer. There may be other IT updates required to support self-sampling. It has not been possible to estimate these costs within the IA due to a lack of data and evidence.

Non-monetised benefits

Health benefits

116. The implementation of self-sampling within the cervical screening programme is expected to increase uptake within the under-screened population, including those who have never participated in cervical screening. There may be additional benefits to increasing screening coverage for those who have never attended screened compared to those who have previously attended but are overdue.

Cost savings to the individual

117. For some individuals taking part in screening via clinical-collected sampling will create additional costs such as childcare and travel costs. Offering self-sampling to individuals who are under-screened may result in cost savings due to individuals not being required to travel to a GP to participate in screening. The potential cost savings to the individual have not been monetised in this IA.

Productivity impacts

118. Screening appointments for clinician-collected sampling may take place during working hours and this may have an impact on productivity. People aged 25 to 64 are eligible for routine cervical screening and therefore there will be a significant proportion of people attending screening that are in work. Depending on their contract of employment there may be a direct cost to the individual if appointment time is taken as unpaid time off, or a cost to their employer due to reduced productivity.

Sensitivity analysis

119. There are uncertainties and limitations regarding some of the assumptions and data in the YouScreen cost-effectiveness modelling study. Sensitivity analysis was included on the following assumptions to assess their impact on the cost-effectiveness of the programme:

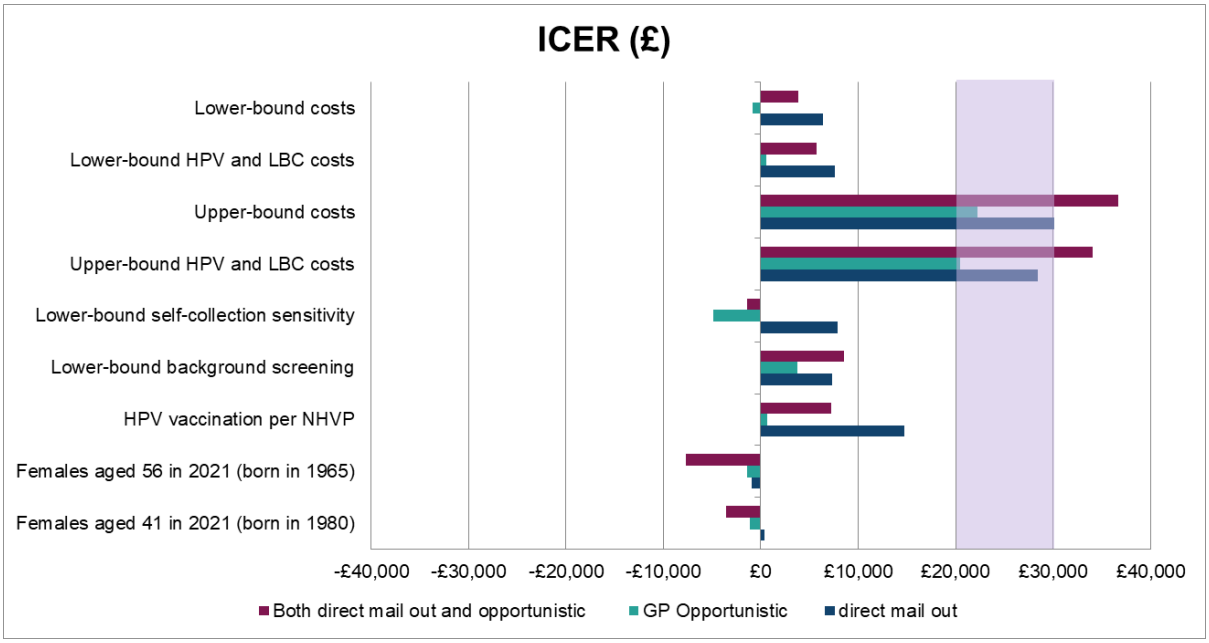
    a. A cohort of women aged 41 in 2021 (born in 1980)
    b. A cohort of women aged 56 in 2021 (born in 1965)
    c. A cohort of women aged 26 who were offered the HPV vaccine at age 12
    d. Lower-bound background screening coverage
    e. Lower-bound self-sampling test sensitivity
    f. Upper-bound: HPV test costs
    g. Upper-bound: all costs
    h. Lower-bound: HPV test costs
    i. Lower-bound: all costs

120. Table 14 shows the estimated ICER for the direct mail-out approach for all sensitivity analysis scenarios relative to the baseline analysis.

Table 14 Summary of sensitivity scenarios (ICER cost per QALY, negative values mean strategy would be net saving)

Strategy	**Direct mail-out**	**GP Opportunistic**	**Both direct mail-out and opportunistic**
Females aged 41 in 2021 (born in 1980)	£403	-£1,147	-£3,581
Females aged 56 in 2021 (born in 1965)	-£941	-£1,409	-£7,709
HPV vaccination per HPV Vaccination Program (NHVP)	£14,698	£707	£7,257
Lower-bound background screening	£7,332	£3,714	£8,520
Lower-bound self-collection sensitivity	£7,889	-£4,855	-£1,421
Upper-bound HPV and LBC costs	£28,395	£20,446	£34,105
Upper-bound costs	£30,110	£22,250	£36,697
Lower-bound HPV and LBC costs	£7,652	£540	£5,761
Lower-bound costs	£6,373	-£821	£3,810
Baseline	£9,392	£2,284	£8,181

Figure 4 Summary of sensitivity scenarios within the (a) direct mail-out (b) GP opportunistic, and (c) both direct mail-out and opportunistic approaches



121. The estimated cervical cancer cases and deaths prevented by self-sampling were the most sensitive to the background level of screening coverage, relatively sensitive to HPV vaccination status and the population cohort considered in the analysis, and to a lesser extent to the relative sensitivity of self-collected versus clinician-collected sampling. Overall, the cost-effectiveness of self-sampling was highly sensitive to cost assumptions.

122. The alternative disutility weights, which assumed a small disutility associated with a negative screening test to reflect the experience of being screened and a smaller disutility than in the baseline weights for abnormal test results, did not substantially impact the cost-effectiveness.

Table 15 Utility weights by health state

Health state description	**Duration (years) applied to the disutility**	**Utility used for sensitivity analysis**
Alive, with no screening event that current year	1	1[83]
Negative screening test (reflects the experience of being screened)	1	0.9998[84]

[83] Assumed

[84] Simonella L, Howard K, Canfell K. A survey of population-based utility scores for cervical cancer prevention. BMC Res Notes. 2014;7:899.

Abnormal test result and/or colposcopy procedure (no treatment for cervical pre-cancer)	1	0.997[85]
Treatment for cervical pre-cancer	1	0.9996[86]
Cervical cancer detected at localised stage of disease	1	0.76[87 88]
Cervical cancer detected at regional stage of disease	1	0.67[87 88]
Cervical cancer detected at distant stage of disease	1	0.48[89]
Cervical cancer survivor	1	1[90]

123. Offering self-sampling opportunistically only or mail-out only remained cost-effective at an ICER threshold of £30,000/QALY under all alternative assumptions considered, but the ICER exceeded £30,000/QALY in the combined opportunistic and mail-out approach in the higher cost scenarios. The ICER also exceeded £30,000 per additional gained in the sensitivity analysis for hysterectomy rates, under the extreme assumption that there are no benign hysterectomies performed.

Population cohort

124. Offering self-sampling to older cohorts (turning 41 or 56 years in 2021) prevented fewer cervical cancer cases and deaths over their lifetimes than in the baseline cohort (turning 26 in 2021) due to the shorter time-period where self-sampling was implemented and assessed regular screening with self-sampling (around 24 or 9 years, compared to around 39 years for those aged 26).

125. Net programme costs per 100,000 women relative to current practice were lower for the birth cohorts turning 41 and 56 years in 2021 as the offer and acceptance of self-sampling, and consequent additional costs, occur later in life and for a shorter duration.

126. All 3 self-sampling scenarios were comparatively more cost-effective for the 2 older cohorts considered, particularly for women turning 41 in 2021. As self-sampling within the NHS CSP would be implemented across all age groups eligible for cervical screening, this suggests that self-sampling for the whole

[85] Simonella L, Howard K, Canfell K. A survey of population-based utility scores for cervical cancer prevention. BMC Res Notes. 2014;7:899.

[86] Simonella L, Howard K, Canfell K. A survey of population-based utility scores for cervical cancer prevention. BMC Res Notes. 2014;7:899.

[87] Myers ER, Green S, Lipkus I. Patient preferences for health states related to HPV infection: visual analogue scales vs time trade-off elicitation. Proceedings of the 21st International Papillomavirus Conference. Proceedings of the 21st International Papillomavirus Conference; 2004; Mexico City, Mexico

[88] Elbasha EH, Dasbach EJ, Insinga RP. Model for assessing human papillomavirus vaccination strategies. Emerg Infect Dis. 2007;13(1):28–41.

[89] Gold MR, Franks P, McCoy KI, Fryback DG. Toward consistency in cost-utility analyses: using national measures to create condition-specific values. Med Care. 1998;36(6):778–92.

[90] Assumed

under-screened population would be more cost-effective than the base case scenario.

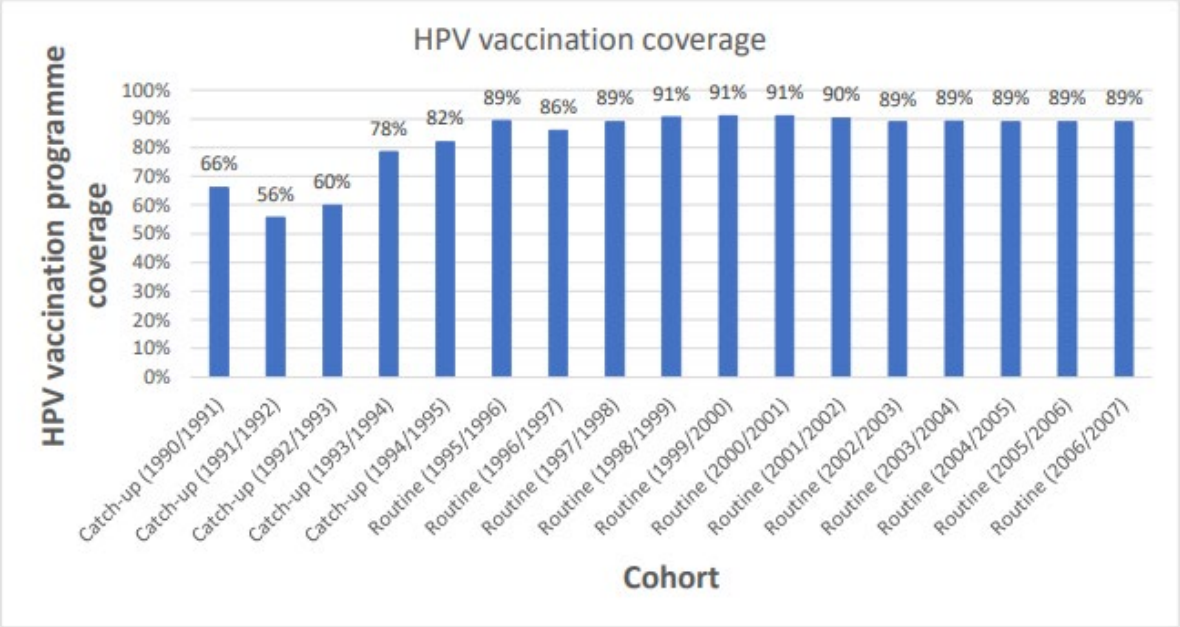
HPV vaccination status

127. The base case assumes that the population participating in self-sampling are unvaccinated. HPV vaccination was introduced in England on 1 September 2008, with routine vaccination offered to girls aged 12 to13 and a catch-up programme for people aged up to 18 years over 2008 to 2010.[91]

128. HPV vaccination reduced the number of cervical cancer cases and deaths prevented, as HPV vaccination lessened the pool of remaining cancers to prevent. Self-sampling via direct mail-out was less cost-effective among a vaccinated population than the base case scenario, and more cost effective when implemented via an opportunistic approach. However, the ICER remained below the cost-effectiveness threshold for all implementation approaches.

Figure 5 Assumed HPV vaccination programme coverage* in girls for catch-up and routine cohorts

[91] Wagner K, White J, Saliba V. Human Papillomavirus (HPV) Vaccine Coverage in England, 2008/09 to 2013/14. A review of the full six years of the three-dose schedule. [Internet]. 2015 [cited 2022 Nov 28]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774074/HPV_Vaccine_Coverage_in_England_200809_to_201314.pdf



*Coverage data for years 2008 to 2009, to 2013 to 2014, was obtained from a 2015 coverage report,[92] and data for years 2014 to 2015, to 2020 to 2021, was obtained from the online database published by UK Health Security Agency (2022).

Background population screening coverage

129. Assuming lower rates of background screening participation increased the number of women offered and who subsequently accepted self-sampling, which in turn resulted in more cervical cancer cases and deaths prevented. Self-sampling was more cost-effective for all self-sampling implementation approaches for a scenario with lower background screening coverage.

Test sensitivity relative to clinician-collected samples

130. In the base case analysis, self-collected HPV test positivity rates were 2% lower than clinician-collected samples. This analysis considered a scenario where self-collected HPV test positivity rates are 20% lower than clinician-collected samples.

131. When the relative sensitivity of HPV testing on self-samples was assumed to be lower this increased cost-effectiveness. This is mainly due to the fact that lower sensitivity of HPV testing within self-sampling would incur fewer follow-up tests and treatment costs.

[92] Wagner K, White J, Saliba V. Human Papillomavirus (HPV) Vaccine Coverage in England, 2008/09 to 2013/14. A review of the full six years of the three-dose schedule. [Internet]. 2015 [cited 2022 Nov 28]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774074/HPV_Vaccine_Coverage_in_England_200809_to_201314.pdf

Costs

132. Table 16 outlines the cost assumptions within the base case and upper and lower cost sensitivity scenarios of the YouScreen cost-effectiveness modelling study. The cost-effectiveness of self-sampling is sensitive to cost assumptions.

Table 16 Itemised cost assumptions for the base case and upper and lower cost scenarios

Parameter description	**Current practice**	**Direct mail-out**	**Opportunistic**
Primary HPV test (Including consumables, personnel, overheads and postage costs where applicable) [93]	**Baseline cost: £38.80** Includes: **£16.09** laboratory cost (unpublished) + **£22.71** sample collection cost (Irenjeet, Yoon Hong et al. 2019)	**Baseline cost: £25.51** Includes: **£16.09** laboratory cost + **£2.38** notification letter and invitation + **£3.56** test kit + **£3.48** for tracked return to the laboratory (all unpublished).	**Baseline cost: £19.65** Includes: **£16.09** laboratory cost + **£3.56** test kit (all unpublished)
	Upper bound cost assumption (Same as the baseline assumption)	**Upper bound cost assumption: £38.42** (Assumes higher laboratory costs) Includes: **£29** laboratory cost. (all unpublished)	**Upper bound cost assumption: £32.56** (Assumes higher laboratory costs) Includes: **£29** laboratory cost (all unpublished)
	Lower bound cost assumption £35.28 (Lower laboratory cost) **£12.57** laboratory cost (Irenjeet, Yoon Hong et al. 2019)	**Lower bound cost Assumption £21.99** (Assumes lower laboratory costs) Includes: **£12.57** laboratory cost (Irenjeet, Yoon Hong et al. 2019)	**Lower bound cost assumption £16.13** (Assumes lower laboratory costs) Includes: **£12.57** laboratory cost (Irenjeet, Yoon Hong et al. 2019)

[93] The total cost for kits sent but not returned in YouScreen (direct mail-out) scenario was calculated by multiplying the number of women who were eligible for self-samplings (Mail-out kits) and rejected the offer, with the item costs for notification letter invitation and test kit.

Liquid-based cytology (LBC) test cost associated with a positive primary HPV test (including consumables, personnel and overheads) [94]	**Baseline cost: £25** (Reflex LBC laboratory cost) (unpublished)	**Baseline cost: £47.71** **£25** reflex LBC laboratory cost (unpublished) + **£22.71** for sample collection at GP visit[95]	**Baseline cost: £47.71** **£25** reflex LBC laboratory cost (unpublished) with **£22.71** for sample collection at the GP[95]
	Upper bound cost assumption is the same as the baseline assumption.		
	Lower bound cost assumption: £21.91[95]	**Lower bound cost assumption: £44.62** Includes: **£21.91** reflex LBC laboratory cost	**Lower bound cost assumption: £44.62** Includes: **£21.91** reflex LBC laboratory cost
Colposcopy evaluation with biopsy	**£216.50** (£176.00 - £257.00)	**£216.50** (£176.00 - £257.00)	**£216.50** (£176.00 - £257.00)
Precancer treatment (LEEP)	**£205.00** (£205.00 - £309.00)	**£205.00** (£205.00 - £309.00)	**£205.00** (£205.00 - £309.00)
Precancer treatment (cone)	**£162.00** (£162.00 - £249.00)	**£162.00** (£162.00 - £249.00)	**£162.00** (£162.00 - £249.00)

Equalities analysis

133. Analysis of self-sampling participants within the YouScreen[96] trial shows that those who took up the offer of self-sampling, across all implementation approaches, were largely reflective of the under-screened population in terms of age, ethnicity and deprivation quintile.

134. Table 17 shows the proportion of under-screened people, and those who responded to the self-sampling offer, by age group. The greatest proportion of

[94] Under the current NHS tender for provision of cervical screening, the cost of a primary HPV test, without YouScreen, includes the cost of any subsequent reflex LBC. Under YouScreen women who are positive for a self-collected HPV test are assumed to attend a GP clinic for the collection of a triage LBC test which incurs additional cost (assumed equal to sample collection under the No YouScreen scenario).

[95] Bains I, Choi YH, Soldan K, Jit M. Clinical impact and cost-effectiveness of primary cytology versus human papillomavirus testing for cervical cancer screening in England. Int J Gynecol Cancer. 2019 May 1;29(4):669.

[96] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

responders came from the 30 to 39 year-old age group. Those who responded to self-sampling follows a similar age breakdown to the under-screened population, however those in older age groups were over represented within self-sampling responses.

Table 17 Total under-screened population and those who participated in self-sampling, by age

Age	Under-screened population	Direct mail-out	Opportunistic	Both opportunistic and direct mail-out
25-29	24.9%	18.7%	21.7%	20.9%
30-39	41.2%	31.3%	32%	31.8%
40-49	19.6%	25.7%	23.2%	23.9%
50-59	10%	18.1%	14.7%	15.6%
60+	4.3%	6.3%	8.4%	7.8%

135. Almost two-thirds of those who responded to the self-sampling offer were from minority ethnic groups and this was largely reflective of the demographics of the under-screened population, shown in figure 6 and figure 7.

Figure 6 Total under-screened population offered self-sampling, by ethnic background

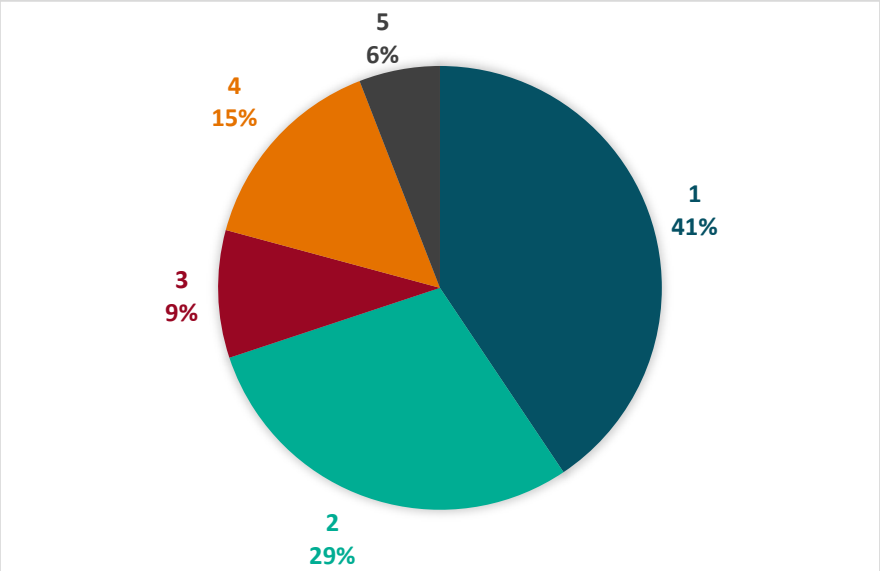
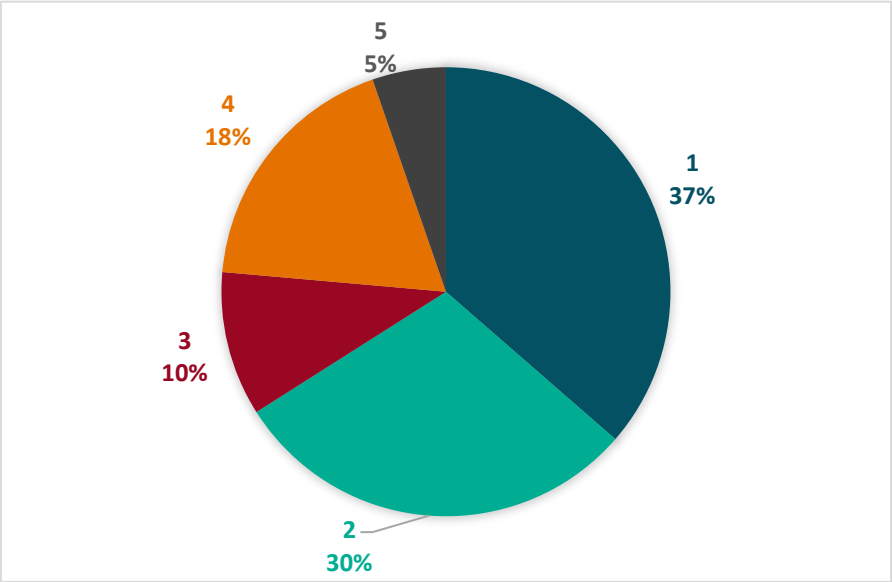
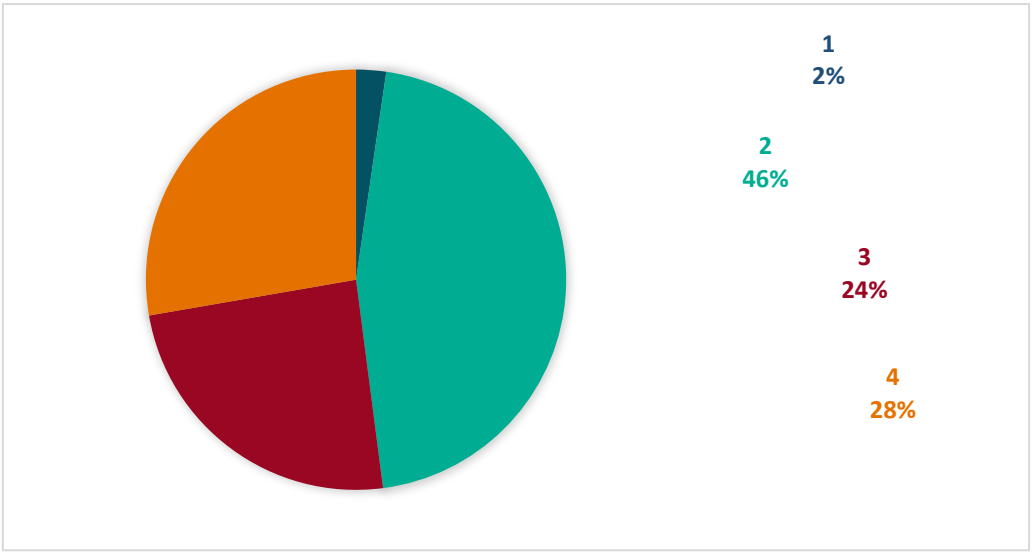


Figure 7 Total population who participation in self-sampling, by Ethnic background



136. Over half of those who returned a self-sample within the YouScreen[97] trial were overdue screening by over 2 years or had never previously attended screening (figure 8). This supports evidence that self-sampling is considered acceptable by under-screened people and can be an approach to increase screening attendance of people who have never previously attended screening.

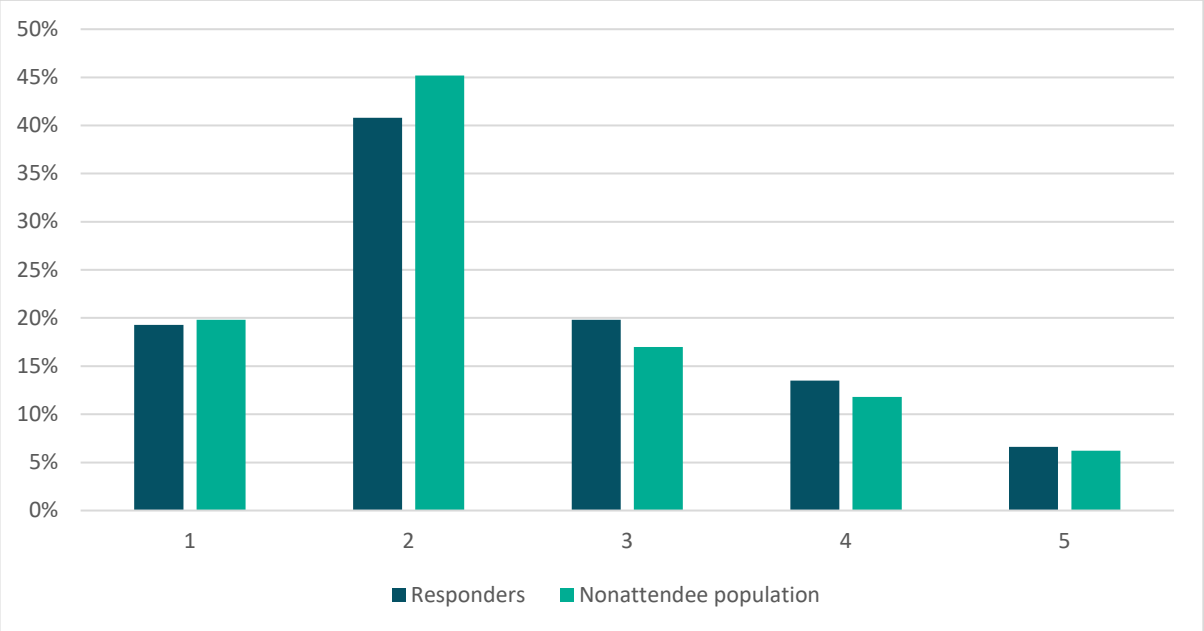
Figure 8 Cervical screening history of those who participated in self-sampling. Self-sampling was offered to under-screened people, defined as at least 6 months overdue for screening.



[97] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

137. Over 60% of those who participated in self-sampling within the YouScreen trial were from the two most deprived quintiles (figure 9). Compared to the under-screened population, a smaller proportion of responders were from the 2 most deprived quintiles. However, responders largely mirrored the distribution in the underlying under-screened population.

Figure 9 Under-screened population and those who participated in self-sampling, by deprivation quintile



138. Introducing self-sampling for under-screened groups has the potential to improve uptake of cervical screening by reducing a number of the barriers to participation experienced by people with different protected characteristics. The existing evidence suggests that self-sampling would be beneficial to historically underserved groups and is not expected to perpetuate existing inequalities in those who access cervical screening. Barriers will continue to exist within screening, particularly later in the pathway for people who test positive for HPV. However, self-sampling is likely to be a beneficial approach to increasing screening coverage and engaging with under-screened people.

139. An equality impact assessment (EIA) has been produced assessing the impact of cervical screening self-screening on people with protected characteristics under the Equality Act 2010.

Risks and assumptions

140. Risks within the modelling for Option 1 include:

a. **Uptake rate.** The cost-effectiveness model assumes that self-sampling uptake for the whole under-screened population will be consistent with the uptake within the YouScreen trial conducted in 5 London boroughs. The uptake rate achieved in a national rollout may differ. The level of engagement with a mail-out offer may differ across different regions that have varying screening coverage. The trial was conducted during the covid-19 pandemic, and this may have impacted uptake of self-sampling.

b. **Self-sampling test kit costs.** The cost-effectiveness model uses the cost per additional person screened as part of the YouScreen trial within the cost estimates. Test kit costs may be lower than in the trial due to the national scale of implementation and higher volume procured. Additionally, in the trial under the direct mail-out approach test kits were sent to all those eligible for self-sampling, whereas the planned NHS England implementation approach includes a step where individuals are first offered self-sampling before a kit is sent out. This may also reduce the cost per additional person screened through a reduction in wastage.

c. **Screening pathway costs.** The cost estimates for laboratory testing, colposcopy, biopsy and cancer treatment used in the model in 2021 may differ to current NHS England costs.

d. **HPV infection risk**. There is uncertainty around underlying HPV infection risk for women in England within the model. As a result, it may underestimate the overall risk of HPV in women in England and therefore underestimate the effectiveness and cost-effectiveness of self-sampling.

e. **Cervical screening background**. The model focuses on a single cohort, which was selected to represent the eventual long-term impact of cervical screening. However, there is a limitation to this as the current eligible population primarily consists of people with a previous history of primary cytology testing rather than HPV testing. As a result, the model may underestimate the risk of HPV and cervical cancer in older age cohorts in the near-term, and therefore may underestimate the benefits of self-sampling.

f. **Extended intervals.** Five-year intervals for those aged 25 to 49 will have been implemented prior to the proposed change to permit offering self-sampling to under-screened people. The cost-effectiveness modelling study was conducted prior to the decision to extended routine intervals for those aged 25 to 49 and so this is not accounted for in the model.

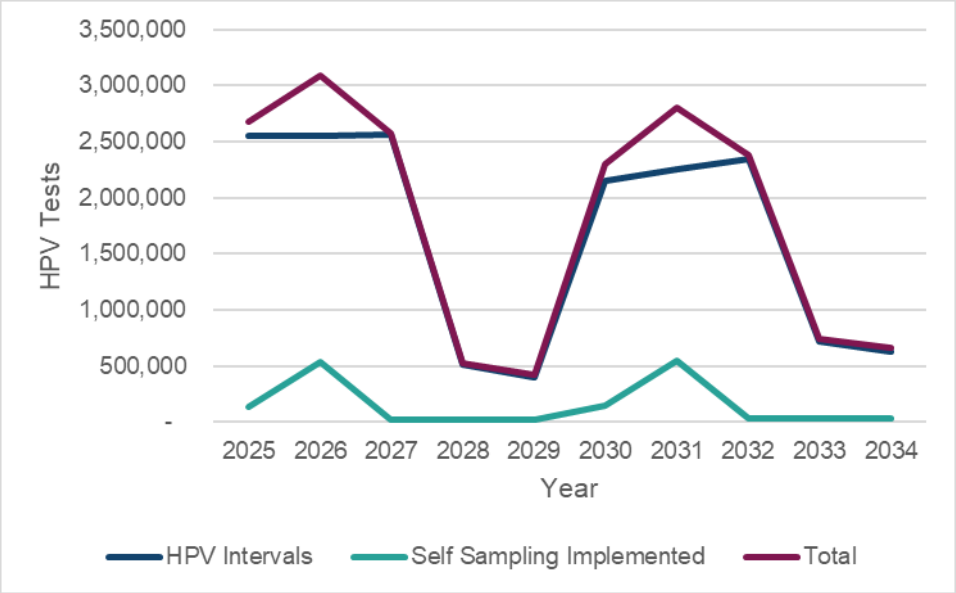
g. **Continued self-sampling participation**. The modelling assumes that people who accept a self-sampling offer continue to participate in cervical screening via self-sampling for the remaining duration of time they are eligible for screening. It also assumes that those who take up an initial self-sampling offer continue to participate in cervical screening.

141. Risks within the implementation of self-sampling include:

    a. **Laboratory testing and system capacity.** Self-sampling is expected to increase the volume of cervical screening tests sent to laboratories for testing. It has been assumed that there is capacity within current contracts to meet this demand, as current cervical screening coverage is below the target coverage level.

    b. **Timing Impact.** Self-sampling will be introduced within the same financial year as intervals change in the 25 to 49 year age group. The implementation of 5-yearly intervals for those aged 25 to 49 was estimated to result in peaks and troughs in the volume of screening tests conducted each year, and therefore also in demands on workforce. The potential timing of the implementation of self-sampling aligns with these peaks and troughs, as shown in figure 10.

Figure 10 Projected change to the number of cervical screens each year, following the introduction of 5-year intervals for hr-HPV negative individuals aged 25 to 49 in early 2025 to 2026 and the proposed implementation of self-sample for under-screened people in 2025 to 2026



c. **Behavioural response.** There is a risk that some people who currently attend clinician-taken screening might instead delay attending screening so as to 'opt in' to self-sampling. Consideration should be made regarding the communications of the proposed self-sampling offer to mitigate the risk that people delay screening to access self-sampling.

d. **Under-screened defined from 6 months overdue**. Within the YouScreen trial self-sampling via an opportunistic offer for those who were over 6 months overdue, and over 15 months overdue for the direct mail-out approach. This may differ to the proposed implementation of self-sampling within NHS England, where self-sampling may be offered to those who are over 6 months overdue across all potential implementation approaches.

e. **Follow-up appointment attendance**. The next stage in the pathway for anyone who tests positive for HPV via self-sampling would be an appointment for a clinician-taken test. At this point, there would then be a risk of people opting out of the whole process, as the barriers that prevented them from attending a clinician-taken screen in the first place may still exist.

Wider impacts

Test kit providers

142. Self-sampling is currently not offered within the NHS CSP. The proposed change to permit self-sampling will increase the volume of test kits purchased from suppliers to volumes higher than during the trialled implementation as part of the YouScreen[98] trial in London.

GP surgeries

143. There is potential for self-sampling via direct mail-out to reduce pressure on GP appointments (as some would have come forward anyway) and therefore increase GP surgeries' capacity to offer clinician-taken screens or other appointments. While there is a chance that this may lead to some GP surgeries over-promoting self-sampling in order to free up capacity and reduce their workload, it is expected that the overall impact of offering HPV self-sampling will be positive for GP surgeries; not least because it may provide the opportunity for GPs to re-engage with patients from hard-to-reach groups.

144. Taking the clinician out of the testing process could potentially result in lost opportunities for wider health discussions and physical examinations (which can currently happen as part of a clinician-taken screen). However, as self-sampling will only be offered to under-screened people (some of whom may never have attended a clinician-taken screen), we would not expect this to have as big an impact as it would if self-sampling were being rolled out more widely to the whole population.

145. As the opportunistic approach would involve a clinician discussing HPV self-sampling with a patient who has come in for a separate issue and may include an additional administrative burden in terms of reporting, this is likely to take time from the appointment itself and could potentially have a knock-on effect on the GP's capacity. Clinicians may also need to take time out to access training around how to use the self-sampling kit and how to communicate this to patients.

146. The opportunistic approach is not within the initial stages of the phased implementation plans within NHS England (which will consider an opt-in mail-out approach), however, it may be reviewed at a future point and added to the cervical screening pathway. The impact on GP surgeries should be considered at this stage.

Service users

147. Given that this recommendation is to offer self-sampling to the under-screened population only, it is possible that this may be perceived as creating an unfair playing field. There is a risk that some people who currently attend their clinician-led screens might instead delay so as to 'opt in' to self-sampling. However, it should be noted that self-sampling isn’t necessarily more acceptable to everyone,

[98] Opportunistic offering of self-sampling to non-attenders within the English cervical screening programme: a pragmatic, multicentre, implementation feasibility trial with randomly allocated cluster intervention start dates (YouScreen) - eClinicalMedicine

with anecdotal evidence showing that some women prefer the reassurance of the test being carried out accurately and effectively by a trained professional.

148. While a self-sampling option might make the initial stage of cervical screening more accessible and acceptable to under-screened people, it is important to note that the next stage in the pathway for anyone who tests positive for HPV via self-sampling would be an appointment for a clinician-taken test. At this point, there would be a risk of people opting out of the whole process, as the barriers that prevented them from attending a clinician-led screen in the first place may still exist.

Laboratories and colposcopy services

149. The workload trend in cervical screening laboratories is reducing because HPV testing is now being used rather than cell cytology. The proposed change to permit self-sampling is expected to increase screening coverage and therefore the volume of samples sent to screening laboratories. Cervical screening coverage is currently below the target coverage. so there is expected to be capacity within current contracts with laboratories to meet an increase in demand. If the uptake of self-sampling exceeds expectations this may need to be reviewed. This can be monitored as part of the planned phased implementation.

150. Colposcopy volumes may increase due to under-screened people engaging in screening for the first time.

Environmental Impacts

151. The proposed introduction of self-sampling is expected to increase the amount of people who accept the offer of cervical screening. This will mean an increase in greenhouse gas emissions from the production and transportation of HPV test kits. However, evidence suggests that self-sampling kits have a lower carbon footprint than clinician-taken screening.[99]

152. Researchers compared carbon emissions associated with different cervical screening methods, including all steps in each approach from invitation to laboratory sample preparation.[100] It was estimated that clinician-taken samples produce 8.7 times more carbon dioxide (3670g) than vaginal self-sampling (423g). In clinician-taken sampling, most of the emissions came from running the appointment at a healthcare facility (2758g).

153. Using Green Book guidance and market traded carbon values,[101] monetised cost of the carbon emissions from an in-person cervical screening appointment is 14p (2024 prices) compared to 2p for self-sampling. Therefore, increasing screening coverage using a self-sampling offer to under-screened people is estimated to

[99] Cervical screening: self-sampling could be environmentally friendly

[100] A comparison of the carbon footprint of alternative sampling approaches for cervical screening in the UK: A descriptive study - Whittaker - 2024 - BJOG: An International Journal of Obstetrics & Gynaecology - Wiley Online Library

[101] Traded carbon values used for modelling purposes, 2024 - GOV.UK

result in lower carbon emissions than increasing participation in clinician-taken sampling.

154. The self-sampling test kits may use more packaging than the in-person kits as they have to be posted individually to the person, and there is the risk that the packaging and test materials will not be recycled as they would be in a clinical setting.

Monitoring and evaluation

155. DHSC will have a role in oversight and accountability to arm's length bodies, and public health policy in general. Cervical screening coverage and outcomes are monitored as part of the existing screening programme and published in the annual NHS Cervical Screening Programme official statistics.[102] This statistical report includes data on the call and recall system, screening samples examined by pathology laboratories and on subsequent referrals to colposcopy clinics, the number of cervical screens conducted each year, and the increase or decrease in coverage compared to previous years.

156. To assess the uptake of self-sampling and enable evaluation of the effectiveness of the implementation of self-sampling within NHS England, it will be important that data is available for both self-sampling and clinician-collected screening, in addition to overall screening programme statistics. Other data that would be useful for monitoring and evaluation purposes includes:

- uptake by delivery method: how individuals receive the self-sampling kit, for example opportunistically, direct mail-out, or opt-in mail-out
- detection and treatment of CIN2+
- cervical cancer incidence and mortality
- adherence to follow up treatment following positive results through self-sampling
- previous screening history and behaviour changes: never screened, late for latest screen, or a regular attender who may have delayed attending screening to be able to switch to self-sampling
- demographic characteristics of individuals who take up self-sampling including age and ethnicity

157. UK NSC has recommended that self-sampling can be offered to under-screened people eligible for the cervical screening programme, as current evidence such as the YouScreen trial have assessed and demonstrated that self-sampling is clinically and cost-effective within this population. This should be re-evaluated once evidence is available that assesses self-sampling for the whole population eligible for cervical screening.

158. The first cohorts of vaccinated people are starting to attend cervical screening, and it is expected that this will reduce the incidence of hr-HPV due to the effectiveness of the vaccine. A study from Public Health Scotland shows that no

[102] Cervical Screening (Annual) - NHS Digital

cervical cancer cases have been detected in fully vaccinated women following the introduction of the HPV vaccination programme for girls aged 12 to 13 which started in Scotland in 2008. However, the vaccine does not protect against all types of HPV and vaccinated individuals are still encouraged to attend cervical screening.

159. This will likely have an impact of the cost effectiveness of the cervical screening programme among the vaccinated cohort. Screening programmes should do more good than harm, and lower incidence of hr-HPV will likely impact the benefits of screening in the vaccinated population cohort. There could also be a behavioural response to the HPV vaccination programme if vaccinated individuals choose to not attend cervical screening.

160. A continuous review of published evidence is central to the work of UK NSC, which enables the committee to make evidence-based recommendations on whether screening programmes should be implemented, modified or ceased in the NHS's across the UK. An article alert system is used to review newly published journal articles, in addition to reviewing recommendations by other expert groups such as the US Preventative Services Taskforce and other pan-Europe and Australasia expert groups.

161. UK NSC also conducts regular reviews of all screening programmes and recommendations, usually every 3 years.[103] However, if significant evidence is published in between regular reviews and captured through the continuous review process, UK NSC can consider evidence for an early topic update.[104]

162. The cost effectiveness of the cervical screening programme should be reviewed once evidence is available on the implementation of self-sampling to determine whether the national screening programme continues to be cost effective. It should also be re-evaluated once evidence is available on self-sampling for the whole population and on screening among vaccinated populations, to ensure the programme in its current format continues to be effective, and that the benefits outweigh the costs.

163. If UK NSC issues further advice on the cervical screening programme, DHSC and NHS England will be able to consider further policies to address this.

[103] Recommendations - UK National Screening Committee (UK NSC) - GOV.UK (view-health-screening-recommendations.service.gov.uk)
[104] UK NSC: evidence review process - GOV.UK (www.gov.uk)