Factors Associated with Breast, Cervical, and Colorectal Cancer Screening
CANCER SCREENING HEALTH PROMOTION ENVIRONMENTAL SCAN

ACKNOWLEDGEMENTS

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A. INTRODUCTION

This document describes different factors associated with cancer screening identified in a brief review of the peer-reviewed literature on cancer screening promotion published between January 2003 and December 2010. The methods used for the review are described in Appendix A.

The factors are presented under the categories of factors associated with cancer screening included in the “What” component of the Cancer Screening Health Promotion (CSHP) model (Appendix B). The whole model is described in detail in the document titled “Cancer Screening Health Promotion Model” available on www.screeningforlife.ca/healthpromotion.

There are six categories of factors associated* with cancer screening in the CSHP model. The first three categories - “Genetic and non-modifiable characteristics”, “Behaviour, Circumstance, & Personal History”, and “Socioeconomic & Environmental conditions” - cover the different determinants of overall health in the original Population Health model ¹. These factors characterize which populations are likely un- or under-screened and who should be engaged in cancer screening promotion interventions. Genetic and non-modifiable characteristics include inherited characteristics and characteristics of an individual that cannot be changed. Behaviour, Circumstance, & Personal History include factors related to an individual’s general behaviour, lifestyle, and life experiences. These factors may be difficult to modify in the short-term. Socioeconomic & Environmental conditions include factors related to an individual’s socioeconomic status and factors related to the environment in which an individual lives and works. Factors that reflect socioeconomic status include education, employment, and income, which are often, though not always, linked. Socioeconomic status is also frequently associated with environmental factors, which is why these factors are grouped together. Socioeconomic and environmental factors are often also difficult to modify in the short-term.

The last three categories – Predisposing factors, Enabling factors, and Reinforcing factors- are adapted from the PRECEDE-PROCEED model. ² The factors in these last three categories are specific to cancer screening promotion and practices. Predisposing, enabling, and reinforcing factors describe why individuals are not screened or what needs to happen in order for individuals to be screened. These factors are often the focus of cancer screening promotion interventions since they are easier to modify than the factors in the first three categories. Examples of predisposing factors include cancer screening knowledge, attitudes, and beliefs, which motivate an individual to be screened. Examples of enabling factors include skills, resources, and policies necessary to seek and access cancer screening services and make it possible for an individual to engage in cancer screening. Examples of reinforcing factors include social influences, incentives, and positive experiences that influence an individual to continue engaging in cancer screening practices.

The following sections describe different factors associated with breast, cervical, and colorectal cancer screening in each of the categories. These factors were most frequently associated with screening for these cancers in the relevant peer-reviewed literature that was published between January 2003 and December 2010. Please note that these are not the only factors associated with cancer screening. As well, there may be studies that did not find associations between these factors.

* Associated means that these factors do not cause screening or prevent screening, but screening rates differ significantly between populations with these factors and populations without these factors.
factors and cancer screening. The purpose of describing these factors is to 1) provide insight into the types of population characteristics that can be examined when designing cancer screening promotion interventions, and 2) the types of predisposing, enabling, and reinforcing factors that cancer screening promotion interventions can aim to modify.

This review only examined literature published between January 2003 and December 2010. The literature reviewed does not represent all that is known about the factors associated with screening for the three cancers, just what was being studied between 2003 and 2010. Interestingly, most of the studies on breast and cervical cancer screening published during this time period focused on promoting screening in underserved populations while studies on colorectal cancer screening published during this time period focused on promoting screening in the general population. Breast and cervical cancer screening have been promoted for a much longer time than colorectal cancer screening so breast and cervical cancer screening rates tend to be high in the general population. Consequently, most of the studies promoting breast and cervical cancer screening focus on populations in which breast and cervical cancer screening rates are still low. On the other hand, colorectal cancer screening rates are still quite low in the general population, which is why many studies examine promotion of colorectal cancer screening in the general target population rather than only among underserved groups. The different populations in the studies, and history of screening promotion for the three cancers made it difficult to directly compare and combine factors associated with screening for the different cancers. For this reason, the factors associated with screening are presented separately for breast, cervical, and colorectal cancer screening.
### Table 1: Examples of factors associated with breast cancer screening behaviour

<table>
<thead>
<tr>
<th>Category of Factor</th>
<th>Factors associated with increased screening</th>
<th>Factors associated with decreased screening</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Genetic &amp; Non-modifiable characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race or ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluency in English</td>
<td></td>
<td>Recent immigration</td>
</tr>
<tr>
<td>Marital status (Married or co-habiting)</td>
<td></td>
<td>Disability</td>
</tr>
<tr>
<td>Other healthy behaviours</td>
<td></td>
<td>Smoking</td>
</tr>
<tr>
<td><strong>Behaviour, Circumstance, &amp; Personal History</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge about screening</td>
<td></td>
<td>Perceived barriers</td>
</tr>
<tr>
<td>Perceived benefits</td>
<td></td>
<td>E.g. Fear</td>
</tr>
<tr>
<td>Perceived susceptibility</td>
<td></td>
<td>Expectation of pain</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td></td>
<td>Belief that cancer is part of one’s destiny</td>
</tr>
<tr>
<td>Physician’s recommendation</td>
<td></td>
<td></td>
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<tr>
<td>Peer and/or family support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommendation from a spiritual leader</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Socioeconomic &amp; Environmental conditions</strong></td>
<td>Education level</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td>Perceived barriers</td>
</tr>
<tr>
<td>High neighborhood stability and material circumstances</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Predisposing factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
<td>Certain ethnic groups (e.g. Aboriginal or Asian women in Canada)</td>
</tr>
<tr>
<td>Recent physician contact</td>
<td></td>
<td>Perceived barriers</td>
</tr>
<tr>
<td><strong>Enabling factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous normal result from mammogram</td>
<td></td>
<td>Perceived barriers</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td>Caregiving responsibilities</td>
</tr>
<tr>
<td>Provider recommendation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recent physician contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived benefits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of screening guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive emotional/social support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous positive mammogram experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reinforcing factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High neighborhood stability and material circumstances</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. FACTORS ASSOCIATED WITH BREAST CANCER SCREENING
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

Genetic & Non-modifiable characteristics

Genetic & non-modifiable characteristics associated with breast cancer screening include age, family history of breast cancer, and race or ethnicity.

**Age** has been associated with breast cancer screening in a number of studies. Most of the reviewed studies on breast cancer screening involved individuals 40 years and older or 50 years and older and suggested that likelihood of screening increased with age. Zackrisson and colleagues (2007), however, found that among Swedish women 45 years and older, the likelihood of not attending screening for breast cancer increased slightly but significantly with age. None of the articles specifically mentioned a decline in screening among women older than 69 who are outside of the target age group for screening. This may be because the studies did not often include a large number of women older than 69.

A number of studies found that individuals with a **family history** of breast cancer tend to be screened more than individuals without a family history of breast cancer. This may be because women with a family history of breast cancer have been advised more about breast cancer screening or have a higher perceived risk of breast cancer. Sinicrope and colleagues (2009) found that women were more likely to have received advice on breast cancer risk reduction and early detection from their mother if their mother had breast cancer. Having a mother or a first degree relative with breast cancer increased the likelihood of women engaging in breast cancer screening behavior.12

**Ethnicity** is another factor that can influence breast cancer screening practices. Thirty-two of the 49 articles on breast cancer screening that were reviewed focused on breast cancer screening practices in specific racial or ethnic groups. The large number of studies focused on ethnic populations suggests a recent trend towards studying factors associated with breast cancer screening in these potentially un- or under-screened populations. In Canada, two studies cited differences in screening practices between ethnic groups. In a comparison of breast and cervical cancer screening practices and beliefs between different ethnic groups in Northwestern Ontario, Ojibwa and Oji-Cree women were least likely to have obtained screening mammograms or Pap tests. An examination of mammography screening retention through the Manitoba Breast Cancer Screening Program found that retention was lowest among Asian and First Nations women. In Britain, Scanlon and Wood (2005) found that compared to the general population, black, minority, and ethnic women knew less about breast cancer, symptoms, and risk factors and were less likely to report breast cancer screening behavior. Barter-Godfrey and Taket (2007) also found that ethnicity was associated with perceptions of breast cancer screening and regular attendance for breast cancer screening among women residing in Southeast London. However, it cannot be assumed that all ethnic minority groups are underscreened. A study by Shirazi and colleagues (2006) found that age-specific breast cancer screening rates in Iranian-American women were higher than national rates for the general population. As well, Cui and colleagues (2007) found that recent mammography use and the factors influencing mammography use did not differ significantly between low-income African-American and White women living in the Southern United States.
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

There were also a number of studies, specifically with African-American populations in the United States, that did not compare screening practices between ethnic groups, but rather focused on factors associated with screening in specific populations. These factors are discussed in the following sections.

Behaviour, Circumstance, & Personal History

A number of the studies reviewed suggested that individuals who have recently immigrated may be un- or under-screened for breast cancer. Zackrisson and colleagues (2007) found that women born outside of Sweden were twice as likely not to attend screening as women born in Sweden were. Asian-Americans who had lived in the United States for less than 10 years were less likely to have had a mammogram than Asian-Americans who were born in the United States. Length of time in the United States was also associated with greater mammography screening among Haitian and Caribbean immigrants and rural Mexican-American women and greater screening for breast, cervical and colorectal cancer among South Asian immigrants.

One factor that may account for differences in screening rates between recent immigrants and the rest of the population in the United States and Canada may be fluency in English. Different studies based in the United States found that fluency in English increased the likelihood of breast cancer screening. However, a language barrier may contribute to perceived barriers and decrease the likelihood of cancer screening. The information received from providers may also influence screening rates. In a study of African and Caribbean women in New York City, Garbers and Chiasson (2006) found that mammography screening likelihood was not significantly different between U.S.-born and foreign-born women, however, U.S. born women were more likely to have received a recommendation for screening from a provider than foreign-born women. Provider recommendation is categorized under predisposing factors.

Marital status may also influence breast cancer screening. Zackrisson and colleagues (2007) found that Swedish women who reported being married or living with a partner were more likely to be screened than Swedish women who reported being unmarried, divorced, or widowed. Satia and colleagues (2007) found that marital status was also associated with increased screening for breast cancer in African-American women.

Another potentially un- or under-screened population is individuals with a disability. Individuals with a disability may have difficulties seeking and receiving health services and, consequently, may be un- or under-screened for breast, cervical, and colorectal cancer. Mele and colleagues (2005) studied the experiences of women with disabilities when seeking breast cancer services and found that barriers such as poor transportation, heavy doors, inaccessible exam tables and bathrooms reduced access to health care services. As well, the women with disabilities in the study felt that providers often undervalued them and their symptoms were often overlooked.

Breast cancer screening is often associated with other health behaviours. For example, breast cancer screening was more likely in African-American women if women had a general interest in preventive health and practiced other healthy behaviours such as visiting the dentist and eating a low fat diet. Smoking was associated with decreased
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breast cancer screening in Latino women in the United States, American female veterans, and women 50 years or older living in New York city.

Socioeconomic and environmental conditions

The association between education level and breast cancer screening has been examined in a number of studies. The relationship between education level and screening is not always clear. Most of the studies reviewed found that individuals with higher levels of education were more likely to be screened. However, Von Euler-Chelpin (2008) and colleagues found that academic women with high levels of education and women with little to no primary education were most likely to have “never used” mammography screening services. As well, Taylor and colleagues (2003) found that late or lapsed attendance for breast cancer screening through Breast Screening New South Wales was associated with higher education.

A number of the studies reviewed found that income increased likelihood of breast cancer screening. Income is often related to employment; however, the exact association between employment and breast cancer screening is unclear from the studies reviewed. At a neighborhood level, Zackrisson and colleagues (2007) found that area-level factors, such as migration and employment rates, were associated with higher mammography screening rates in 97 neighborhoods in a Swedish city. In this study, migration rate was used as an indicator of stability and social context and employment rate was used as a measure of material circumstances. Juon and colleagues (2004) found that among Korean-American women, employed women with health insurance had higher rates of mammography screening than employed women without health insurance. This study suggests that mammography screening is influenced by health insurance, rather than employment. Health insurance is discussed under enabling factors.

Predisposing factors

Predisposing factors include an individual’s knowledge, attitudes, and beliefs towards screening and the various factors that influence an individual’s knowledge, attitudes, and beliefs towards screening.

A number of the studies reviewed found that breast cancer screening was associated with increased knowledge about screening, including knowledge of screening methods, where to get screened, and cancer risk.

Several studies cited associations between constructs from the Health Belief model (Appendix C) and breast cancer screening. The Health Belief Model and definitions of constructs are described in the document titled “Health Promotion and Behavioural Change Theory” available on www.screeningforlife.ca/healthpromotion. Several studies found that breast cancer screening is more likely when individuals have perceived benefits of screening or perceived susceptibility to breast cancer. Self-efficacy is also associated with increased screening for breast cancer. Perceived barriers decrease screening for breast cancer. Examples of perceived barriers include fear and expectations of pain. Many of the studies discussing perceived barriers involved underserved populations including Mexican-American, African-American, Appalachian, and Chinese-American populations, and
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women with mental illness or substance abuse disorders. Beliefs that cancer is part of one’s destiny was associated with decreased screening for breast cancer in African-American and Chinese-Australian women.

An individual’s knowledge, attitudes, and beliefs regarding breast cancer screening can be influenced by a physician’s recommendation to be screened, advice and support from peers or family members, and recommendations from spiritual leaders. Darnell and colleagues (2006) found that among African-American women, mammography screening was not associated with knowledge about screening but was associated with seeing, reading, or hearing messages promoting mammography screening in their churches on four or more occasions.

Enabling factors

Enabling factors include an individual’s skills and abilities, resources, and factors related to access of health care services. A number of the studies reviewed found an association between breast cancer screening and health insurance. These studies were all based in the United States where health insurance is not universal. Breast cancer screening was also more likely if the woman had a recent physician contact. A recent physician contact suggests that the women are able to seek and receive health care services. As mentioned previously, Mele and colleagues (2005) found that difficulties accessing health services prevented several women with disabilities from seeking and receiving breast cancer screening services. Lairson and colleagues (2008) found that access issues such as time to facility and wait times for a mammogram prevented Veteran women in the United States from being screened. Yu and Wu (2005) found that the ability to seek information and access breast cancer screening services was associated with increased screening in Chinese-American women. In an article by Peters (2010), women in general expressed a clear preference for women-centered health screening services; however, access to these services is not optimal. These studies emphasize the importance of addressing access to breast cancer screening services when promoting breast cancer screening in different populations.

Reinforcing factors

Many of the reinforcing factors that promote maintenance of breast cancer screening behaviour are similar to the predisposing and enabling factors that promote initial breast cancer screening behaviour. Decker and colleagues (2008) found that factors influencing retention of women in the Manitoba Breast Cancer Screening Program included results from their previous screen, ethnicity, and education. Women were more likely to return for their next routine screen if they had a normal result previous, were not Asian or Aboriginal, and had a grade 9 or higher level of education.

Other factors associated with repeat screening in the literature included provider recommendation, recent physician contact, perceived benefits of regular screening, and fewer perceived barriers to regular screening. Russell and colleagues (2006) noted that the perceived barriers for women who have never been screened may differ from women who have been screened previously. Knowledge of screening guidelines was associated with regular breast cancer screening in African-American and Korean-American women.
Messina and colleagues (2004) found that in a large national sample of post-menopausal women, regular breast cancer screening was associated with increased positive emotional support and social interactions and decreased caregiving responsibilities. As well, a number of researchers found that women with a previous mammography screening experience were likely to receive another mammogram unless the previous screening experience was negative.
### C. FACTORS ASSOCIATED WITH CERVICAL CANCER SCREENING

Table 2: Factors associated with cervical cancer screening behaviour

<table>
<thead>
<tr>
<th>Category of Factor</th>
<th>Factors associated with increased screening</th>
<th>Factors associated with decreased screening</th>
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<tbody>
<tr>
<td>Genetic &amp; Non-modifiable characteristics</td>
<td>Age</td>
<td>Race or ethnicity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Displacement</td>
</tr>
<tr>
<td>Behaviour, Circumstance, &amp; Personal History</td>
<td>Length of time in new country</td>
<td>Fluency in English</td>
</tr>
<tr>
<td></td>
<td>Fluency in English</td>
<td>Marital status</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disability</td>
</tr>
<tr>
<td>Socioeconomic &amp; Environmental conditions</td>
<td>Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td></td>
</tr>
<tr>
<td>Predisposing factors</td>
<td>Knowledge about screening</td>
<td></td>
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<tr>
<td></td>
<td>Physician’s recommendation</td>
<td></td>
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<tr>
<td></td>
<td>Perceived benefits</td>
<td></td>
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<tr>
<td></td>
<td>Perception that screening is normal</td>
<td></td>
</tr>
<tr>
<td>Enabling factors</td>
<td>Health insurance</td>
<td>Poor access to screening services</td>
</tr>
<tr>
<td></td>
<td>Regular source of health care</td>
<td>Poor quality of screening services</td>
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<tr>
<td></td>
<td></td>
<td>Fear of discrimination</td>
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<tr>
<td>Reinforcing factors</td>
<td>Positive Pap test beliefs</td>
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<td></td>
<td>Health insurance</td>
<td></td>
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<tr>
<td></td>
<td>Knowledge of screening guidelines</td>
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<tr>
<td></td>
<td>Physician’s recommendation</td>
<td></td>
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<tr>
<td></td>
<td>Friends/family who regularly receive Pap tests</td>
<td></td>
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<tr>
<td></td>
<td>High education and English proficiency</td>
<td></td>
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<tr>
<td></td>
<td>Previous abnormal Pap test result</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Annual medical visits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heterosexual</td>
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</table>
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

Genetic & Non-modifiable characteristics

As was the case with breast cancer screening, a number of the articles reviewed found an association between age and cervical cancer screening. Most of the studies on cervical cancer screening that were reviewed involved women 18 years and older. The exact influence of age on cervical cancer screening was not clear from the studies reviewed. This may be due to the different populations in the studies, age groups compared, and/or frequency of Pap testing that was examined. For example, using a sample of 18,338 women older than 18 years, drawn from the 2000 National Health Interview Survey and Cancer Topical module, Lockwood-Rayerman (2004) found that women 45 years and older living in the United States were more likely to have had a Pap test in the previous 12 months than women younger than 45. On the other hand, Buki and colleagues (2007) and Gorin and colleagues (2005) found that older Latina women were more likely to be overdue for cervical cancer screening than younger women. Similarly, Carruth and colleagues (2006) found that as age increased, likelihood of screening for cervical cancer decreased in farmwomen living in the Southern United States. Lee and colleagues (2008) also found a similar trend in Korean-American women living in Chicago, but their study only included women 40 years or older.

Several studies demonstrated differences in cervical cancer screening rates among ethnic groups. Using data from the 2001 Canadian Census and the 2003 Canadian Community Health Survey, Woltman & Newbold (2007) found that in the Toronto, Montreal, and Vancouver Census Metropolitan Areas, cervical cancer screening was lowest among Asian women (including Chinese and South Asian women). A study of physician service claims in Ontario between 2000 and 2002 showed that of 724,584 women eligible for Pap testing, screening was lowest among minority women. As mentioned previously, a comparison of breast and cervical cancer screening practices and beliefs between different ethnic groups in Northwestern Ontario, found that Ojibwa and Oji-Cree women were least likely to have obtained screening mammograms or Pap tests. In the United States, studies found lower cervical cancer screening rates in Latina/Hispanic women and Thai immigrant women in California. It is important to note, however, that cervical cancer screening is not always lower in ethnic, minority groups and that ethnicity alone does not always influence cervical cancer screening. Hewitt and colleagues (2004) in a study of data on 13,745 women, 18 years and older, without a hysterectomy, obtained from the 2000 National Health Interview Survey found that Pap testing was higher in African-American women. Abraido-lanza and colleagues (2004) in their study suggested that after controlling for socioeconomic and access factors, Latina ethnicity was neither associated with breast nor cervical cancer screening. Also, according to Taylor and colleagues (2009), cervical cancer screening disparities between Vietnamese and other racial/ethnic groups are decreasing.

Behaviour, Circumstance, & Personal History

The literature reviewed on cervical cancer screening identified an association between cervical cancer screening and different behaviour, circumstance, and personal history factors. In Canada, two studies found that cervical cancer screening rates were lower among recent immigrants. In a study of 148 women diagnosed with cervical cancer in the United States, recent immigrant women were less likely to have been screened prior...
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to diagnosis. In another study, length of time in the United States was associated with greater screening for breast, cervical and colorectal cancer among South Asian immigrants. As with breast cancer screening, fluency in English may also influence likelihood of cervical cancer screening. Lin and colleagues (2008) and Juon and colleagues (2003) found that fluency in English increased the likelihood of cervical cancer screening in Korean-American women. On the other hand, a language barrier may decrease cancer screening.

Marital status may also be associated with cervical cancer screening. In the previously mentioned study by Hewitt and colleagues (2004), a review of data on 13,745 women 18 years and older who had not had a hysterectomy obtained from the United States 2000 National Health Interview Survey, cancer screening rates were lower in women who reported being unmarried. Being married was also associated with screening for cervical cancer in other U.S. studies with Latino women, Southern farmwomen, Mexican-American, Vietnamese-American, and Taiwanese, and Korean-American women.

Disability may be associated with screening for breast, cervical, and colorectal cancer. Two studies found that disabled individuals face considerable barriers when seeking and receiving health services and, consequently, are under-screened for breast, cervical, and colorectal cancer.

Socioeconomic & Environmental Conditions

In the literature reviewed, indicators of socioeconomic status including education, income, and employment were frequently associated with cervical cancer screening. A number of studies found that individuals with higher education levels were more likely to be screened for cervical cancer. Individuals with higher incomes were also more likely to be screened for cervical cancer. Employment also increased the likelihood of screening for cervical cancer. While none of the articles specifically mentioned the association between environmental factors and cervical cancer, associations were found between cervical cancer and factors such as peer and family support and distance to screening facility, which are related to the environment in which an individual lives and works. These factors are described under predisposing and enabling factors.

Predisposing Factors

In the studies reviewed, knowledge about screening was the most frequently mentioned factor associated with cervical cancer screening. Knowledge about screening included knowledge of Pap tests, where to be screened for cervical cancer, and risk factors for cervical cancer. A physician’s recommendation was the second most frequently mentioned predisposing factor associated with cervical cancer screening. As well, perceptions that screening is normal increased the likelihood of cervical cancer screening among university women in Eastern Canada, and among Korean-American and young Hispanic women in the United States. A physician’s recommendation and perceptions that screening is normal influenced a woman’s knowledge and attitudes towards screening. In addition, leisure-time physical activity was associated with increased cervical cancer screening in women in Puerto Rico. A number
of studies found that cervical cancer screening was more likely when individuals had positive beliefs or **perceived benefits** of screening for cervical cancer.\(^57, 81, 86, 90\) Perceived benefits was the only construct from the Health Belief Model (Appendix C) that was discussed in the literature reviewed.

### Enabling Factors

For cervical cancer, several studies found that having a **regular source of healthcare** increased the likelihood of screening.\(^3, 39, 62, 67, 68, 70, 79, 80, 83, 84\) Issues accessing services were stated as barriers to cervical cancer screening.\(^79, 88, 89\) **Access issues** included long distance to providers\(^88\), rigid appointment schedules\(^88\), preference for women-centered care\(^63\) and long wait-times.\(^89\) **Poor quality of care** was also cited as a barrier to cervical cancer screening.\(^79, 89\) Pinzon-Perez and colleagues (2005) assessed perceptions of quality of care and found that cervical cancer screening was less likely when women perceived that continuity and quality of care were lacking.\(^89\) Abraído-Lanza and colleagues (2004) assessed quality of care using source of health care (none, emergency room, hospital outpatient clinic, health center, physician’s clinic) and range of health needs examined during last physical examination including routine tests and health behaviours that were assessed. Source of health care and extent of last physical were associated with increased Pap test screening in both Latina and non-Latina women.\(^79\) Fear of discrimination was also cited as a barrier to cervical cancer screening in lesbians.\(^93\)

### Reinforcing Factors

The factors influencing repeat cervical cancer screening are similar to the factors influencing initial screening. Fernández-Esquer and colleagues found that **Pap test beliefs** were the strongest predictor of repeat screening in low-income Mexican-American women living in Texas.\(^69\) **Age** was associated with repeat screening in low-income Mexican-American women\(^69\) and Korean-American women\(^71\), and lesbians.\(^93\) Fernández-Esquer and colleagues (2003) found Mexican-American women younger than 40 living in Texas were more likely to have been regularly screened for cervical cancer in the previous 5 years than Mexican-American women 40 years and older living in Texas.\(^69\) Juon and colleagues (2003) studied cervical cancer screening in Korean-American seniors and found that women 65 years and older were less likely to be screened regularly than women younger than 65.\(^71\) **Health insurance** was also associated with repeat screening in both of these studies.\(^71\) Fernández-Esquer and colleagues (2003) also found that marital status and level of acculturation influence repeat screening in the Mexican-American women in their study.\(^69\) Juon and colleagues (2003) found that **knowledge of screening guidelines, a physician’s recommendation, having friends/family who received Pap tests, and having both high education and high English proficiency** increased the likelihood of cervical cancer screening in the Korean-American women in their study. Women in their study who did not get screened were more likely to believe that screening was unnecessary.\(^71\) In addition, Taylor (2009) found that previous physician recommendation for testing was strongly associated with recent Pap testing in Vietnamese immigrants.\(^80\) In a fourth study, Matthews and colleagues (2004) compared screening behaviour between women who have sex with women and heterosexual women and found that recent and annual screenings were predicted by a **previous abnormal Pap result, having annual medical visits, and being heterosexual.**\(^94\)
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

D. FACTORS ASSOCIATED WITH COLORECTAL CANCER SCREENING

Table 3: Factors associated with colorectal cancer screening behaviour

<table>
<thead>
<tr>
<th>Category of Factor</th>
<th>Factors associated with increased screening</th>
<th>Factors associated with decreased screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetic &amp; Non-modifiable characteristics</td>
<td>Age, Family history</td>
<td>Certain race/ethnic groups (e.g. African-American, Hispanic-American)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behaviour, Circumstance, &amp; Personal History</td>
<td>Length of time in new country</td>
<td>Disability</td>
</tr>
<tr>
<td>Socioeconomic &amp; Environmental conditions</td>
<td>Higher socioeconomic status, Education</td>
<td>Residence in neighborhood with poor socioeconomic conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predisposing factors</td>
<td>Knowledge about screening, Perceived benefits, Perceived susceptibility, Self-efficacy, Physician's recommendation</td>
<td>Perceived barriers, E.g. Fear, Expectation of pain, Embarrassment, Lack of time, Religious Sensitivities, Screening is a low priority</td>
</tr>
<tr>
<td>Enabling factors</td>
<td>Health insurance, Usual source of care</td>
<td>High cost</td>
</tr>
<tr>
<td>Reinforcing factors*</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*None of the studies reviewed focused on maintenance of colorectal cancer screening behaviour. Consequently, reinforcing factors associated with colorectal cancer screening were not identified in this review.

Genetic & Non-modifiable characteristics

As is the case with breast and cervical cancer screening, the studies reviewed found that age and ethnicity often influenced likelihood of colorectal cancer screening. **Age** was associated with screening for colorectal cancer in a number of the studies that were reviewed.3-5, 95-100 Close to half of the studies on colorectal cancer screening that were reviewed involved individuals 50 years and older. For colorectal cancer screening, studies showed that likelihood of screening increased with age.101 **Ethnicity** was associated with screening for colorectal cancer in different studies based in the United States. These studies found that, compared to their Caucasian counterparts, colorectal screening knowledge and behaviour was lower among certain race/ethnic groups102, 103 including African-American104-107 and Hispanic108, 109 individuals.
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

Like breast cancer screening, individuals with a family history of colorectal cancer tended to be screened more than individuals without a family history of colorectal cancer.5,104

**Gender** was also associated with colorectal cancer screening.110 A number of the studies reviewed found that screening rates were higher in men than women.24, 32, 101, 105, 111 This was particularly true when colonoscopy was the screening method used.96, 112-114

**Behaviour, Circumstance, & Personal History**

The behaviour, circumstance, and personal history factors discussed in the literature reviewed were not unique to colorectal cancer. As discussed before, length of time in a new country was found to increase likelihood of screening in a number of studies on breast and cervical cancer. Glenn and colleagues (2009) found that length of time in the United States was associated with greater screening for breast, cervical, and colorectal cancer among South Asian immigrants.24 Sun and colleagues (2004), however, found that among elderly urban Chinese-Americans, receipt of an FOBT in the 12 months prior to the study was associated with fewer years of residency in the United States suggesting that the association between length of time in the United States and colorectal cancer screening may be different for different populations.55 As well, as mentioned before, disability has been associated with decreased screening for breast, cervical, and colorectal cancer.28

Studies on breast and cervical cancer screening found an association between other healthy behaviours and screening. This may also be the case for colorectal cancer. McGregor and colleagues (2007) found that colorectal cancer screening among a sample of 1,808 Albertan men and women aged 50-74 was associated with screening for other cancers.114

**Socioeconomic & Environmental Conditions**

**Socioeconomic status** (SES) is frequently associated with poor health outcomes and increased barriers to seeking and receiving health care services. A number of studies on colorectal cancer screening focused specifically on lower-income populations or populations with lower SES who may be potentially un- or under-screened for colorectal cancer.53, 96, 104, 111, 115-118 In a study of African-Americans and Caucasians in a community in the Southern United States, lower education, lower income, and unemployment were all associated with decreased colorectal cancer screening knowledge, which was associated with decreased screening for colorectal cancer.104 James and colleagues (2008) found that individuals with lower SES were more likely to report barriers to colorectal cancer screening, particularly with endoscopy, than individuals with higher SES.118

**Education level** was discussed in a number of the studies on colorectal cancer screening that were reviewed. All of the studies found that individuals with higher education levels were more likely to be screened for colorectal cancer.3, 5, 53, 55, 95-97, 101, 104, 108, 116, 119

Two of the studies on colorectal cancer screening that were reviewed linked socioeconomic status to neighborhood residence.111, 117 Both studies found that individuals with colorectal cancer from neighborhoods with poorer socioeconomic conditions were frequently diagnosed with colorectal cancer at later stages, resulting in fewer treatment...
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

options and lower survival rates than individuals with colorectal cancer from neighborhoods with better socioeconomic conditions. Late-stage diagnosis is often an indicator of inadequate screening. Lau and colleagues (2009) looked at the correlation between living arrangement and colorectal cancer screening, finding that elderly persons living with a spouse were significantly more likely to obtain preventative screening. Von Euler-Chelpin and colleagues (2010) also found an association between marriage and use of the fecal occult blood test (FOBT).

Predisposing Factors

Predisposing factors include an individual’s knowledge, attitudes, and beliefs towards screening and the factors that influence knowledge, attitudes, and beliefs.

Knowledge about screening was frequently associated with increased colorectal cancer screening. A number of the studies linked knowledge about colorectal cancer screening with physician’s recommendation suggesting that physicians can play a larger role in educating and counseling patients about colorectal cancer screening. Screening for colorectal cancer was also strongly correlated with mammography use in African-American women.

Like the literature reviewed on breast cancer screening, several studies cited an association between colorectal cancer screening and constructs from the Health Belief model (Appendix C). The Health Belief Model and definitions of constructs are described in the document titled “Health Promotion and Behavioural Change Theory” available on www.screeningforlife.ca/healthpromotion. Colorectal cancer screening was more likely when individuals have positive beliefs or perceived benefits of screening.

Perceived susceptibility of colorectal cancer also increases likelihood of being screened. Self-efficacy is also associated with increased screening for colorectal cancer. Perceived barriers decreased screening for colorectal cancer. Examples of perceived barriers include fear and expectations of pain, particularly for minority groups such as African-American, Appalachian, United Kingdom ethnic minorities, and Chinese-American populations. Other barriers include embarrassment, lack of time, religious sensitivities, and low priority of colorectal cancer screening in relation to other health issues or life responsibilities are mentioned as reasons for not being screened.

According to Bazargan and colleagues (2009) and Chen and colleagues (2010), completing colorectal cancer screening was associated with lower perceived barriers.

A physician’s recommendation was the most frequently discussed factor associated with colorectal cancer screening in the literature reviewed. Post and colleagues (2008) found that physician’s recommendation was only significantly associated with increased colorectal cancer screening in patients younger than 65.

Enabling Factors

As with breast and cervical cancer screening, having health insurance and a usual source of care increased the likelihood of colorectal cancer screening.
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

All of the studies that discussed health insurance were based in the United States where health insurance is not universal.

For colorectal cancer, the only other enabling factor that prevented screening in the literature reviewed was cost\textsuperscript{115, 121, 123, 124}, which may also be associated with insurance coverage in the United States.

Reinforcing Factors

All of the studies reviewed focused on colorectal cancer screening uptake rather than maintenance. Consequently, reinforcing factors associated with continued screening for colorectal cancer were not identified in this review.

E. SUMMARY OF FACTORS ASSOCIATED WITH CANCER SCREENING

The evidence from the literature review suggests that screening is influenced by a combination of multiple factors. The influence of these factors frequently varies for different individuals and populations. The CSHP model recommends that for health promotion interventions to be effective, the presence and extent of influence of these different factors needs to be assessed, rather than assumed, for the different populations that the interventions aim to reach.

Current trends in research on factors associated with screening for breast, cervical, and colorectal cancer include an interest in focusing on factors that promote or prevent screening in potentially underserved populations such as minority groups, recent immigrants, and individuals with low socioeconomic status. There was less research on individuals with disabilities or homosexual individuals, though these populations may also be under-screened.

For all three cancers, screening was associated with knowledge about screening (including screening guidelines), a provider’s recommendation, perceived benefits of screening, and general interest in health behaviours including screening for other cancers. Screening was less likely when individuals perceived barriers such as fear or embarrassment or had poor access to screening services.
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

POTENTIAL POPULATIONS IN ALBERTA THAT ARE UNDER- OR UN-SCREENED

For all three cancers:
- individuals with low socioeconomic status (including education, income, employment)
- individuals with disabilities
- individuals without health insurance

For breast cancer:
- women without a family history of breast cancer
- certain race/ethnic groups (e.g. Aboriginal and Asian women)
- recent immigrants
- women who are not fluent in English
- women are single, divorced, or widowed
- women without a recent physician contact
- women who smoke

For cervical cancer:
- certain race/ethnic groups (e.g. Aboriginal and Asian women)
- recent immigrants
- women who are not fluent in English
- women are single, divorced, or widowed
- women without a regular source of healthcare
- homosexual women

For colorectal cancer:
- individuals without a family history of colorectal cancer
- younger individuals in the 50-74 year target age group
- women
- individuals who reside in neighborhoods with poor socioeconomic conditions
- individuals without a regular source of health care
## Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

### Potential Reasons People Do Not Get Screened Regularly

**For all three cancers:**
- lack of knowledge

**For breast cancer:**
- perceived barriers e.g. fear and expectations of pain
- belief that cancer is part of one’s destiny
- no recent physician contacts
- negative experiences when screened previously by mammography

**For cervical cancer:**
- poor access to screening services (e.g. distance to provider, appointment schedules, wait-times)
- poor perceptions of quality of care

**For colorectal cancer:**
- perceived barriers
  - E.g.
    - fear and expectations of pain
    - embarrassment
    - lack of time
- screening is a low priority

### Potential Reasons People Get Screened Regularly

**For all three cancers:**
- knowledge about screening (including screening guidelines)
- physician’s recommendation
- perceived benefits
- generally practice health behaviours including screening for other cancers

**For breast cancer:**
- perceived susceptibility
- self-efficacy
- peer and/or family support
- recommendation from a spiritual leader
- positive experiences when screened previously by mammography

**For cervical cancer:**
- perceptions that screening is normal
- family/friends receive Pap tests
- positive Pap test beliefs
- as part of annual medical visits

**For colorectal cancer:**
- perceived susceptibility
- self-efficacy
APPENDIX A: Literature Methods

Literature on factors associated with cancer screening was gathered from a search for peer-reviewed articles on breast, cervical, and colorectal cancer screening promotion practices. Table 1 provides a list of the databases and search terms used for the literature review. Articles retrieved were in English, had human subjects, and involved adults age 18 years and over. A total of 1657 articles were retrieved. The following criteria were used to exclude articles that were not relevant to the literature review:
- published prior to 2003
- described studies conducted in developing countries
- focused on patient diagnosis and/or treatment
- involved patients considered high-risk
- did not include the target age and gender groups for each of the Alberta provincial organized screening programs (women aged 50-69 years for breast cancer screening; women aged 21-69 years for cervical cancer screening; men and women aged 50-74 years for colorectal cancer screening)
- focused on factors associated with cancer screening by methods other than mammogram, Pap test, FOBT (Fecal Occult Blood Test), colonoscopy, flexible sigmoidoscopy, or barium enema

The remaining 364 articles were then separated into review articles (n=12), articles examining factors associated with cancer screening behaviour (n=151) and articles describing outcomes of cancer screening promotion interventions (n=201). This document presents the findings of the review on literature focusing on factors associated with cancer screening behaviour.

Forty-eight articles examined determinants of breast cancer screening, 48 articles examined determinants of colorectal cancer screening, and 33 articles examined determinants of cervical cancer screening. Eight articles examined screening for all three cancers, 15 examined screening for breast and cervical cancers, and two examined screening for breast and colorectal cancers. The majority of studies were conducted in the United States. Studies were also reviewed from Australia, Canada, Cyprus, Denmark, France, Italy, Netherlands, Sweden, Taiwan, Mexico and the United Kingdom. Seventy-four articles examined determinants specific to ethnic populations including African-Americans, Hispanic-Americans, Asian-Americans, South Asian-Americans, Chinese-Australians, Chinese-Canadians, and Chinese-Americans, Vietnamese-Americans, Korean-Americans, Iranian-Americans, and Aboriginal groups. Other target populations included low-income, minority, uninsured, employed, disabled, women who have sex with women, university, and non-metropolitan farm women. The major age groups targeted in the articles were ages 40 years and older for breast cancer screening, ages 18 years and older for cervical cancer screening, and ages 50 and older for colorectal cancer screening.
Table A.1. Databases and search terms used for Cancer Screening Determinants and Cancer Screening Promotion Interventions Literature Reviews

<table>
<thead>
<tr>
<th>Database</th>
<th>Type of search term</th>
<th>Search terms used</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMBASE (Excerpta Medica Database)</td>
<td>Medical Subject Heading (MeSH)</td>
<td>breast cancer/diagnosis, prevention OR uterine cervix cancer/diagnosis, prevention colorectal cancer/diagnosis, prevention AND mass screening OR cancer screening OR mammography OR Papanicoloaou test OR vaginal smear OR occult blood AND health promotion OR patient education OR continuing education and staff training</td>
</tr>
<tr>
<td>CINAHL (Cumulative Index to Nursing and Allied Health Literature)</td>
<td>Medical Subject Heading (MeSH)</td>
<td>breast neoplasms OR cervix neoplasms OR colorectal neoplasms AND cancer screening OR mammography OR cervical smears OR occult blood AND health promotion OR education medical continuing OR education nursing continuing</td>
</tr>
<tr>
<td></td>
<td>Keyword</td>
<td>breast cancer OR cervical cancer OR colorectal cancer AND screening OR mammography OR pap OR cervical smear OR occult AND train OR education OR promotion</td>
</tr>
<tr>
<td>MEDLINE® (Medical Literature Analysis and Retrieval System Online)</td>
<td>Medical Subject Heading (MeSH)</td>
<td>breast neoplasms/diagnosis, prevention and control OR cervical neoplasms/diagnosis, prevention and control OR colorectal neoplasms/diagnosis, prevention and control AND mass screening OR mammography OR vaginal smears OR occult blood AND health promotion</td>
</tr>
<tr>
<td>PsycINFO®</td>
<td>Medical Subject Heading (MeSH)</td>
<td>neoplasms AND cancer screening AND health promotion</td>
</tr>
<tr>
<td>Cochrane Library</td>
<td>Keyword</td>
<td>breast cancer screening increase OR cervical cancer screening increase OR colorectal cancer screening increase</td>
</tr>
</tbody>
</table>
APPENDIX B: Cancer Screening Health Promotion Model

Cancer Screening Health Promotion Model
Alberta Health Services (AHS) Screening Programs, 2010
APPENDIX C: The Health Belief Model

A Recent Version of the Health Belief Model

Individual Perceptions

- Perceived susceptibility and severity

Modifying Factors

- Age, Sex, Ethnicity, Personality, Socio-economics, Knowledge

- Perceived Threat

Likelihood of Action

- Perceived Benefits minus Perceived Barriers

- Likelihood of Behaviour

Cues to Action
- education
- symptoms
- media information
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

Constructs in the Health Belief Model 136, 137

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Potential Change Strategies</th>
</tr>
</thead>
</table>
| Perceived Susceptibility | Beliefs about the chances of getting a condition | • define population(s) at risk and levels of risk  
|                     |                                                                           | • tailor risk information based on individual characteristics or behaviours  
|                     |                                                                           | • help individuals develop accurate perceptions of own risk |
| Perceived Severity  | Beliefs about the seriousness of a condition and its consequences         | • specify consequences of condition and recommended action |
| Perceived Benefits  | Beliefs about the effectiveness of taking action to reduce risk or seriousness | • explain how, where, and when to take action and potential positive results |
| Perceived Barriers  | Beliefs about the material and psychological costs of taking action       | • offer reassurance, incentives, and assistance  
|                     |                                                                           | • correct misinformation |
| Cues to Action      | Factors that activate "readiness to change"                              | • provide how-to information, promote awareness, and employ reminder systems |
| Self-Efficacy       | Confidence in one’s ability to take action                               | • provide training and guidance in performing action  
|                     |                                                                           | • use progressive goal setting  
|                     |                                                                           | • give verbal reinforcement  
|                     |                                                                           | • demonstrate desired behaviours |
Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

REFERENCES


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Factors Associated with Breast, Cervical, and Colorectal Cancer Screening

Screening among African American Women and Latinas. Health Promotion Practice 2006;7(3 Suppl):20S-12S.


Factors Associated with Breast, Cervical, and Colorectal Cancer Screening


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