ENHANCING FOLLOW-UP ADHERENCE IN CERVICAL CANCER SCREENING FOR LOW-INCOME INDIVIDUALS

by

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Abstract

Cervical cancer (CC) remains a major public health concern, disproportionately affecting low-income populations due to barriers in screening and follow-up care. Inadequate follow-up after a positive HPV self-sample result puts individuals at higher risk of disease progression, yet there is limited research on effective follow-up strategies for this group. This integrative review explores interventions aimed at improving adherence to follow-up care in low-income women.

A systematic search identified eight studies examining follow-up interventions in low-income populations. Follow-up rates varied widely (5.6%–92%), with higher adherence observed when multiple follow-up methods were used, such as phone calls, text messages, postal mail, and home visits. Patient education, patient navigation, and the provision of a second self-sampling kit also showed promise in increasing follow-up rates. However, inconsistencies in study methodologies and healthcare settings make direct comparisons challenging.

These findings highlight the need for standardized, evidence-based follow-up strategies to address disparities in CC care. Future research should focus on scalable, cost-effective interventions, including mobile health (mHealth) approaches and patient navigation models. Policy efforts should prioritize integrating multi-modal follow-up strategies into national screening programs to improve outcomes for vulnerable populations.

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Glossary

Cervical Cancer: cancer of the cells of the cervix (Canadian Cancer Society, 2023)

Colposcopy: a procedure to examine cells of the cervix and vagina (BC Cancer, 2025)

Human Papillomavirus: a group of over 200 related viruses, with 40 of them known to affect the genitals, mouth and throat (Government of Canada, 2024b)

Lost to Follow-up: describes individuals not reporting and inability to trace them during a study period or required follow-up timeframe (Patel et al., 2021)

Human Papillomavirus Self-sampling: a procedure where the individual uses a swab to collect cells from the vagina and cervix to be tested for human papillomavirus (CPAC, 2019)

Papanicolaou Test (Pap test): a procedure performed by a health care provider in which a small brush is used to collect cervical cells which are then sampled for cancerous lesions or pre-cancerous cell changes caused by human papillomavirus (CPAC, n.d.)

Patient Navigation: assistance for patients interacting with the health care system, including booking and attending follow-up appointments (National Cancer Institute, n.d.)

Mobile Health Interventions (mHealth): the use of mobile or wireless devices to deliver health care, such as text messaging and mobile applications (Dugas et al., 2020)

Author Note: In this review, the term “women” is used to reflect the language commonly found in the literature and healthcare guidelines on cervical cancer screening and HPV follow-up care. However, it is important to acknowledge that not all people with cervixes identify as women. This review is intended to be inclusive of all people with cervixes, including transgender men, non-binary individuals, and gender diverse people requiring this care.

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Chapter One: Introduction

Cervical cancer (CC) is among the four most common cancers in women around the world and is now the fastest increasing cancer in women globally (Canadian Cancer Society, 2023; Martinez-Gutierrez et al., 2023). Since 2015, Canada has seen an increase in rates of CC of 3.7% per year, after 30 years of overall decreasing rates due to the introduction of screening programs and human papillomavirus (HPV) vaccination (Canadian Cancer Society, 2023; Fay et al., 2024). The reason for this increase is multifactorial, and has been associated with inadequate screening uptake, including suboptimal rates and poor adherence to follow-up recommendations, higher rates of HPV due to evolving sexual practices, and poor HPV vaccine coverage (Canadian Cancer Society, 2023).

In 2023, it is estimated that 1500 people were diagnosed with CC and 400 died from the disease (Canadian Cancer Society, 2023). Risk factors for developing CC are broad and include ethnicity, socioeconomic status, living rurally, health status, as well as individual factors (Canadian Partnership Against Cancer [CPAC], n.d.; Government of Canada, 2024a; Simkin et al., 2021).The age-standardized incidence rate per 100,000 of CC is highest among those living in the lowest neighbourhood income quintile (9.0 per 100,000) and those living in rural communities (9.4 per 100,000) (Statistics Canada, 2023). Moreover, 30% of CC diagnoses in Canada occur in under-screened groups (Tatar et al., 2023)

The World Health Organization has called for a global strategy to eliminate CC by 2030 through improvements in vaccination, screening, and treatment (World Health Organization, 2020). Canada responded with the *Action Plan for the Elimination of Cervical Cancer in Canada* by 2040 through three priorities: improving HPV immunization rates, robust screening HPV screening, and improving follow-up of abnormal screening results (CPAC, 2019).

Cancer screening for CC is available in all Canadian provinces and territories. Canada has set a target of achieving a screening rate of at least 80% of eligible participants, and in 2017, the overall participation rate was 76.6% (CPAC, n.d.). British Columbia's (BC) participation rates were below the target in 2018 at 67.5% in all age groups (25-69), corrected for hysterectomies (BC Cancer, 2020). In the lowest neighbourhood income quintile, representing those whose income falls in the lowest 20% of income distribution federally, screening rates were notable lower at 66.2%, representing an under-screened and vulnerable group (CPAC, n.d.). Furthermore, inadequate follow-up for positive screening tests in low-income groups contributes to disparities in CC rates and subsequent cancer care (CPAC, 2019; Kristiansen, 2019; Martinez-Gutierrez et al., 2023). Unfortunately, according to CPAC (2019), there is currently no standardized approach to tracking and monitoring follow-up rates, increasing the risk of patients being lost to follow-up.

The effectiveness of screening in CC treatment and prevention is highly dependent on the patient completing follow-up testing. A systematic review by Martinez-Gutierrez et al. (2023) found high rates of inadequate follow-up, ranging from 4-75%, where younger age, low socioeconomic status, and lower education levels contributed to inadequate follow-up. Despite these statistics and the elevated rates of CC in low-income and rural populations, there is a paucity of Canadian data detailing follow-up rates, nor studies exploring different follow-up strategies to improve rates in this vulnerable population. This integrative literature review aims to explore the following question: in low-income women, what strategies are effective in improving adherence to follow-up care after a positive HPV self-sample?

In this review, I will begin by discussing the etiology of CC and its effects on under-screened groups, including incidence, screening rates and barriers to screening. CC screening in

BC, including recent changes in care and new guidelines, will be explored. Current follow-up practices for positive HPV self-samples will be reviewed. The methods and findings of this integrative review will be presented, along with a discussion of the results, the limitations found in existing research studies, and recommendations arising out of this integrative review.

Background

Etiology of Cervical Cancer

The human papillomavirus is a common sexually transmitted infection, affecting up to 70% of Canadians. HPV is the cause of anogenital warts, cancer of the vulva, vagina, penis, and anus, and is the leading cause of CC (Government of Canada, 2024b; Schmeler, 2024; Walboomers, 1999). Persistent infections with oncogenic types of HPV, such as HPV 16 and 18, cause over 70% of CCs, while HPV types 31, 33, 35, 45, 52 and 58 are responsible for approximately 20% of CCs (Caird et al., 2022). As mentioned, HPV infections are common, however only a small percentage of affected patients go on to develop CC, as most infections are transient and cleared by the immune system (Schmeler, 2024). On average, it takes 15 years for an oncogenic strain of HPV to cause CC, from the initial infection to the development of cervical neoplasia and invasive cancer (Schmeler, 2024).

Early CC is frequently asymptomatic, highlighting the importance of screening (National Cancer Institute, 2022). Symptoms present in early disease can include post-coital bleeding, irregular or heavy vaginal bleeding and changes to vaginal discharge (National Cancer Institute, 2022; Schmeler, 2024). Once the cancer has become advanced and spread to other areas of the body, symptoms such as fatigue, back pain and pelvic pain, and urinary and bowel symptoms may present (National Cancer Institute, 2022; Schmeler, 2024).

Risk factors for CC are diverse and include HPV and non-HPV related factors. HPV-related factors include becoming sexually active at an early age, having multiple partners, or having a partner with multiple partners, a history of other sexually transmitted infections, a history of vulvar or vaginal cancers, and immunosuppression (Government of Canada, 2024a; Schmeler, 2024). Low socioeconomic status is an important non-HPV risk factor, likely related to decreased access to screening and health services (Government of Canada, 2024a; Schmeler, 2024). Additional non-HPV related risk factors for CC include smoking cigarettes, current use of oral contraceptives, and genetics (Government of Canada, 2024a; Schmeler, 2024).

Cervical Cancer Screening

CC is now considered a preventable disease (CPAC, 2019). Through high sensitivity testing and early identification and treatment, the disease is highly curable (CPAC, 2019). Screening for CC comes in two forms: the well-known Papanicolaou test, or Pap test, and the HPV test (BC Cancer, 2024). The Pap test, also referred to as the cytology method, involves a health care provider collecting cervical cells which are then sampled for cancerous lesions or pre-cancerous cell changes caused by HPV (CPAC, n.d.). This method is widely used globally and has led to a dramatic reduction of the incidence of CC since its implementation in the 1960s (CPAC, 2019). In HPV testing, cervical cells are collected and tested directly for high-risk types of HPV (CPAC, 2019). The seminal paper by Walboomers et al. (1999) identified that HPV causes over 99% of cervical cancer and recommended the use of HPV testing over cytology. While guidelines globally are slowly incorporating this recommendation, Australia, the United Kingdom, and The Netherlands have implemented HPV testing as their primary screening method (CPAC, 2019).

The HPV test has several advantages over the Pap test, including the ability to test high-risk HPV strains earlier, before they cause cellular changes that could lead to CC (CPAC, 2019). Because this testing method has been shown to be more sensitive and objective than the Pap test, it has allowed screening intervals to be extended to once every five years (BC Cancer, 2024; CPAC, 2019; Rijkaart et al., 2012). A distinct advantage of the HPV test is the possibility of self-sampling: people may collect their own sample at a time and place that is comfortable and convenient for them (CPAC, 2019). HPV self-sampling helps overcome barriers associated with provider collected Pap tests, including lack of a primary care provider or difficulty attending in-person appointments, and stigma related to sexually transmitted infections (STIs).

Currently in Canada, Prince Edward Island and British Columbia have implemented HPV screening as the primary screening for CC (CPAC, n.d.). Ontario plans to roll out HPV testing system-wide in 2025, and all provinces and territories but one are planning implementation (CPAC, n.d.). The *Action Plan for the Elimination of Cervical Cancer in Canada* has set a target of reaching 80% of eligible individuals from all groups be up to date with CC screening by 2030 (CPAC, 2019). HPV self-sampling is an integral component of reaching this target for all.

Vulnerable Populations

CC is unequally distributed amongst socioeconomic groups in high-income countries, despite the availability of publicly-funded HPV immunizations, screening, and treatment, as evidenced by higher incidence and mortality rates of the disease in low-income groups (Fay et al., 2024; Murfin et al., 2019; Schmeler, 2024; Statistics Canada, 2023). A trend analysis conducted in Canada between 1990-2019 found that Canadians with lower household incomes and education levels experienced higher rates of CC mortality (Fay et al., 2024). This study corroborates findings of other studies of high-income countries in Europe and the United States

(Murfin et al., 2019; Schmeler, 2024). Murfin et al. (2019) posits that these disparities can be attributed to reduced HPV immunization status and reduced screening rates among low-income groups.

Screening Rates in Vulnerable Populations

A variety of groups are at risk of being under-screened or never-screened for CC. These populations include low-income groups, new immigrants, Indigenous groups, sexual and gender minorities, those living in rural or remote communities, those without primary care providers, and those with a history of trauma (BC Cancer, 2024; Tatar et al., 2024). The definition of under-screening in the literature varies, but generally refers to individuals overdue for screening based on established guidelines, i.e. more than five years overdue for screening, or those who have never been screened (Brewer et al., 2021; Caird et al., 2022; Dutton et al., 2020; Smith et al., 2018; Tatar et al., 2024). Statistics Canada (2023) reports reduced CC screening rates in the lowest neighbourhood income quintiles in Canada (Q1, Q2) at 66.2% and 73.3% respectively, compared with an average of 81.03% CC screening rates in the highest neighbourhood income quintiles (Q3-Q5).

Screening Barriers

Barriers for CC screening exist in multiple forms: system barriers, socioeconomic barriers, sociocultural barriers, and psychological barriers (Caird et al., 2022; Tatar et al., 2024). Restricted screening, such as only providing CC screening in health clinics, is both a system barrier and a socioeconomic barrier. Restricted CC screening prioritizes those physically and financially able to access medical clinics, while those without access to a vehicle or childcare are more likely to be excluded from accessing screening. A lack of cultural sensitivity, including gender and modesty preferences or mistrust in healthcare providers, can represent a significant

sociocultural barrier for new immigrants or Indigenous people in accessing CC screening (Molokwu et al., 2018; Tatar et al., 2024). Psychological factors also represent screening barriers, such as the stigma associated with testing positive for an STI, embarrassment, and lack of knowledge regarding the relationship between HPV and CC (Molokwu et al., 2018; Tatar et al., 2024; Victoria et al., 2020). Together, these barriers are significant and may contribute to reduced CC screening rates in vulnerable populations.

Follow-up for Cervical Cancer Screening

Appropriate follow-up is an integral component of CC screening. Without timely follow-up, further investigations and early treatment initiation will not occur and the individual will be at risk of the disease progressing (CPAC, 2019). The barriers to screening previously described are important to consider, as they represent barriers to adherence to follow-up as well. The follow-up process for an HPV-positive self-sample is a multi-step and timely process and largely falls on the individual patient to complete.

In BC, all HPV self-sample CC screening results are reported to both the patient and their primary care provider (BC Cancer, 2024). Patients without a primary care provider are notified of their result by BC Cancer, either online or by mail, and directed to the appropriate follow-up test (BC Cancer, 2024). Individuals who test positive for HPV 16/18 are referred for colposcopy, and those who test positive for other high-risk strains are recommended to have a provider collected Pap test (BC Cancer, 2024). A colposcopy is a procedure to further examine the cervix for abnormalities; if abnormalities are noted, a biopsy will be taken to determine the next steps (BC Cancer, 2025). Depending on the biopsy results, the individual is referred to treatment (BC Cancer, 2025).

As mentioned, certain groups, such as low-income populations, face barriers to access CC screening. Furthermore, adherence to follow-up recommendations in high-risk groups is less than optimal. Hui et al. (2014) found that adherence rates were lowest among low-income, inner city African American women, with 30-40% adherence to follow-up recommendations. Similarly, a British retrospective analysis (Douglas et al., 2015) reported that individuals living in the lowest income quintile were less likely to adhere to a recommendation for a follow-up colposcopy. A systematic review conducted by Martinez-Gutierrez et al. (2023) identified 41 distinct factors associated with inadequate adherence to follow-up care, however low-socioeconomic status emerged only in some studies. Despite these inconsistent findings, low-income populations remain at greater risk for CC-related morbidity and mortality, highlighting the need for further research on effective follow-up strategies in this population (Fay et al., 2024; Murfin et al., 2019; Schmeler, 2024; Statistics Canada, 2023).

Interventions to Increase Adherence to Follow-up Care

Interventions designed to reduce barriers to follow-up care and increase the engagement of high-risk groups are essential for improving HPV-positive follow-up rates. Several follow-up strategies have been proposed and studied in middle-and high-income countries following a positive Pap test; however, examining effective follow-up interventions specifically in low-income individuals after a positive HPV self-sample has remained under explored (Martinez-Gutierrez et al., 2023; Varon et al., 2024). Some proposed interventions include direct communication with patients to deliver their HPV results, multi-component notification systems, patient navigation to assist with booking and attending follow-up appointments, and education regarding HPV and its connection to CC (Arrossi et al., 2022; Dunn et al., 2013; Kristiansen et al., 2019; Martinez-Gutierrez et al., 2023; Varon et al., 2024).

Chapter Two: Methods

An integrative review is a method of presenting a thorough and comprehensive overview on a topic through the synthesis and analysis of diverse types of literature (Toronto & Remington, 2020; Whittemore & Knafl, 2005). The aim of this integrative review is to explore the following question: In low-income women, what follow-up strategies are effective in improving adherence to follow-up care after a positive HPV self-sample? This integrative review was conducted following the Whittemore and Knafl (2005) methodology.

Design

The research question was designed with the Population, Intervention, Outcome (PIO) framework, which is a variant of the Population, Intervention, Comparison, Outcome (PICO) model (Grove, 2021a). The PIO design was selected due to the limited amount of data available comparing different follow-up strategies; thus, no specific comparator was utilized. The population of focus was low-income women; the intervention was follow-up strategies; and the outcome was improving adherence to follow-up recommendations in HPV-positive self-samples.

Databases

Several databases were utilized for the search process. The Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Medline through OVID were accessed via the University of Northern British Columbia online library database. These databases were selected due to their nursing and medical focus. Hand searching was performed via Google Scholar to reach articles that may not have been indexed in the databases and ensure that the overall search was comprehensive. Ancestry searching was performed by reviewing the reference list of relevant articles; this step did increase the volume of articles retrieved for review.

Search Terms

Search terms were generated based on the research question and the various synonyms for each term. See Appendix A for a description of how the terms were applied in the databases. Table 1 provides the search terms aligned with each component of the PIO question design.

Table 1

Search Terms

Population	("MH Socioeconomic Factors" or "MH Poverty" or "MH Working Poor" or "MH Social Class" or "MH Medically Underserved" or "MH Healthcare Disparities" or (low* adj3 (income or socioeconomic* or "social class" or SES or "social status")) or (poverty or impoverished or disadvantaged or "working poor") or (economic* adj3 (disadvantag* or hardship* or deprive*)) or (underserved or "under served" or underresourced) or (vulnerab* adj3 (population* or group* or communit*)))
Intervention	((cervix or cervical) N4 (self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self test* or self-test*) OR ((HPV or "Human papillomavirus") N4 (self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self-test* or self test)) OR ((MH cervical smears) or (MH papillomavirus infections) or (MH Human papillomavirus Viruses) or (MH Cancer Screening) or (MH Early Detection of Cancer) AND (self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self test* or self-test*))
Outcome	("Follow-Up Studies/" or "Patient Follow-Up/" or "Continuity of Patient Care/" or "Aftercare/" or follow-up or "post-treatment care" or monitoring or tracking or care continuity or recall or re-engagement or retention in care)

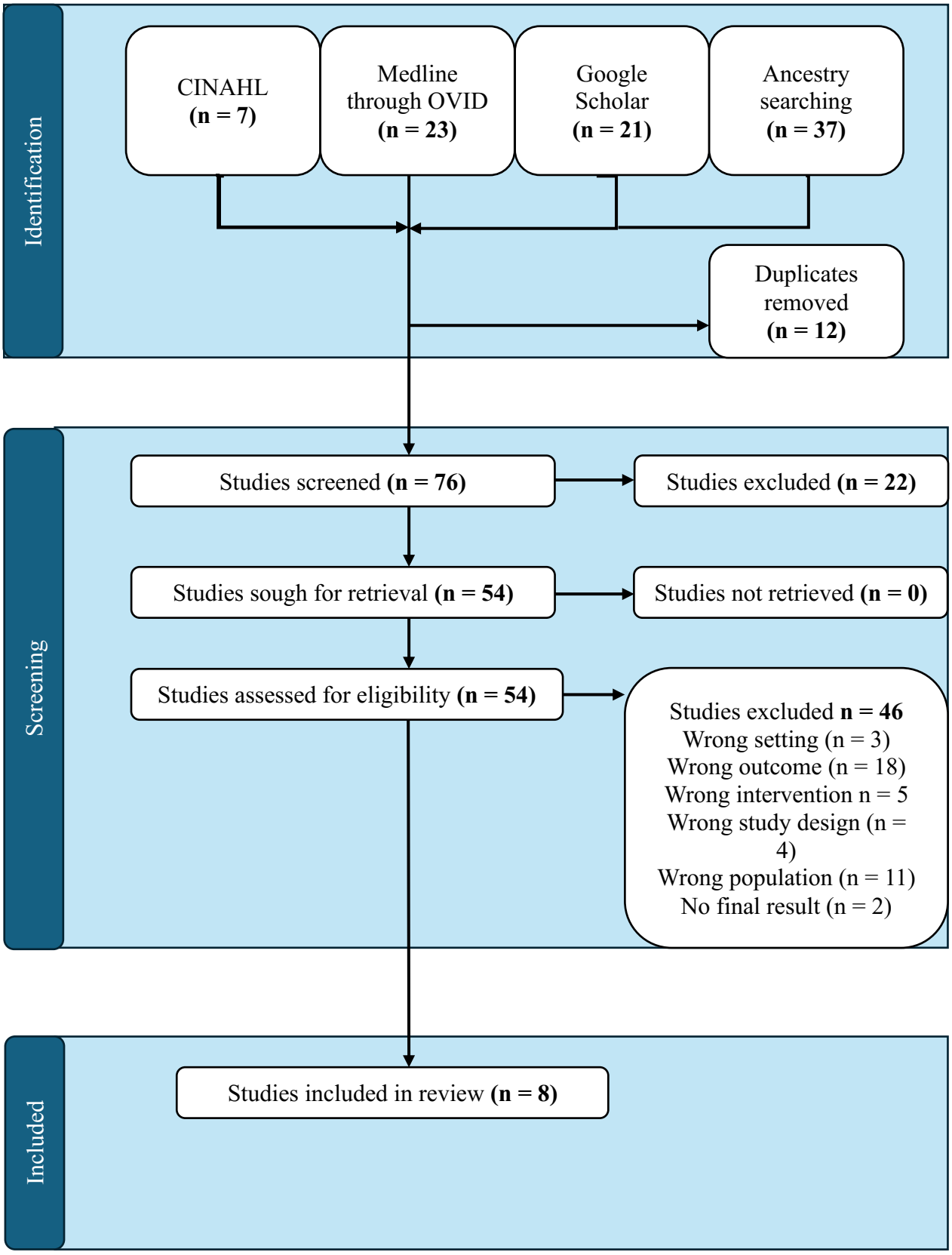
Data Management

In total, the search generated 88 studies for consideration in this integrative review. The search produced seven studies from CINAHL, 23 from Medline through OVID, 21 from Google Scholar, and 37 from ancestry searching. The studies were input into Covidence, an online, systematic review tool, for title, abstract, and full text review (Veritas Health Innovation, n.d.). Covidence removed 12 duplicate studies, leaving 76 studies to be reviewed by title and abstract, which further excluded 22 studies. The final 54 studies were read in full and considered based on

inclusion and exclusion criteria. As the data was retrieved and sorted by the author, Covidence generated a Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flowchart according to these steps. This flowchart is shown in Figure 1.

Figure 1

PRISMA Flowchart



Inclusion and Exclusion Criteria

Integrative reviews typically address broad, overarching questions and this may result in a high number of articles retrieved in the initial database search (Toronto & Remington, 2020). Implementing limiting criteria is a method of refining a search to ensure it remains relevant and focused on the research question of the integrative review. Inclusion and exclusion criteria are characteristics that the literature must contain for the study to be included in the integrative review (Toronto & Remington, 2020).

The literature search was focused on finding articles that discuss follow-up strategies for low-income women who received a positive HPV self-sample result. As a result, one of the inclusion criteria was that the study population focused on low-income women. There were no exclusion criteria related to ethnicity so that the results could capture all groups of low-income women who had been studied. Articles that focused on HPV self-sampling specifically were included, while studies that focused on Pap testing were excluded. To be included in the integrative review, the studies needed to focus on adherence to follow-up and follow-up recommendations by the study population. Follow-up was defined as completion of further recommendations for care, such as completion of a Pap test or colposcopy. Only completed primary research articles were included in the review, and therefore systematic reviews were excluded. There were no exclusion criteria related to geography in order to maximize available data. Studies published between 2015 from 2024 were selected to ensure a broad and relevant review, and this time frame reflects the emerging availability of HPV self-sampling data. Based on these criterion, eight studies were ultimately selected for this integrative review.

All inclusion and exclusion criteria are summarized in Table 2. The studies selected for this integrative review were read comprehensively three times by the author before data was extracted and organized into the review matrices as shown in Appendix B.

Table 2

Inclusion and Exclusion Criteria for Research Article Selection

	Inclusion	Exclusion
Population	Low-income	All others
Intervention	HPV self-sample	Pap test
Outcome	Adherence to follow-up	All others
Study characteristics	Primary research studies	Systematic Reviews
Geography	Worldwide	None
Date	2015-2024	Prior to 2015

Data Analysis

The eight studies included in this integrative review were critically appraised by the author using the Critical Appraisal Skills Program (CASP) checklists (CASP, 2025). Quality appraisals for the included studies ranged from moderate to high quality. No study was excluded based on its CASP rating to ensure that all available literature on this topic was captured in the integrated review findings. The CASP rating for each study is included in the review matrices in Appendix B.

Chapter Three: Findings

Eight studies were included in this integrative review to evaluate effective follow-up methods for improving adherence to care recommendations after a positive HPV self-sample in low-income women. The findings of these studies revealed that follow-up rates were inconsistent, multiple follow-up notification methods resulted in improved adherence to follow-up care, and including additional interventions contributed to enhanced adherence of follow-up recommendations.

Study Characteristics

Of the eight studies included in the review, three were randomized controlled trials (Brewer et al., 2021; Molokwu et al., 2018; Pretsch et al., 2023), four were cross-sectional studies (Crosby et al., 2015; Dutton et al., 2020; Lea et al., 2019; Mremi et al., 2021) and one was a descriptive quantitative study (Tamalet et al., 2016). Since integrative reviews aim to synthesize diverse sources of evidence, including a variety of study designs allows for a more comprehensive analysis of the topic (Whittemoore & Knafl, 2005). See Table 3 for study characteristics.

Table 3

Study Characteristics

Study	Type	Location	Setting	Sampling	Mean Age	Low-Income Status	Last Cervical Screening
Brewer et al., 2021	RCT	Auckland, NZ	Urban	Purposive	44	Majority	>3 years
Crosby et al., 2015	C-S	Kentucky, USA	Rural	Purposive, convenience	47.5	All	>3 years
Dutton et al., 2020	C-S	New South Wales, Australia	Rural	Snowball, convenience	40.5	All	>3 years
Lea et al., 2019	C-S	North Carolina, USA	Mixed	Purposive	44.6	All	>3 years
Molokwu et al., 2021	RTC	Texas, USA	Urban	Purposive	46	All	>3 years
Mremi et al., 2021	C-S	Tanzania	Rural	Purposive	44	All	Not stated
Pretsch et al., 2023	RTC	North Carolina, USA	Urban	Purposive	42	All	>3 years
Tamalet et al., 2016	DQ	Marseille, France	Urban	Purposive	50.6	All	>2 years

Note. C-S = cross-sectional; DQ = descriptive quantitative; RTC = randomized controlled trial.

Four studies were conducted in North America (Crosby et al., 2015; Lea et al., 2019; Molokwu et al., 2018; Pretsch et al., 2023), two studies in Oceania (Brewer et al., 2021; Dutton et al., 2020), one study in Africa (Mremi et al., 2021), and one study in Europe (Tamalet et al., 2016). The studies were conducted in a variety of contexts: three studies were conducted in rural areas (Crosby et al., 2015; Dutton et al., 2020; Mremi et al., 2021), one study was completed in an area of mixed rural and urban (Lea et al., 2019), and four studies were in urban contexts (Brewer et al., 2021; Molokwu et al., 2018; Pretsch et al., 2023; Tamalet et al., 2016).

The studies recruited their participants by purposive, snowball, and convenience sampling. Six studies employed purposive sampling (Brewer et al., 2021; Lea et al., 2019; Molokwu et al., 2018; Mremi et al., 2021; Pretsch et al., 2023; Tamalet et al., 2016), while Dutton et al. (2020) recruited participants through convenience and snowball sampling, and Crosby et al. (2015) combined purposive and convenience sampling. Each of these sampling methods was appropriate for recruiting participants in these studies. Purposive sampling was suitable as it ensured participants met the specific characteristics required for the studies being conducted (Andrade, 2020). Snowball sampling, or network sampling, utilizes the network of the purposive sample as a means of expanding the sample size, thereby reaching more participants with similar characteristics (Grove, 2021b). Although convenience sampling is a non-probability method, it was justified in Crosby et al. (2015) and Dutton et al. (2020) since the study communities included participants with the necessary characteristics for their respective studies (Grove, 2021b). The studies included a total of 7,616 participants, with an average age of 44.9 years old.

Since it has been demonstrated in the literature that socioeconomic status plays a critical role in CC morbidity and mortality, this review focused on studies examining low-income

populations. In all studies included in this integrative review, either the majority or entirety of participants were classified as low-income. Brewer et al. (2021) included a majority low-income population at 60% of the sample, while Dutton et al. (2020), Crosby et al. (2015), Lea et al. (2019), Molokwu et al. (2018), Mremi et al. (2021), Pretsch et al. (2023), and Tamalet et al. (2016) exclusively studied low-income individuals. Low-income status was determined using various criteria, including residence in economically depressed regions, enrollment in Medicare or Medicaid, lack of health insurance, income below 200% or 250% of the U.S. federal poverty line, and education level not exceeding Grade 12. Refer to Table 4 for low-income determination per study.

Table 4

Participant Income Status

Study	Low-Income Status Determination
Brewer et al. (2021)	Geographical region
Crosby et al. (2015)	Geographical region
Dutton et al. (2020)	Geographical region
Lea et al. (2019)	Enrolled in Medicaid, uninsured, 200% below US poverty line
Molokwu et al. (2018)	Majority uninsured
Mremi et al. (2021)	Geographical region, majority not education beyond age 12
Pretsch et al. (2023)	Enrolled in Medicaid, uninsured, 250% below US poverty line
Tamalet et al. (2016)	Geographical region

Four studies explicitly identified participants as low-income (Lea et al., 2019; Crosby et al., 2015; Pretsch et al., 2023; Tamalet et al., 2016). In others, low-income status was inferred based on limited educational attainment (Mremi et al., 2021) or a high percentage of uninsured

participants (Molokwu et al., 2018). Additionally, 60% of Brewer et al.'s (2021) participants lived in areas of high socioeconomic deprivation, further supporting their classification as low-income. Dutton et al. (2020) did not provide detailed demographic data, but the study was conducted in rural and remote Aboriginal communities in New South Wales, Australia - regions known for having some of the lowest income levels in the state (Vidyattama et al., 2019). Furthermore, Aboriginal populations in Australia are twice as likely to experience poverty compared to non-Aboriginal individuals (Vidyattama et al., 2019).

Inconsistent Follow-up Rates

A key finding across the studies included in this review was the inconsistency of adequate follow-up among HPV-positive participants after HPV self-sampling. In the studies reviewed, follow-up rates for HPV-positive participants ranged from 5.6%- 92%. Crosby et al. (2015) achieved the lowest follow-up rate (5.6%) of all the studies included, and Brewer et al. (2021) achieved the highest rate of follow-up (92%). The average follow-up rate for all the studies was 57%.

Adequate follow-up was defined in these studies as achieving at least 60% follow-up in HPV-positive participants. That is, at least 60% of participants attended follow-up recommendations based on their HPV results. This threshold was met in four studies (Brewer et al., 2021; Molokwu et al., 2018; Mremi et al., 2021; Tamalet et al., 2016).

Multiple Follow-up Methods

Every study in the review communicated directly with the participants to deliver HPV self-sample results. Each study followed-up with the participants directly with a phone call to communicate HPV results, either as the sole method of communication or in combination with

one of the following other methods: phone call, text message, postal mail, or home visit. See Table 5 for the follow-up methods used in each study, as well as the rates of follow-up achieved.

Table 5

Follow-up Methods and Rates of Follow-up

Study	Phone	Text message	Mail	Home visit	Did not specify	HPV + follow-up rate
Brewer et al., 2021	X			X		92%
Crosby et al., 2015	X					5.6%
Dutton et al., 2020	X		X	X		46%
Lea et al., 2019	X					58%
Molokwu et al., 2018	X		X			66%
Mremi et al. 2021	X	X				82%
Pretsch et al., 2023	X		X			43%
Tamalet et al., 2016	Y		Y		X	66%

Note. X = method used by study; Y = method used by study after second HPV-positive self-sample.

Two studies delivered the results by phone call alone (Crosby et al., 2015; Lea et al., 2019). The six remaining studies employed a combination of follow-up strategies: phone call and mail notification (Molokwu et al., 2018; Pretsch et al., 2023), phone call and text message (Mremi et al., 2021), phone call and home visit (Brewer et al., 2021), or phone call, mail notification and home visit (Dutton et al., 2020). Tamalet et al. (2016) did not specify the initial communication follow-up strategy used with participants; however, the authors did specify that they had contacted participants by phone call or mail after a *second* positive HPV self-sample had been received.

Adequate follow-up was more likely to be achieved when more than one follow-up strategy was used. Four out of eight studies achieved a follow-up rate of over 60% (Brewer et al., 2021; Molokwu et al., 2018; Mremi et al., 2021; Tamalet et al., 2016). Each of these studies used a combination of methods described above. The combination of phone call and home visit achieved the highest follow-up rate at 92% (Brewer et al., 2021), followed by text message and phone call at 82% (Mremi et al., 2021). Molokwu et al. (2018) and Tamalet et al. (2016) achieved a follow-up rate of 66%; both studies used phone call and mail notification for result delivery.

The remaining four studies did not achieve the 60% follow-up threshold, and they all used similar result notification strategies. Crosby et al. (2015) utilized phone follow-up alone and achieved a 5.6% follow-up rate. Similarly, Lea et al. (2019) used phone follow-up as the sole method of communication and reached 58% follow-up. Pretsch et al. (2023) used phone and mail notification for result delivery and achieved a follow-up rate of 43%. Dutton et al. (2020) employed the most intensive follow-up strategies (phone call, mail notification, and home visit), but achieved a follow-up rate of only 46%.

Only one study commented on the total time spent with participants to communicate the HPV result (Brewer et al., 2021). This study reported an average time of 2.5 hours delivering results to each participant and achieved a follow-up rate of 92%. None of the other studies reported the amount of time spent communicating results to participants.

Additional Interventions

In addition to the follow-up methods described above, several studies employed further interventions as part of their study protocols. Such additional interventions utilized by the researchers included providing patient education (Crosby et al., 2015; Molokwu et al., 2018;

Mremi et al., 2021), patient navigation for scheduling follow-up procedures (Crosby et al., 2015; Mremi et al., 2021; Pretsch et al., 2023) and mailing a second HPV self-sample to HPV-positive participants without follow-up at 12 months (Tamalet et al., 2016). See Table 6 for intervention details.

Table 6

Intervention Details

Study	Education	Second HPV self-sample	Patient navigation	HPV + follow-up rate
Brewer et al. (2021)				92%
Crosby et al. (2015)	X		X	5.6%
Dutton et al. (2020)				46%
Lea et al. (2019)				58%
Molokwu et al. (2018)	X			66%
Mremi et al. (2021)	X		X	82%
Pretsch et al. (2023)			X	43%
Tamalet et al. (2016)		X		66%

Patient Education

Three studies provided HPV education to participants at different points in their protocols (Crosby et al., 2015; Molokwu et al., 2018; Mremi et al., 2021). This educational information was delivered to participants by health outreach workers or by nurses involved in the study. The timing of the education was as follows: either prior to HPV self-sampling (Molokwu et al., 2018; Mremi et al., 2021), or during follow-up phone calls (Crosby et al., 2015).

Molokwu et al. (2018) developed patient education materials at a Grade 6 reading level and included information regarding susceptibility and severity of HPV infections, CC screening and prevention through immunization, and safe sex practices. Participants in the study received education through one of two formats: a high-intensity PowerPoint presentation delivered by a community worker, or a low-intensity pamphlet (Molokwu et al., 2018). Both groups were given the pamphlet to keep. Information regarding self-sampling, sample collection technique, and test reliability was also included. Post-survey questionnaires found that HPV knowledge was significantly associated with a follow-up Pap test ($p=0.033$), and that the high-intensity intervention resulted in statistically significant improvement in HPV knowledge ($p=<0.001$). Molokwu et al. (2018) achieved a follow-up rate of 66% in the HPV-positive study participants.

Mremi et al. (2021) delivered HPV education after providing instructions on how to collect the self-sample. The study nurses reviewed the implications of an HPV-positive result with each participant individually. Following self-sampling, the participants completed a questionnaire and 98.9% of the participants reported no difficulty understanding the self-sample collection instructions. Additionally, most of the participants reported high acceptability of HPV self-sampling and "found the procedure easy to perform" (Mremi et al., 2021, p. 808). They had a follow-up rate of 82% (Mremi et al., 2021).

Crosby et al. (2015) delivered tailored education to the HPV-positive participants during the result notification phone call from the study nurse. The education included information on HPV and its link to CC, the risk of developing CC with a positive HPV result, and the importance of a follow-up Pap test to detect cellular changes of the cervix. All participants were successfully contacted and received both their results and HPV-related education in a single

phone call. Despite this intervention, the study achieved a follow-up rate of only 5.6% (Crosby et al., 2015).

Patient Navigation

Patient navigation, defined as assisting participants to book their follow-up procedures, was demonstrated in three studies (Crosby et al., 2015; Mremi et al., 2021; National Cancer Institute, n.d.; Pretsch et al., 2023). Patient navigation occurred either via text message or phone call.

Mremi et al. (2021) delivered patient navigation via text message to HPV-positive participants. The text messages did not include the actual test result, but rather requested that the participant present for a follow-up appointment at a future date. These text messages were sent out four times between 14 days and one day prior to the appointment with reminders to attend the follow-up appointment. If participants did not attend, they were then called directly and navigated to follow-up. These collective efforts resulted in a follow-up rate of 82% (Mremi et al., 2021).

Crosby et al. (2015) and Pretsch et al. (2023) called their study participants to provide patient navigation. Crosby et al.'s (2015) participants were offered scheduling assistance when their results were delivered by phone. The patient navigation included information on free or sliding-scale screening available locally for follow-up procedures. The participants were contacted an additional two times for further navigation assistance if they did not complete the recommended follow-up (Crosby et al., 2015). Further, when analyzing covariates, Crosby et al. (2015) found that those who were contacted for a second navigation attempt were less likely to attend follow-up. The authors could not deduce whether motivational issues or access issues

impacted the poor follow-up rate, creating a lack of statistical power in the study (Crosby et al., 2015). These interventions resulted in a follow-up rate of 5.6%.

Pretsch et al.'s (2023) study delivered HPV results by phone, contacting participants up to three times for patient navigation to schedule a follow-up appointment. Participants in this study also received information on low-or no-cost Pap tests. This resulted in a follow-up rate of 43% for HPV-positive participants (Pretsch et al., 2023).

Provision of Additional Self-Sample

Tamalet et al. (2016) employed one additional intervention that was not used in any other study. Participants who tested positive for HPV but did not complete follow-up recommendations within 12 months were sent another HPV self-sample in the mail. This strategy enabled recovery of 50% of the participants initially lost to follow-up and resulted in a total follow-up rate of 66%. Furthermore, the authors found that 43% of those with previous HPV-positive results were ultimately able to clear the infection.

Strengths and Limitations of the Literature in this Review

Strengths and limitations were noted in several domains in the literature included in this for review. While the diverse methodologies provided a broad perspective on follow-up strategies, they also introduced variability that impacted the ability to draw direct comparisons. A total of three different study designs were represented in the articles included in this review. Four studies used a cross-sectional study design without a control group (Crosby et al., 2015: Dutton et al., 2020; Lea et al., 2019; Mremi et al., 2021), making it difficult to establish causation and increased the risk of confounding bias (Sterne et al., 2024). Tamalet et al. (2016) employed a descriptive quantitative design, which shares characteristics with a cross-sectional approach and carries similar limitations, such as confounding bias and challenges in establishing causation

(Sterne et al., 2024). Three of the studies used randomized controlled trials (Brewer et al., 2021; Molokwu et al., 2021; Pretsch et al., 2023), allowing the researchers to compare interventions (Sterne et al., 2024). While varied methodologies are important for a comprehensive integrative review, this diversity also contributes to significant heterogeneity in the study settings, populations, and interventions, thereby limiting generalizability (Whittemore & Knafl, 2005).

Most of the studies used purposive sampling to recruit their participants, which enabled the researchers to sample the target population but does carry the risk of self-selection bias (Sterne et al., 2024). Further, most of the study sample sizes were small, contributing to the increased risk of confounding bias and limited statistical power (Sterne et al., 2024).

Only one study identified a theoretical framework to inform their study, the Health Belief Model (Molokwu et al., 2018). This framework is considered foundational in health behaviour research, and it was created for deeper understanding of health prevention behaviour, such as cancer screening (Alyafei & Easton-Carr, 2024). Incorporating a theoretical framework allows researchers to ground their work in a logical framework that is linked to a wider body of knowledge (Bomer-Norton, 2021). Without a theoretical framework, the findings of these studies may lack connection to existing research within the field, increasing the risk of misinterpretation or unintended application of results (Bomer-Norton, 2021).

The duration of the studies ranged from six months (Crosby et al., 2015), to 47 months (Pretsch et al., 2023). The studies of shorter duration may have had limited capacity to assess information about long-term adherence to follow-up recommendations. Most studies verified the completion of follow-up recommendations through chart verification, thereby ensuring accurate results. One exception was Lea et al. (2019), who relied on participant reporting, increasing the

risk of reporting bias. Tamalet et al. (2016) did not report the follow-up verification strategy used, thereby reducing transparency of the research.

Six studies incorporated surveys, including four Likert scales and two questionnaires. However, no study reported utilizing a validated questionnaire or tool to create their surveys, raising concerns about data validity and measurement bias (Grove, 2021c).

Finally, the studies reviewed took place in both high-income and low-income countries, which leads to marked heterogeneity of culture, health care settings, and participants. This variability makes cross-study comparison more challenging.

Several strengths were identified in the studies reviewed. Most of the studies had clear and consistent inclusion and exclusion criteria, improving comparability among studies. Only one study, Dutton et al. (2020), did not provide detailed information about the inclusion and exclusion criteria used. Across the studies, completion of a follow-up test or colposcopy was consistently defined as adequate follow-up after a positive HPV self-sample, ensuring a uniform outcome measure.

Chapter Four: Discussion

This integrative review evaluated different follow-up strategies to determine which are effective in improving adherence to follow-up care after a positive HPV self-sample in low-income women. The findings show inconsistent follow-up rates for HPV-positive participants. Further, the findings indicate that achieving adequate follow-up in this population is resource-intensive and may require more thorough interventions to complete care recommendations. Specifically, multiple communication modalities may be required to achieve adequate follow-up, and the addition of patient navigation, HPV education, and the provision of a second HPV self-sample may be useful.

Follow-up rates were inconsistent between studies, ranging from 5.6% to 92% of HPV-positive participants successfully completing further recommendations for care. Several factors may account for these inconsistent results, such as the diverse study settings, the varied population, or the interventions themselves. In the literature, follow-up rates for abnormal CC screening in diverse populations were also varied, with one systematic review reporting follow-up rates between 25-96% (Martinez-Gutierrez et al., 2023). These inconsistent results underline the importance of further research on effective ways to follow-up with this population.

Multi-follow-up Strategy

A crucial follow-up strategy identified in the studies was phone follow-up; all studies contacted their participants via phone call at some point in the result notification process. Employing a second result notification strategy improved adherence to follow-up, with follow-up rates ranging from 66%-92% in studies that used more than one method (Brewer et al., 2021; Molokwu et al., 2018; Mremi et al., 2021; Tamalet et al., 2016). These results are significant as they demonstrate that continued follow-up attempts with HPV-positive individuals are effective

in ensuring adherence to care recommendations, suggesting that a successful follow-up strategy requires multiple methods of communication.

Several other studies reproduced these results in the literature (Arrossi et al., 2022; Sultana et al., 2022; Varon et al., 2024). Sultana et al. (2022) notified their participants with a letter and a reminder phone call by a physician liaison, resulting in 84% follow-up for HPV-positive participants. Arrossi et al. (2022) implemented a multi-component intervention of text messages and a home visit by a community health worker that achieved successful follow-up of 70.5% of participants. Varon et al.'s (2024) systematic review found that participants were more likely to complete follow-up recommendations when multiple interventions were incorporated, such as combining patient education with patient navigation. While the participants in these studies were not entirely low-income, Sultana et al. (2022) did focus on never-and under-screened individuals, and Arrossi et al.'s (2022) population was from a country with an overall low adherence to follow-up, making their findings relevant to population included in this integrative review. Additionally, 1/3 of the studies reviewed by Varon et al. (2024) used interventions specific to low-income populations.

Home Visits

Two studies used home visits as part of the intervention strategy, with one study achieving a high follow-up rate and one study not reaching the 60% follow-up threshold (Brewer et al., 2021; Dutton et al., 2020). This strategy has been used in other studies with promising results in a variety of contexts (Arrossi et al., 2022; Martinez-Gutierrez et al., 2023). While some countries use home visits routinely as part of their health care system, this may not be a feasible strategy for middle-to high-income countries. In the Canadian context, home visits are reserved mostly for those with extensive needs, such as bathing and dressing, or for palliative care

(Government of British Columbia, 2025). As such, utilizing home care nurses to encourage effective CC screening follow-up in certain populations would constitute a significant shift in the allocation of resources and is likely not feasible in a public health care system.

Mobile Health Interventions

Mremi et al. (2021) was the only study that utilized mobile health (mHealth) interventions (text messages) as their primary method of communication, and successfully achieved follow-up in 82% of participants. The results of their study may indicate that using mHealth interventions to communicate with patients is an effective way to ensure follow-up in this population. As mentioned previously, an Argentinian study employed a similar mHealth strategy and achieved high rates of follow-up (Arrossi et al., 2022). Additionally, a 2021 scoping review examining mHealth strategies to improve CC screening rates found that mHealth interventions were associated with an increased uptake of screening (Bhochhibhoya et al., 2021). Despite the apparent effectiveness of this follow-up strategy, the use of mHealth interventions is currently under-explored in low-income populations as a follow-up strategy, and further research is needed in a variety of settings to assess its applicability and usefulness. Interestingly, none of the studies included in this integrative review, nor encountered in the literature, reporting using email to contact patients. Email communication may represent an additional underexplored resource for communicating with patients and supporting appropriate follow-up after an HPV-positive result.

Patient Navigation

Patient navigation is a follow-up strategy known to be effective in improving screening rates and follow-up in cancer care in general (Chen et al., 2024). This strategy was used in three studies with mixed results (Crosby et al., 2015; Mremi et al., 2021; Pretsch et al., 2023). This

review showed that patient navigation via text message resulted in adequate follow-up in one study (Mremi et al., 2021), but not in the two other studies employing patient navigation by phone call (Crosby et al., 2015; Pretsch et al., 2023). A recent systematic review showed that patient navigation was found to be statistically significant with follow-up for an abnormal cervical screening result, compared with studies that did not use patient navigation (Varon et al., 2024). Moreover, it has been shown to reduce time between diagnosis and treatment in other cancers (Chen et al., 2024). Despite patient navigation being successful in only one study in this review, this evidence reinforces the importance of continuing to explore the effect of patient navigation via different modalities on improving follow-up care in this population.

Education

HPV education was provided in three studies with varying degrees of effectiveness (Crosby et al., 2015; Molokwu et al., 2018; Mremi et al., 2021). Two studies delivered HPV specific education prior to self-sample collection, and both achieved adequate rates of follow-up (Molokwu et al., 2018; Mremi et al., 2021). The third study only provided education to participants who tested positive for HPV and only during their follow-up calls; they did not achieve adequate follow-up rates (Crosby et al., 2015). Additionally, the content of the education delivered was varied, where one study provided high-intensity patient education by a health worker, and the others provided less detailed education. This suggests that the timing of HPV education delivery, as well as the content of the education, is important and may contribute to higher rates of follow-up if it is utilized.

Lack of education or misinformation regarding HVP and CC has been identified as a barrier to cervical screening and follow-up adherence (Victoria et al., 2020). Further, Sossauer et al. (2014) found that high-intensity education was positively correlated with higher knowledge

regarding HPV and CC. However, only one study in two systematic reviews examining factors influencing follow-up care included education as an intervention (Martinez-Gutierrez et al., 2023; Varon et al., 2024). This lack of information represents a significant gap in the literature and requires further study on the effect of HPV-specific education on follow-up rates and, specifically, the timing and intensity of such education.

Provision of Additional Self-Sample

Sending a second HPV self-sample was a novel intervention only implemented in one study, Tamalet et al. (2016). This intervention recovered 50% of HPV-positive participants who did not attend follow-up recommendations (Tamalet et al., 2016). Comparable results were found by an Australian randomized controlled trial, where never-and under-screened HPV-positive participants not attending recommended follow-up were mailed a second HPV self-sample kit (Sultana et al., 2022). This additional intervention re-captured 37/108 participants who had been lost to follow-up and resulted in an overall follow-up rate of 59.3%. This particular intervention is rarely seen in the literature and may represent an understudied strategy to improve follow-up rates in this population.

Time Consideration

Only one study quantified the amount of time researchers spent delivering results to ensure adequate follow-up for HPV-positive participants (Brewer et al., 2021). None of the other studies reported this variable, which may be an important factor to consider in this population. Nevertheless, most of the studies employed at least two follow-up strategies, implying that delivering results requires intensive human resources, regardless of whether adequate follow-up is achieved. This variable may be an important outcome for further research to examine, as

resources in most health care settings are already limited. Further, this may represent an area in which mHealth interventions could be useful in reducing human resource expenditure.

Implications for Research and Policy

Effective follow-up strategies for HPV-positive low-income women that result in further care remain inconsistent. The literature has shown that using multiple communication strategies is important in achieving follow-up in this population. MHealth, patient navigation, and HPV-specific education may be effective interventions and are key areas for further research. This review found that Canadian studies in this discipline are sparse: therefore, conducting longitudinal research in the form of randomized controlled trials to assess the effectiveness of multi-modal strategies is necessary to improve the generalizability of results within the Canadian context.

While low-income women have been named a vulnerable population in several important practice documents (BC Cancer, 2024; CPAC, 2019), *Current Oncology* guidelines on management of a positive HPV self-sample have excluded this important population (Zigras et al., 2023). For outcomes to improve in low-income individuals, all major guidelines must consistently define vulnerable populations to offer actionable practice recommendations for policy makers and health care providers. Further research is essential to develop evidence-based strategies that address the specific needs of this group.

Strengths and Limitations of this Integrative Review

There are several limitations in this integrative review. Despite effort to include all relevant studies, some research may have been missed. The small number of studies reviewed is a limitation, further narrowed by the focus on self-sampling, as significant data exists for follow-up after a positive Pap test. While the U.S. has a substantial amount of research on low-income

women, no studies specifically examining effective follow-up strategies for low-income women in Canada were found. Additionally, including studies from both high-income and low-income countries, and with varied healthcare systems and cultures, limits the generalizability of the results, despite the focus on low-income populations.

However, this review has notable strengths. It was guided by an established framework (Whittemore & Knafl, 2005) and by the validated CASP tool (CASP, 2025), which enhances the rigor of the review. Furthermore, as Canada is currently shifting to self-sampling as the primary method of CC screening, this review is timely and relevant.

Chapter Five: Conclusion

Adequate follow-up after a positive HPV self-sample result is crucial in reducing morbidity and mortality of CC, particularly in low-income women who often face significant barriers to care. This review identified several promising interventions, including multi-method communication strategies (phone call, text message, mail, home visits), patient navigation, HPV education, and mHealth interventions, all of which improved adherence to follow-up recommendations. Additionally, sending a second HPV self-sample emerged as a potentially effective but currently underexplored intervention that warrants further investigation.

Despite these findings, gaps remain in understanding the most effective approaches for follow-up in low-income women, particularly in Canada, where no studies specifically examine follow-up strategies after a positive HPV self-sample in this population. As Canada is currently undergoing policy and practice changes regarding HPV self-sampling (CPAC, n.d.) in response to the World Health Organization global strategy, there is an opportunity to explore and evaluate effective interventions in vulnerable groups to reduce the disparities in CC outcomes (World Health Organization, 2020). Future research should focus on resource-sparing equitable strategies that ensure all individuals, regardless of socioeconomic status, receive timely follow-up care and treatment for CC.

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Appendix A

Detailed Search Strategy

Search Date	Database	Search Terms	Articles Retrieved
November 6, 2024	CINAHL	((cervix or cervical) N4 (self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self test* or self-test*) OR ((HPV or "Human papillomavirus") N4 (self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self-test* or self test)) OR ((MH cervical smears) or (MH papillomavirus infections) or (MH Human papillomavirus Viruses) or (MH Cancer Screening) or (MH Early Detection of Cancer)) AND (self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self test* or self-test*) AND (MH "Socioeconomic Factors") OR (MH "Poverty") OR (MH "Working Poor") OR (MH "Social Class") OR (MH "Medically Underserved") OR (MH "Healthcare Disparities") OR (low* N3 (income OR socioeconomic* OR "social class" OR SES OR "social status")) OR (poverty OR impoverished OR disadvantaged OR "working poor") OR (economic* N3 (isadvantage* OR hardship* OR deprive*)) OR (underserved OR "under served" OR underresourced) OR (vulnerab* N3 (population* OR group* OR communit*)) AND (MH "Follow-Up Studies" OR MH "Patient Follow-Up" OR MH "Continuity of Patient Care" OR MH "Aftercare" OR follow-up OR "post-treatment care" OR monitoring OR tracking OR "continuity of care" OR recall OR "recall system" OR re-engagement OR "retention in care")	7

November 6, 2024	Medline with OVID	((cervix or cervical) adj4 (self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self test* or self-test)) OR ((HPV or "Human papillomavirus") adj4 (self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self-test* or self test*)) OR ((MH isadvantage test/ or MH vaginal smears/ or MH Papillomavirus Infections/ or MH "Early Detection of Cancer") AND ((self-screen* or "self screen*" or self-collect* or "self collect*" or self-sampl* or "self sampl*" or self test* or self-test)) AND ("MH Socioeconomic Factors" or "MH Poverty" or "MH Working Poor" or "MH Social Class" or "MH Medically Underserved" or "MH Healthcare Disparities" or (low* adj3 (income or socioeconomic* or "social class" or SES or "social status")) or (poverty or impoverished or disadvantaged or "working poor") or (economic* adj3 (isadvantage* or hardship* or deprive*)) or (underserved or "under served" or underresourced) or (vulnerab* adj3 (population* or group* or communit*))) AND ("Follow-Up Studies/" or "Patient Follow-Up/" or "Continuity of Patient Care/" or "Aftercare/" or follow-up or "post-treatment care" or monitoring or tracking or care continuity or recall or re-engagement or retention in care)	23
November 6, 2024	Google Scholar	(hpv-self sampling or cervical cancer screening) and (hpv positive or abnormal result) and (low-income or underscreened) and (follow-up)	21
November 6, 2024- November 11, 2024	Ancestry Searching		37

Appendix B

Review Matrices

Article:
Brewer, N., Bartholomew, K., Grant, J., Maxwell, A., McPherson, G., Wihongi, H., Bromhead, C., Scott, N., Crengle, S., Foliaki, S., Cunningham, C., Douwes, J., & Potter, J. D. (2021). Acceptability of human papillomavirus (HPV) self-sampling among never- and under-screened Indigenous and other minority women: A randomised three-arm community trial in Aotearoa New Zealand. *The Lancet Regional Health - Western Pacific, 16,* Article 100265. https://doi.org/10.1016/j.lanwpc.2021.100265

Objective: To evaluate whether invitation for self-sampling methods could increase screening participation and to seek information on resources required to achieve 90% follow-up if HPV+

Setting, sampling technique and sample size: Auckland, New Zealand, purposive sampling, N: 3550 (actual participation: 545)

Type of study and design: Open-label, three-armed RTC with non-random sub-study

1. Offered clinic based self-sampling
2. Offered home based self-sampling
3. Usual care (offered cytology at PCP office with GP or nurse)
4. Sub study: non-responders informed they could self-sample at home/clinic

Findings:

- Highest participation in home-based group (14%, $p<0.0001$)
- All ethnicities were more likely to participate in home-based group than usual care
- Previous screening did not have large impact on participation
- High follow-up if HPV + (92%) with mean time to achieve follow-up 2.5 hours
- Sub-study yielded further 6.9% of non-responders

Strengths and limitations:
Strengths: RTC measuring different HPV testing locations, attempt to capture more participants with offer of second HPV self-sample at home, high follow-up for HPV + participants with intensive follow-up strategy
Limitations: achieved low overall participation (15%), study may not be generalizable as it did not include rural women, short study return time (6 months) may have impacted follow-up rates

Implications + CASP rating

- Patients more likely to perform CC screening if home self-sample provided
- Low participation rate may highlight need to focus resources on low-income population
- Large burden on health care system to achieve adequate follow-up with human resource intensive strategy
- CASP: moderate

Article: Crosby, R. A., Hagensee, M. E., Vanderpool, R., Nelson, N., Parrish, A., Collins, T. & Jones, N. (2015). Community-based screening for cervical cancer: A feasibility study of rural Appalachian women. *Sexually Transmitted Diseases, 42*(11), 607-611. https://doi.org/10.1097/OLQ.0000000000000365

Objective: To describe women's comfort and perceptions of their experience of self-collection HPV tests, to determine whether nurse guided patient navigation increase the rate of women receiving a Pap test after being screened for HPV, and to test the hypothesis that women testing positive for HPV would be more likely to have a subsequent pap test than those who test negative

Setting, sampling technique and sample size: Kentucky, USA, purposive and convenience sampling, N: 400

Type of study and design: Cross sectional study
Self-sampling occurred at recruitment venue. Research nurses provided results to all participants over the phone or face to face with patient navigation to schedule follow-up Pap test. HPV + participants received HPV education. Up to three navigation attempts were made for participants. Survey for demographics and attitudes on HPV and sexual health.

Findings

- All participants successfully contacted for patient navigation
- 5.6% of HPV positive participants had follow-up Pap test
- Those contacted for a 2nd navigation attempt were less likely to have a follow-up Pap test at 6 months
- Participants testing positive were not more likely to have follow-up Pap test
- High acceptability of HPV self-sampling (89.2%)

Strengths and limitations
Strengths: successfully recruited adequate sample size in target population, up to 3 navigation attempts made with participants, multiple data analysis techniques used to interpret findings
Limitations: no power analysis done, 6-month study duration may not have been long enough for follow-up, no validated tool used for questionnaire

Implications + CASP rating

- Findings contradict other research on positive effect of patient navigation
- Patient navigation proved human resource heavy
- Further research could focus on mHealth interventions for patient navigation
- CASP: moderate

Article: Dutton, T., Majoram, J., Burgess, S., Montgomery, L., Vail, A., Callan, N., Jacob, S., Hawkes, D., Saville, M., & Bailey, J. (2020). Uptake and acceptability of human papillomavirus self-sampling in rural and remote Aboriginal communities: Evaluation of a nurse-led community engagement model. *BMC Health Services Research, 20*, Article 398. https://doi.org.10.1186/s12913-020-05214-5

Objective: To determine whether community-based HPV self-sampling model effectively recruited never-and under-screened Aboriginal women in CC screening, to assess clinical outcomes including follow-up, assess acceptability of the model by participants

Setting, sampling technique and sample size: 8 rural and remote communities in New South Wales, Australia, convenience and snowball sampling, N: 215

Type of study and design: Cross sectional study design
Community health workers recruited participants at community events and home visits + provided kits. Self-sampling was completed at home. Results returned by mail to participants and GP, results and follow-up explained to participants by community nurses either face to face or by phone. Evaluation questionnaire on service elicited during follow-up.

Findings

- 46% of participants had follow-up after 20 months
- 13.2% of participants reported difficulty understanding test + relied on nurses to explain results
- Unexpected outcome of participants who presented for follow-up cytology with GP sought care for other health conditions

Strengths and limitations
Strengths: high community engagement between public health and local aboriginal land council, triangulation of qualitative results between 2 researchers to ensure validity of findings
Limitations: convenience and snowball sampling could have resulted in selection bias, no eligibility criteria, inclusion/exclusion criteria or demographic data included, did not specify how many participants required home visit for follow-up

Implications + CASP rating

- Demonstrates high burden on health care system for result delivery to ensure follow-up
- High reliance on nurses to explain results may indicate low health literacy, underlying importance of education on HPV and CC
- CASP: moderate

Article: Lea, C. S., Perez-Heydrich, C., Des Marais, A. C., Richman, A. R., Barclay, L., Brewer, N. T., & Smith, J. S. (2019). Predictors of cervical cancer screening among infrequently screened women completing human papillomavirus self-collection: My Body My Test 1. *Journal of Women's Health, 28(*8), 1094-1104. https://doi.org/10.1089/jwh.2018.71.41

Objective: To identify barriers, knowledge, attitudes, and predictors of cervical cancer screening among low-income women. To assess predictors of longer time since last Pap test and of completing in clinic Pap test after receiving HPV results from self-sample.

Setting, sampling technique and sample size: North Carolina, USA, purposive sampling, N: 230

Type of study and design: Cross sectional study design
Participants mailed HPV self-sample, contacted by American Sexual Health Association for result notification, followed by 3 questionnaires. Information provided on low-cost or free Pap tests in their region. Participants self-reported completing Pap test.

Findings

- Participants who tested positive for HPV on self-sample more likely to report completing follow-up Pap test (OR=5.1, 95% CI: 1.4-25.7)
- Travel >11 miles associated with completing follow-up Pap test (OR 3.6, 95% CI 1.0-14.2)
- Many participants unaware of programs that offer free or low-cost Pap tests
- Cost and lack of health insurance most frequent barrier for completing CC screening cited by participants
- Participants with high school education or less were more likely to have longer time intervals between screening than those with more education

Strengths and limitations
Strengths: findings generalizable to local low-income population, multiple recruitment strategies used to identify and recruit hard to reach population, fulsome questionnaires used to collect data on attitudes and barriers to screening
Limitations: purposive sampling may have resulted in self-selection bias, small sample size, self-reported Pap tests may have led to overreporting, no validated tool used for questionnaire

Implications + CASP rating

- USA policy should focus on informing women of low cost or free Pap tests to ensure access to recommendations for care
- Under-educated women should be a focus for targeted screening and follow-up
- CASP: high

Article: Molokwu, J. C., Penaranda, E., Dwivedi, A., Mallawaarachchi, I., & Shokar, N. (2018). Effect of educational intervention on self-sampling acceptability and follow-up Paps in border dwelling Hispanic females. *Journal of Lower Genital Tract Disease, 22*(4), 295-301. https://doi.org/10.1097/LGT.0000000000000424

Objective: To evaluate the effect of a community outreach-led education intervention compared with education pamphlet on cervical cancer screening preferences and the effect on subsequent screening for predominantly Hispanic women living on the US-Mexican border who are overdue for CC. Secondary outcomes: acceptability of test, HPV knowledge.

Setting, Sampling Technique and Sample Size: Border of US and Mexico in Texas, USA, purposive sampling, N: 202

Type of study and design: Randomised control trial
Intervention arm: education from outreach worker using PowerPoint presentation + provision of educational material for participants to keep. Education materials at Grade 6 reading level including severity of hrHPV, cervical cancer screening with instruction for HPV self-sampling. Self-sampling completed after the education session
Control arm: leaflet provided with the educational materials described above + self-sampling kit with instructions

Findings

- High intensity intervention significantly improved post-survey HPV knowledge (0.74 vs 0.09, p: <0.001)
- HPV knowledge improvement was significantly associated with a follow-up Pap test (p=0.033)
- Participants testing positive for HPV were more likely to seek follow-up Pap, but result was not statistically significantly

Strengths and limitations
Strengths: Community recruitment allows for generalizability to local population, only study comparing intervention in RTC, used HBM theoretical framework to guide study
Limitations: Results may not be generalizable to other cultures, races or non-border populations, small size sample, purposive sampling may have resulted in self-selection bias

Implications + CASP rating

- Highlighted that education on HPV important in increasing screening and follow-up
- Demonstrates that policy should be focused on increasing education on HPV and CC
- CASP: moderate

Article: Mremi, A., Linde, D. S., Mchome, B., Mlay, J., Schledermann, D., Blaakaer, J., & Rasch, V. (2021). Acceptability and feasibility of self-sampling and follow-up attendance after text message delivery of human papillomavirus results: A cross-sectional study nested in a cohort in rural Tanzania. *Acta Obstetricia et Gynecologica Scandinavica, 100(4),* 802-810. https://doi.org/10.1111/aogs.14117

Objective: To explore the acceptability and feasibility of HPV self-sampling among Tanzanian women living in rural areas, and to assess the attendance rate of follow-up screening appointments for hrHPV positive women

Setting, sampling technique and sample size: Kilimanjaro region of Northern Tanzania, purposive sampling, N: 1108

Type of study and design: Cross sectional study in a cohort
Study nurses gave participants instructions for self-sampling with individual counseling regarding the implication of receiving a positive test. If positive, 4 text messages over 1 month were sent to participants with appointment date for follow-up Pap test. Phone call if did not present for follow-up.

Findings

- 82% of participants presented for follow-up
- 16% required phone call to attend follow-up
- High acceptability of self-sampling among participants

Strengths and limitations
Strengths: large sample size, high follow-up rate, utilized education + mHealth intervention
Limitation: conducted in rural setting of low-income country, may have limited generalizability to other settings, no validated tool used for questionnaire, purposive sampling may have resulted in self-selection bias or courtesy bias leading to over estimation of acceptance of self-sampling. ⅓ of participants were HIV positive, a population with high awareness of importance of follow-up which might have contributed to results

Implications + CASP rating

- Shows promise of mHealth to reduce human resources burden of CC screening
- Demonstrates that policy should be focused on increasing education on HPV and CC
- CASP: moderate

Article: Pretsch, P. K., Spees, L. P., Brewer, N. T., Hudgens, M. G., Sanusi, B., Rohner, E., Miller, E., Jackson, S. L., Barclay, L., Carter, A., Wheeler, S. B., & Smith, J. S. (2023). Effect of HPV self-collection kits on cervical cancer screening uptake among under-screened women from low-income US backgrounds (MBMT-3): A phase 3, open-label, randomised controlled trial. *Lancet Public Health, 8*(6), e411-e421. http://doi.org/10.1016/s2468-2667(23)00076-2

Objective: To identify whether mailing HPV self-collection kits to women's home in conjunction with providing appointment scheduling assistance resulted in increased uptake of cervical cancer screening compared with offering scheduling assistance alone

Setting, sampling technique and sample size: North Caroline, USA, purposive sampling, N: 665

Type of study and design: Randomised control trial

1. Intervention group: Self-sampling HPV test mailed to home + scheduling assistance for follow-up Pap test
2. Control group: Scheduling assistance for Pap test

Both groups completed telephone questionnaires at 4 stages of study. Trained interviewer provided results over the phone with brief counselling. Up to 3 calls made for scheduling assistance.

Findings

- Screening uptake higher in intervention group (72% and 37%)
- Similar rates of follow-up for HPV positive participants in both groups (43%)

Strengths and limitations
Strengths: study exceeded power analysis, comprehensive statistical analysis, multiple attempts to contact participants
Limitations: Purposive sampling may have resulted in self-selection bias, unable to say if home HPV sampling vs scheduling assistance resulted in outcome or if follow-up due to another variable

Implications + CASP Rating

- Results demonstrate that further research is required to isolate variables responsible for improving follow-up rates
- Scheduling assistance via phone call is human resource intensive
- Further research could focus on other mHealth interventions for scheduling assistance
- CASP: moderate

Article: Tamalet, C., Halfon, P., Le Retraite, L., Grob, A., Leanri, F. X, Heid, P., Sancho-Garnier, H., & Piana, L. (2016, May). Genotyping and follow-up of HR-HPV types detected by self-sampling in women from low socioeconomic groups not participating in regular cervical cancer screening in France. *Journal of Clinical Virology*, *78*, 102-107. https://doi.org/10.1016/j.jcv.2016.02.027

Objective: To describe hrHPV types in women ages 35-69 from low socioeconomic status not attending regular cervical screening in Marseille, France

Setting, sampling technique and sample size: Marseille, France, purposive sampling, N: 22,702 (Participation: 4245)

Type of study and design: Quantitative descriptive population-based intervention study Participants received HPV self-sample in the mail with instructions to mail samples to lab. Results communicated to participants and GPs but did not specify how. Reminder call and letter sent at 3 and 6 months if no follow-up complete. HPV + Participants not completing follow-up at 12 months were sent another HPV-self sample with results delivered by phone/mail

Findings

- Overall follow-up was 66% of HPV positive participants
- Results from second HPV sample revealed that 43% had cleared the infection
- Sending second HPV self-sample recovered 50% of participants lost to follow-up

Strengths and limitations
Strengths: large sample size, used novel strategy to recover participants lost to follow-up
Limitations: did not explicitly say how they followed-up with participants, did not describe ethical considerations/approval by ethical body

Implications + CASP rating

- Sending second HPV self-sample may be effective strategy to recover those lost to follow-up; however, requires more research
- CASP: moderate