

# Uptake and acceptability of human papillomavirus self-sampling in rural and remote Aboriginal communities: Evaluation of a nurse-led community engagement model

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## Research article

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# Abstract

**Background** Aboriginal women experience disproportionately higher rates of cervical cancer mortality yet are less likely to participate in screening for early detection. This study sought to determine whether a community-based HPV self-sampling service model can effectively recruit never-screened and under-screened Aboriginal women to participate in cervical cancer screening; assess the clinical outcomes; and explore the acceptability of the model from the perspective of the participants.

**Methods** Aboriginal women aged 25-69 years of age were recruited from eight rural and remote communities in New South Wales, Australia to participate in HPV self-sampling via a community-based service model. Outcome measures were: number of women screened by HPV self-sampling, their prior cervical screening status (under-screened or never-screened), clinical outcomes and participation in follow-up pathways of care, and satisfaction with the service model.

**Results** In total, 215 women conducted a HPV self-sampling test and 200 evaluation surveys were completed. One-fifth of participants (n=46) were never-screened and one-third (n=69) were under-screened. Many were unsure of their screening status. Nine women were HPV 16/18 positive and eight had completed all follow up by the conclusion of the study. A further 30 women were HPV other positive of which 14 had completed follow up at the conclusion of the study. Satisfaction with the HPV self-sampling kit, the process of self-sampling and the service model was high (>92% satisfied on all items). Many women had difficulty understanding their official HPV results and placed high importance on the nurse explaining it to them.

**Conclusions** A community-based service model that respects Women's Business can effectively recruit under-screened and never-screened Aboriginal women to complete cervical cancer screening. Furthermore, this service model supports them to complete recommended follow-up care and engage with their local existing health services.

## Background

In December 2017, the Australian National Cervical Screening Program (NCSP) was updated, with HPV testing replacing Pap tests, and clinician-supervised, HPV self-sampling becoming available to eligible under-screened women. To be eligible for self-sampling, a woman must be aged 30 years or over and be overdue for screening by at least two years. Other changes include an increase in entry age from 18 to 25 years, and recommended screening every five years (previously two years).<sup>1</sup> This change was based on extensive evidence demonstrating that HPV testing is a more sensitive screening test, providing better protection against cervical cancer through detection of HPV before cell changes occur in the cervix.<sup>2-4</sup> Key to the NCSP's success however, is in effectively recruiting women to participate in screening. Never-screened or under-screened women are at higher risk of cervical cancer than those who regularly participate in screening programs, and this recent change to the NCSP provides a unique opportunity to engage these women.<sup>5-7</sup>

National data on cervical screening rates of Aboriginal and Torres Strait Islander women is currently limited. Data that are available, however, suggest that average screening rates are in the range of 30–40%, a rate that is up to 20–30 percentage points lower than that of non-Indigenous women.<sup>8–12</sup> Aboriginal and Torres Strait Islander women also experience higher rates of cervical cancer incidence and mortality,<sup>12–13</sup> hence, increasing their participation in preventative screening is crucial.

International research aimed at increasing the uptake of cervical screening, was summarised in a recent meta-analysis,<sup>14</sup> and they found that door-to-door recruitment was most effective (39.7%) at increasing uptake as compared to clinician-collected samples. This was followed by community campaigns (9.5%) and mail-out to all (7.3%), with the opt-in approach considered ineffective (-5.1%). However, the success of these recruitment techniques varied across populations and geographical regions, and thus techniques need to be tailored to specific regions. The best way to offer self-sampling to women who are disengaged from the health system and are under- or never-screened is also not yet known. To our knowledge, no other programs in Australia have offered face-to-face distribution and collection of HPV self-sampling kits within the home and community. One Australian study successfully recruited Aboriginal women from a regional Aboriginal Community Controlled Health Service to participate in self-sampling,<sup>15</sup> suggesting self-sampling is an acceptable option for Aboriginal and Torres Strait Islander women. No HPV self-collection studies have specifically targeted Aboriginal and Torres Strait Islander women in rural and remote communities.

The option of clinician-supervised patient self-sampling under the new NCSP could positively impact screening practices of women who have never been screened or are under-screened. However, this pathway relies on existing patient engagement with a clinician and/or health service. Innovative models of care are needed to engage hard-to-reach women, particularly those in rural and remote communities where the proportion of under-screened and never-screened women increases and access to female health professionals is limited. This research sought to: determine whether a community based HPV self-sampling model effectively recruited never-screened and under-screened Aboriginal women to participate in cervical cancer screening; assess the clinical outcomes, including follow-up; and explore the acceptability of the model from the perspective of the participants.

## Methods

### Community consultation

Marathon Health Primary Health Care Nurses (PHCNs) consulted extensively with local organisations and community members across rural and remote New South Wales, Australia to establish the new service model for HPV self-sampling amongst Aboriginal women, including clinical governance processes.

### Pilot sites

Eight rural and remote communities participated in the pilot study. Notably, seven of these had minimal access to female General Practitioners (GPs). A target sample size was calculated based on the aggregate population size of all eight communities and average current estimated screening rates across these eight communities (data kindly provided by the NSW Cancer Institute). Assuming 45% of women

within these communities were under-screened or never-screened, a target sample of 20% of these women (n = 266) was set for this study.

#### Self-sampling pathway

PHCNs established partnerships with Local Aboriginal Land Councils (LALC) as the representative body for Aboriginal people in each community. Each LALC identified a female employee or community member to recruit as the Community Engagement Worker (CEW) for each site. Their primary role was to engage and recruit women to the program, and support them along the way, with clinical support provided by the PHCN. See Fig. 1 for a detailed flowchart of the self-sampling process. In brief, the CEWs recruited eligible women at local community events, pop-up clinics and home visits, and the self-sampling process was completed with the support of the PHCN and CEW. The VCS Foundation analysed HPV samples and returned pathology results by mail to the participant, their nominated GP and the PHCN. A project GP was recruited to provide clinical oversight of those participants who did not have a regular GP. The PHCN followed up with all participants face-to-face or by phone to ensure they received their results and that they understood their meaning, including any follow-up that was required. Women who returned invalid results were provided the option to rescreen.

**Participants:** The age cohort was closely aligned to the renewed NCSP with women in the range 25–69 years (inclusive) eligible to participate. Exceptions to this were: the current NCSP only permits self-sampling at 30 years of age whilst this study used 25 years as the lower limit; and screening of women younger than 25 years was allowed at the discretion of the PHCN based on clinical indication. Although initially set at 64 years of age, the upper age limit was increased to 69 years in line with the renewed NCSP in December 2017. The NCSP now recommends all women conduct an ‘exit-screen’ between 70–74 years of age. Hence, an upper age limit of 69 years was set to ensure women conducted their recommended exit screen outside of this pilot study under the guidance of their clinician.

#### Data collection and management

An eligibility survey was conducted at the outset of the recruitment process. An evaluation survey was conducted during follow-up to elicit feedback on the service model and the participant’s experience of self-sampling using likert scale responses from 1 (very unsatisfied) to 5 (very satisfied). Clinical data were input into the client’s electronic medical record as per routine practice. All data were stored securely and confidentially so as to comply with both clinical governance requirements and research ethics requirements.

All data were linked using a code number and then de-identified by the PHCN before analysis by the research team. Data were entered into Excel. IBM SPSS Statistics (version 22) was used for descriptive statistics on the quantitative dataset. Open-ended comments were combined and key themes then extracted by two researchers independently as part of the manifest content analysis process.<sup>16</sup> Themes and sub-themes were compared and discussed until a consensus was reached.

## Results

## Part 1: Clinical results

HPV self-sampling kits were distributed from September 2016 to June 2018 (21 months). The 215 women (80.8% of the targeted sample) that agreed to participate were all eligible and completed the HPV self-sample. Participation was highest amongst women aged 25–29 years (Fig. 2).

One-fifth of participants (21.4%; 46) had never completed a Pap test and 32.1% (69) had previously completed a Pap test but more than 4 years ago, with the range since last Pap test being 4 to 20 years (Fig. 3).

Eighteen percent (18.1%; 39) of women had a positive result: 4.2% (9) were HPV Positive 16/18 and 14% (30) HPV Positive other. Seventy-eight percent (78%; 168) had a negative result (two of which were the results of a second screen as the initial result was invalid), and 3.7% (8) had invalid results and did not complete a rescreen.

Eight of the nine women (88.9%) with a HPV Positive 16/18 result had attended a colposcopy appointment by mid-July 2018. The other woman failed to attend her appointments due to documented clinical and other issues. Just under half (46.7%; 14) of the women with a HPV Positive other result had attended an appointment for a cervical screen by mid-July 2018. Attendance at follow-up appointments was relatively similar regardless of cervical screening history (Fig. 4).

## Part 2: Women's satisfaction and feedback

Almost all women (92.6%; 199) completed the follow-up evaluation survey. One completed the survey twice as her initial result was invalid (200 total surveys). More than 90% of women were highly satisfied with the HPV self-sampling kit and the process involved (Table 1). In response to whether results were presented in an easy to understand format, 13.2% (23) were unsatisfied or very unsatisfied. Further, some women that were highly satisfied with the format of results commented that they were unable to interpret the paper copy independently, but the PHCN explained the results well:

Table 1  
Participating women's level of satisfaction with the HPV self-sampling program

Aspects of the self-sampling program	(5) very satisfied	(4) satisfied	(3) neither satisfied/ dissatisfied	(2) dissatisfied	(1) very dissatisfied
<b>1.1 HPV self-sampling kit</b>					
The kit provided everything to complete the self-sampling test? (n = 200)	199 (99.5%)	1 (0.5%)	-	-	-
Satisfaction with the self-sampling instructions (n = 200)	196 (98.0%)	1 (0.5%)	1 (0.5%)	-	2 (1%)
<b>1.2 HPV self-sampling process</b>					
Process clearly explained by the CEW (n = 197)	188 (95.4%)	5 (2.5%)	3 (1.5%)	1 (0.5%)	-
Able to ask questions and receive answers in a timely manner? (n = 186 <sup>a</sup> )	183 (98.4%)	2 (1.1%)	-	1 (0.5%)	-
The process was simple (n = 197)	187 (94.9%)	4 (2%)	4 (2%)	-	2 (1.0%)
Provided with privacy and confidentiality (n = 197)	182 (92.4%)	6 (3.0%)	7 (3.6%)	2 (1.0%)	-
<b>1.3 Results</b>					
Results were provided in an easy to understand format (n = 174 <sup>b</sup> )	136 (78.2%)	6 (3.4%)	9 (5.2%)	3 (1.7%)	20 (11.5%)
	< 2 weeks	< 3 weeks	> 3 weeks	Unsure	Not at time PHCN made contact <sup>c</sup>
Mailed results returned within 2 weeks (n = 195)	148 (75.9%)	13 (6.7%)	6 (3.1%)	13 (6.7%)	15 (7.7%)
<sup>a</sup> Eight participants said they did not need to ask questions and six did not respond to this question.					
<sup>b</sup> Some participants had not yet received results and thus not applicable or did not respond to this question.					
<sup>c</sup> The hard copy paper results were not yet received by the participant at the time the PHCN provided the results verbally over the phone (this may have been within two weeks of the self-sampling test).					

The pathology made no sense to me but when the Nurse called and discussed I understood them

Table 1 to be inserted here.

The majority of participants (96.0%; 192) would use the HPV self-sampling kit again. Of the six women who stated they would not use it again, four were referred to the GP for a pap test and would thus go directly to the GP next time, and two experienced difficulties completing the sample. Almost all women (98.5%; 197) would recommend the HPV self-sampling kit to other women.

Women were grateful of, and highly satisfied with, the service (Table 2). There was overwhelming agreement that self-sampling removed the shame, intimidation, embarrassment, and pain that has historically been associated with clinician-collected Pap tests. Positive aspects included the ability to complete the test in the home, and thus the accessibility and privacy of cervical screening; the simplicity of the test; being in charge of women's business; the appropriateness of the self-sampling kit contents, with the exception of there not being a non-transparent bag to return the swab in; and the professionalism of the PHCN. Women felt they would not have completed cervical screening had this service not been available.

Table 2

## Participating women's experiences with HPV self-sampling

Themes	Description
Location of self-sample	In the home: Women felt it was a more private, confidential and comfortable experience; they could complete it without embarrassment and shame.
	Out of the home: There was mixed feelings regarding privacy and confidentiality when completed out of the home (e.g. park, LALC, mother's groups).
Accessible	Accessible (in the home) and free. No need to travel long distances for a female GP, or wait and pay at a General Practice.
Privacy and confidentiality – shame and embarrassment	Self-sampling was private and confidential, with no shame or embarrassment. Women did not feel violated or lose their dignity.
Simplicity	Self-sampling was described as simple, easy, convenient, quick, and not too daunting. Several women experienced some difficulty completing the test themselves.
In charge of women's business	Women felt a sense of control over their own women's business, health and wellbeing. Women found it to be a positive and personal experience, and they felt comfortable and at ease.
Comparison of HPV self-sampling to Pap test	Pap test – uncomfortable, painful, humiliating, daunting, shameful, embarrassing, degrading, intimidating, not confidential. Women do not like going to the Doctor and do not want a man involved in women's business. HPV self-sampling – easier, more private, discreet, comfortable, personal, dignified, appropriate, and quicker. Not as intrusive, evasive or awkward.
Self-sampling kit contents	High importance was place on the quality of the instruction cards: (a) They were clear, easy to understand, straight forward – not having to sift through unnecessary readings. (b) Illustrations for black women were good. In the case a woman could not read, the Nurse could clearly explain the process and the picture cards supported this.
	The women were happy they could keep the case the kit came in.
	A non-transparent bag needs to be included in the kit for the sample to be returned to improve privacy and remove any shame.
The PHCN gave the women confidence in the service being professional	Women placed high importance on a trained professional (i.e. the PHCN) being present throughout the program, giving them confidence that it was accurate and professional. Some women would have preferred the PHCN (instead of the CEW) to explain the kit/process and take the completed sample.
Verbal communication of results	Women appreciated the verbal communication of results from the PHCN, particularly as many women could not understand them. This was described as 'caring' and gave women confidence in the entire program.

Themes	Description
Unlikely that women would have completed a cervical screen had the HPV self-sampling test not been offered	Women commented on: never having completed a cervical screen until participating in this study; being hesitant, reluctant, frightened, or scared to go to the Doctor to have a cervical screen, even in the case that one woman had a family history of cervical cancer and understood the risks; postponing Pap tests, with women suggesting anywhere between 1 and 20 years before they thought they would be screened again.
Grateful of a potential lifesaving experience	Women (irrelevant of results) were grateful and happy they had been offered the self-sampling kit, and that it could have saved their lives.
Initial concerns with the Program	Women were not always forthcoming to completing the self-sampling, describing that they were initially nervous (e.g. unsure of accuracy of the test; previous painful experience with a pap test; worried of a positive result). However, these comments were followed by positive feedback about the test and increased confidence to complete the test next time.

I could do it myself. No pain. I ended up having to go to the GP for a Pap test but I would have never done that if I didn't have a self-sample, may have saved my life. I recommend this to everyone. The government needs to give all women the choice to self-sample

Table 2 to be inserted here.

## Discussion

This program successfully recruited never- and under-screened Aboriginal women across rural and remote Australia to participate in HPV self-sampling in the home or community. Despite historically being disengaged from the health system, eight of the nine women with a HPV Positive 16/18 had attended a colposcopy appointment by the completion of the project. This is in line with other studies that also reported high follow-up rates for women who participated in self-sampling.<sup>13, 15</sup> The lower follow-up rates (46.7%) however for women who tested HPV Positive Other may be the result of not tracking women for long enough as anecdotally some women did attend a GP appointment after the end date of this study. Long-term research is needed to understand whether follow-up care is achieved and how women can best be supported.

Given the target population was not actively engaged in cervical cancer screening or the health system, the timely and individual support the PHCN and CEW provided to each woman to ensure results and follow-up care were understood, and women remained engaged, was key to the model's success. Women placed high importance on the verbal communication of results given by the PHCN, particularly as they did not understand the hard copy results. Ensuring women have maximum understanding of the next steps in their pathway of care decreases anxiety and assists with successful completion of the self-sampling pathway.<sup>17</sup> Flexibility in PHCN and CEW roles enabled innovative solutions to be adapted for

each woman to support them at an individual level to access the follow-up care required. This included offering self-sampling in the home environment. The majority of self-sampling studies have not allowed for home-based self-collection so this study adds to the limited evidence base attesting to its effectiveness at engaging women to complete screening.

There was overwhelming agreement that this method for cervical cancer screening is appropriate for Aboriginal women, ensuring Women's Business is respected. In comparison to Pap Tests it was seen as a positive experience which women were happy to repeat and recommend to others, also documented in numerous self-sampling trials.<sup>17-20</sup> Importantly, women mentioned they would not have participated in screening had this not been available.

This pilot highlighted how the model can provide an access point into the health system, demonstrated by the large proportion of women that entered the mainstream health system for follow-up care. Further, an unexpected outcome was that some women who attended a GP follow-up appointment, also sought after additional medical advice/treatment for other conditions. It provided a comfortable access point for these women, and therefore can have a net overall positive impact on health service engagement.

Whilst the current NCSP supports never- and under-screened women to participate in self-sampling rather than clinician-led sampling, there are specific criteria and it must be facilitated and requested by a clinician who routinely performs cervical screening. Hence, it is reliant on existing engagement with a clinician/health service. The current community-based service model could serve as an effective adjunct to clinician-led NCSP services by engaging with those women who are currently not engaged with a health service or clinician. Significantly, data from this study shows that this service model can also facilitate health service engagement amongst women who were previously disengaged. For many women though, the barriers to engagement with cervical screening under the previous NCSP will not immediately be broken down by completing one self-sample HPV test. It is a key recommendation of this study that women who are eligible for self-sampling continue to remain eligible to screen via this pathway, should they decline clinician-led screening in the future.

## **Limitations**

This study did not capture numbers of women who were approached and declined participation or were obviously ineligible, such as being pregnant. There was not a structured process in place to document the follow-up outcomes for women and support required. When women completed the evaluation survey there was a feeling that using a scale of 1 to 5 was not always understood by the women, and that a yes/no response (or something similar) would be more appropriate.

## **Conclusions**

This pilot demonstrated how a community-based model that respects Women's Business, is community-led, and has a clinical lead to maintain high clinical governance and professionalism within the program,

can effectively recruit under-screened and never-screened Aboriginal women to complete cervical cancer screening and support them to complete recommended follow-up care. Future research and evaluation is needed to explore translation of this best practice service model into other remote, rural and regional sites. Research that builds on the current pilot study data can inform the requirements of rolling out this service model to communities that differ by population size, remoteness, geography, health service access, and other aspects unique to that community. Long-term follow-up of HPV self-sampling participants can also shed light on the ongoing health service engagement and cervical screening practices of these women.

## **Abbreviations**

CEW  
Community Engagement Worker  
GP  
General Practitioner  
HPV  
Human Papilloma Virus  
LALC  
Local Aboriginal Lands Council  
NCSP  
National Cervical Screening Program  
PHCN  
Primary Health Care Nurse

## **Declarations**

### **Ethics approval and consent to participate**

Ethics approval for this project was granted by the Aboriginal Health and Medical Research Council Human Research Ethics Committee (reference 1188/16) and Western Sydney University Human Research Ethics Committee (reference H11837). All participants signed a consent form.

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

The datasets are available from the corresponding author upon request.

## Competing interests

The authors declare that they have no competing interests.

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## Authors' contributions

All authors satisfy the four criteria to authorship as outlined by the International Committee of Medical Journal Editors. All authors contributed to revising of the manuscript and have read and approved the final manuscript.

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## References

1. Australian Government Department of Health. National Cervical Screening Program. Updated 28 Aug 2019. <http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/cervical-screening-1> (viewed Aug 2019).
2. Elfstrom KM, Smelov V, Johansson AL, et al. Long term duration of protective effect for HPV negative women: follow-up of primary HPV screening randomised controlled trial. *BMJ*. 2014;348:g130.
- 3.

- Ronco G, Dillner J, Elfstrom KM, et al. Efficacy of HPV-based screening for prevention of invasive cervical cancer: follow-up of four European randomised controlled trials. *Lancet*. 2014;383:524–32.
- 4.
- Canfell K, Saville M, Caruana M, et al. Protocol for Compass: a randomised controlled trial of primary HPV testing versus cytology screening for cervical cancer in HPV-unvaccinated and vaccinated women aged 25–69 years living in Australia. *BMJ open*. 2018;8:e016700.
- 5.
- VCS Foundation. Statistical Report 2015. 2017. <https://www.vcs.org.au/population-health/statistical-reports/annual-statistical-reports/> (viewed Aug 2019).
- 6.
- Bos AB, Rebolj M, Habbema JD, et al. Nonattendance is still the main limitation for the effectiveness of screening for cervical cancer in the Netherlands. *Int J Cancer*. 2006;119(10):2372–5.
- 7.
- Sasieni PD, Cuzick J, Lynch-Farmery E, et al. The National co-ordinating network for cervical screening working group. Estimating the efficacy of screening by auditing smear histories of women with and without cervical cancer. *Br J Cancer*. 1996;73:1001–5.
- 8.
- Australian Institute of Health and Welfare. Cervical Screening in Australia 2018. Canberra, AIHW;2018 Contract No.: Cat. no. CAN 111.
- 9.
- Australian Institute of Health and Welfare. National Key Performance Indicators for Aboriginal and Torres Strait Islander primary health care: results from June 2016. 2017.
- 10.
- Binns PL, Condon JR. Participation in cervical screening by Indigenous women in the Northern Territory: a longitudinal study. *MJA*. 2006;185:490–4.
- 11.
- Coory MD, Fagan PS, Muller JM, et al. Participation in cervical cancer screening by women in rural and remote Aboriginal and Torres Strait Islander communities in Queensland. *MJA*. 2002;177:544–7.
- 12.
- Whop LJ, Garvey G, Baade P, et al. The first comprehensive report on Indigenous Australian women's inequalities in cervical screening: A retrospective registry cohort study in Queensland, Australia (2000–2011). *Cancer*. 2016;122:1560–9.
- 13.
- Australian Institute of Health and Welfare. Australian Cancer Incidence and Mortality (ACIM) books: cervical cancer. 2017. <https://www.aihw.gov.au/reports/cancer/cancer-data-in-australia/acim-books> (viewed Aug 2019).
- 14.
- Arbyn M, Smith SB, Temin S, et al. Detecting cervical precancer and reaching underscreened women by using HPV testing on self samples: updated meta-analyses. *BMJ*. 2018;363:k4823.
- 15.

Saville M, Hawkes D, McLachlan E, et al. Self-collection for under-screened women in a National Cervical Screening Program: pilot study. *Curr Oncol (Toronto Ont)*. 2018;25:e27–32.

16.

Bengtsson M. How to plan and perform a qualitative study using content analysis. *NursingPlus Open*. 2016;2:8–14.

17.

Gupta S, Palmer C, Bik EM, et al. Self-Sampling for Human Papillomavirus Testing: Increased Cervical Cancer Screening Participation and Incorporation in International Screening Programs. *Front Public Health*. 2018;6:77.

18.

Madzima TR, Vahabi M, Lofters A. Emerging role of HPV self-sampling in cervical cancer screening for hard-to-reach women: Focused literature review. *Canadian Family Physician Medecin de famille canadien*. 2017;63:597–601.

19.

Sultana F, Mullins R, English DR, et al. Women's experience with home-based self-sampling for human papillomavirus testing. *BMC Cancer*. 2015;15:849.

20.

Winer RL, Gonzales AA, Noonan CJ, et al. Assessing Acceptability of Self-Sampling Kits, Prevalence, and Risk Factors for Human Papillomavirus Infection in American Indian Women. *J Community Health*. 2016;41:1049–61.

## Figures

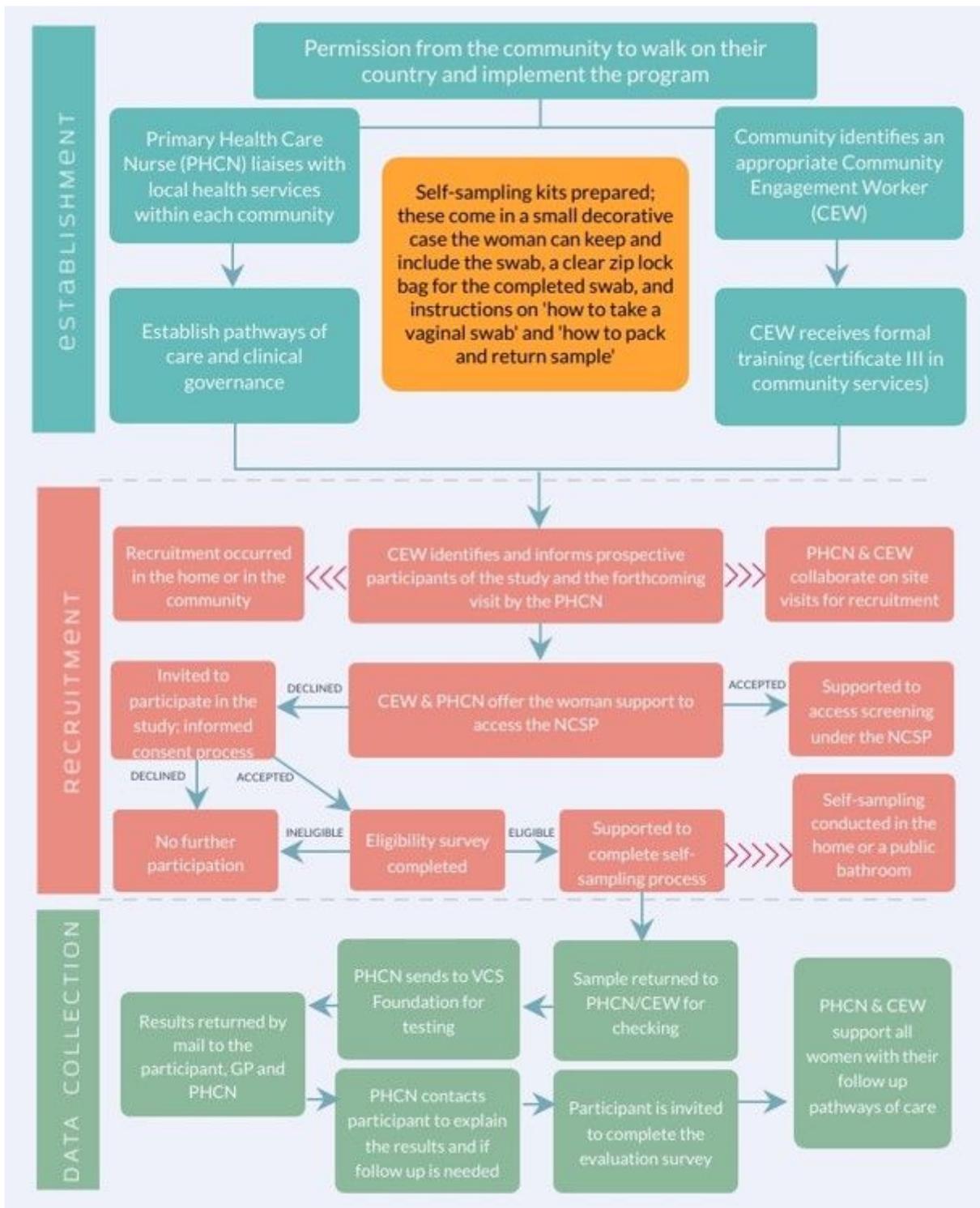
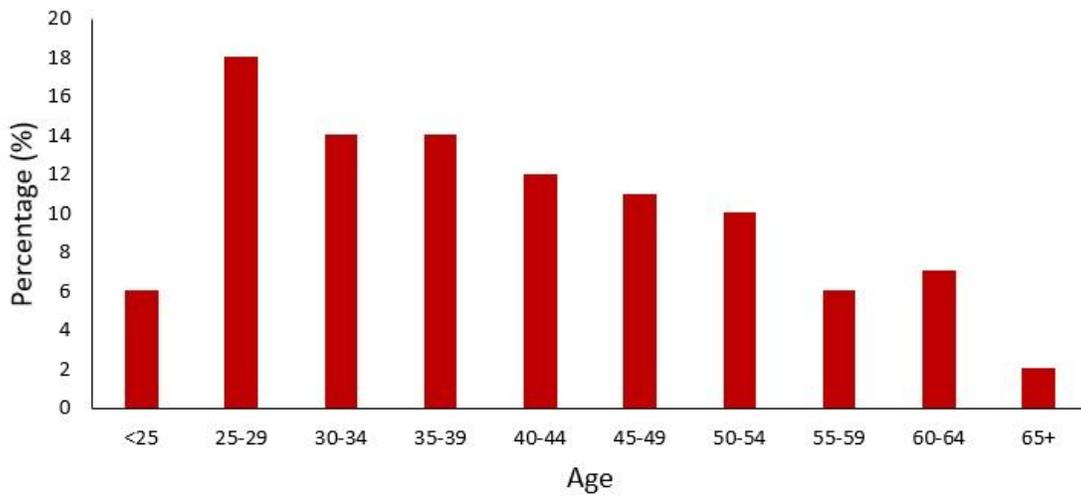


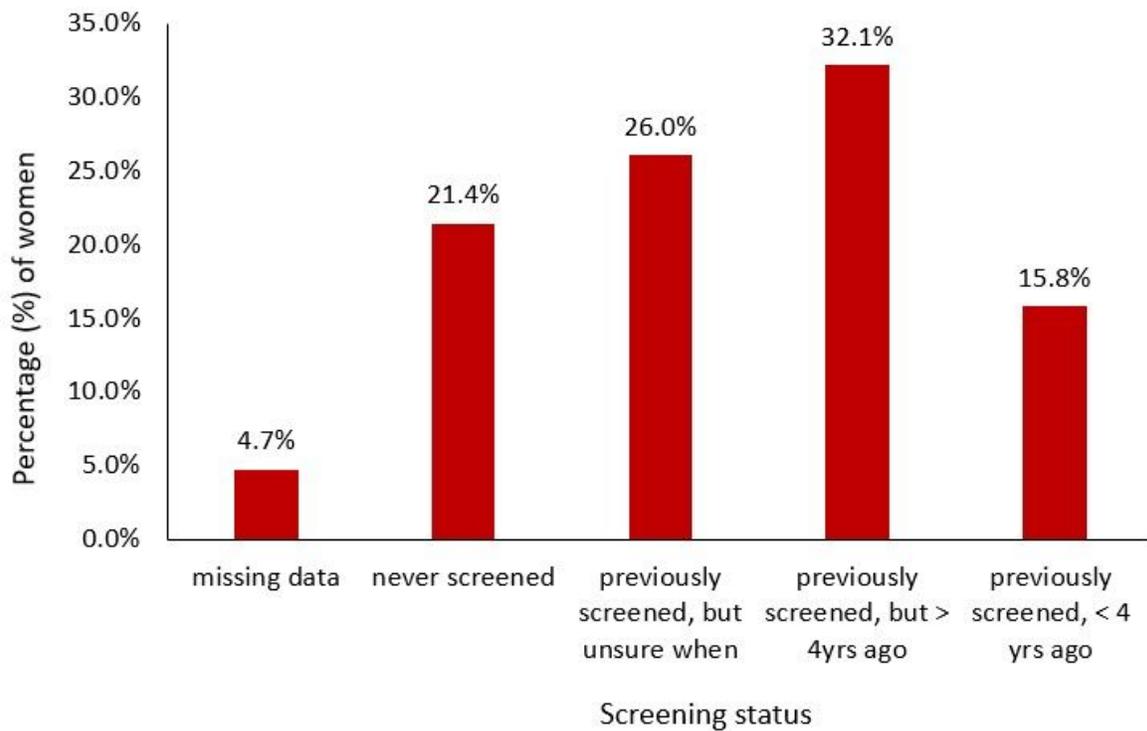
Figure 1

Study flowchart



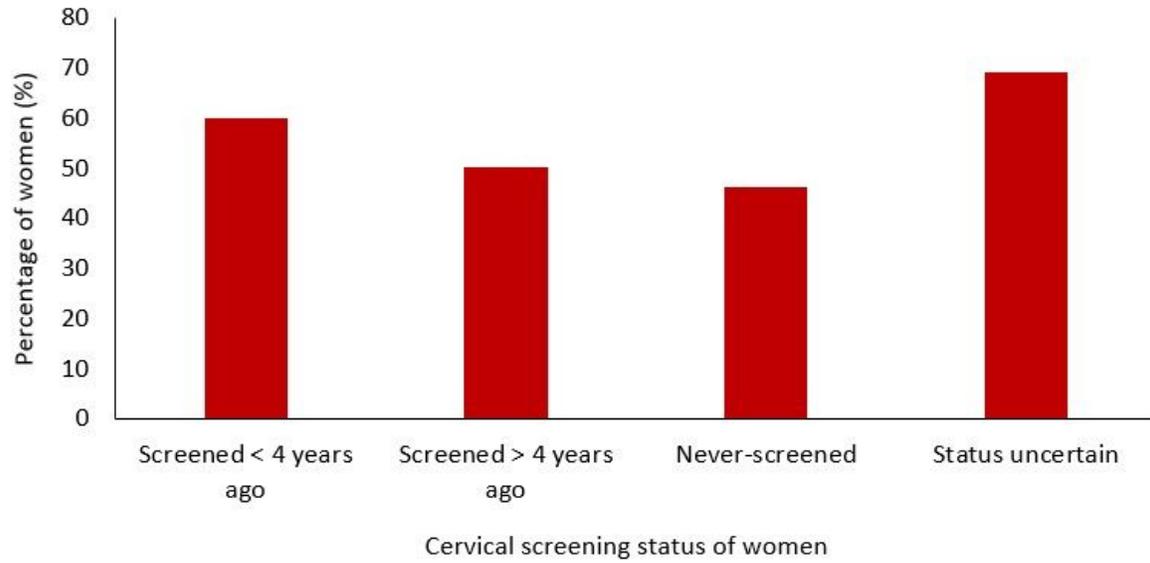
**Figure 2**

Age distribution of women that participated in HPV self-sampling



**Figure 3**

Cervical screening history of women who participated in HPV self-sampling



**Figure 4**

Follow-up rate of women who tested positive for HPV by cervical screening status