Ontario Health
Cancer Care Ontario

Technical Appendix: Indicator Methodologies

Ontario Breast Screening Program

Average Risk

Methodology Component	Methodology Component Details
Indicator	**Breast cancer screening participation**
Indicator Definition	Age standardized percentage of Ontario screen-eligible women, ages 50 to 74, who completed at least one mammogram within a 30-month period
Calculations for the Indicator	(Total number of Ontario screen-eligible people ages 50 to 74 who completed at least one screening mammogram within a 30-month period ÷ Total number of Ontario screen-eligible women ages 50 to 74 in the reporting period) × 100
Denominator	Total number of Ontario screen-eligible people ages 50 to 74 in the reporting period. • Ontario screen-eligible people ages 50 to 74 at the index date • Index date was defined as the midpoint in the reporting period, e.g. Jan 1st 2021 for 2020-2021 • The 2011 Canadian population was used as the standard population for calculating age-standardized rates Exclusions: • Women with a missing or invalid HIN, date of birth, or postal code • Women with a prior diagnosis of invasive or ductal carcinoma in-situ breast cancer before Jan 1st of the reporting period; prior diagnosis of breast cancer was defined as: ICD-O-3 codes: C50, a morphology indicative of breast invasive or ductal carcinoma in-situ cancer, microscopically confirmed with a pathology report • Women with a mastectomy before Jan 1st of the reporting period. Mastectomy was defined in OHIP by fee codes E505, E506, E546, R108, R109, and R117

Numerator	Total number of Ontario screen-eligible people, ages 50 to 74, who have completed at least one mammogram in a given 30-month period.
	
	• Identifying mammograms:
	  ○ OBSP screening mammograms were identified in ICMS
	  ○ Non-OBSP screening mammograms were identified using fee code X178 (screening bilateral mammogram) in OHIP
	• All mammograms in ICMS were counted, including those with partial views
	• Each woman was counted once regardless of the number of mammograms performed in a 30-month period; if a woman had both a program and non-program mammogram within a 30-month period, the program mammogram was selected

Methodology Component	Methodology Component Details
Data sources	• ICMS (Integrated Client Management System) - OBSP screening mammograms and demographics • OHIP's CHDB (Claims History Database) - Non-OBSP screening mammogram and mastectomy claims • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers • RPDB (Registered Persons Database) – Demographics • Statistics Canada: 2011 Canadian population values • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information • ON-Marg Index (Ontario Marginalization Index) - Equity information
Data Availability and Limitations	• Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • OHIP fee code X178 for screening bilateral mammography was introduced in October 2010

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Methodology Component	Methodology Component Details
Indicator	**Breast cancer screening retention**
Indicator Definition	Percentage of Ontario screen-eligible women, ages 50 to 72, who had a subsequent mammogram within 30 months of a previous program mammogram
Calculations for the Indicator	(Total number of screen-eligible people ages 50 to 72 who had a subsequent OBSP screening mammogram within 30 months of a previous program mammogram ÷ Total number of screen-eligible people ages 50 to 72 with an OBSP screening mammogram) × 100
Denominator	Total number of screen-eligible people ages 50 to 72 with an OBSP screening mammogram in a given calendar year • Average risk people ages 50 to 72 who had an OBSP screening mammogram in a given calendar year • Mammograms were identified in the ICMS by OBSP mammogram records for screening purposes • All mammograms in ICMS were counted, including those with partial views Exclusions • People with a missing or invalid HIN, date of birth • People who died during the 30-month retention period and were not rescreened • People who had breast cancer in the 30-month retention period and were not rescreened • People who had mastectomy in the 30-month retention period and were not rescreened • People who were rescreened during the 30-month retention period but had a mastectomy or breast cancer diagnosis between the index date and the rescreen date
Numerator	Total number of screen-eligible people ages 50 to 72 who had a subsequent program mammogram within 30 months of a previous program screening mammogram • Subsequent screening mammograms were identified through ICMS • All tests were considered, regardless of test results
Data sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • OHIP's CHDB (Claims History Database) - Mastectomy claims • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only • People who have moved out of the province could not be excluded • There is a 31-month reporting lag for this indicator, as one complete month is required to allow for the data entry of the screening result and 30 months is required to follow up participants to determine the next screen date

Methodology Component	Methodology Component Details
Indicator	**Breast cancer screening abnormal call rate**
Indicator Definition	Percentage of screen-eligible people ages 50 to 74 who had an abnormal OBSP screening mammogram
Calculation	(Total number of screen-eligible people ages 50 to 74 who had an abnormal OBSP screening mammogram result ÷ Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram in a given year) × 100
Denominator	Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram in a given year • Average risk people ages 50 to 74 who had an OBSP screening mammogram • Mammograms were identified by OBSP mammogram records in ICMS for screening purposes • All mammograms in ICMS were counted, including those with partial views Exclusions: • People with a missing or invalid date of birth
Numerator	Total number of screen-eligible people ages 50 to 74 who had an abnormal OBSP screening mammogram • An abnormal screening mammogram was defined as an OBSP screening mammogram referred by the OBSP radiologist for further testing
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, and breast assessments • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only • There is a one-month reporting lag for this indicator, as the sites have one month to enter the mammogram screening result (normal or abnormal) in ICMS

Methodology Component	Methodology Component Details
Indicator	**Breast cancer screening 6-month abnormal follow-up**
Indicator Definition	Percentage of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who were diagnosed (benign or cancer) within 6 months of the abnormal screen date
Calculation for the Indicator	(Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who were diagnosed (benign or breast cancer) within 6 months of the abnormal screen date ÷ Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram) × 100
Denominator	Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram in a given calendar year • Average risk people ages 50 to 74 who had an abnormal OBSP mammogram in ICMS • Mammograms were identified by OBSP mammogram records in ICMS for screening purposes • People with abnormal OBSP screening mammograms were identified as those referred for further testing by the OBSP radiologist in ICMS • All mammograms in ICMS were counted, including those with partial views Exclusions • People with a missing or invalid HIN, date of birth
Numerator	Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who were diagnosed (benign or breast cancer) within 6 months of the abnormal screen date • Date of diagnosis for benign cases was defined as date of last biopsy or procedure with benign finding • Date of diagnosis for breast cancer cases was defined as date of first fine needle aspiration (FNA) or tissue biopsy (core or open) procedure for breast cancer
Data sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only • There is an eight-month reporting lag for this indicator as the regions have eight months to close off assessment cases and enter the information in ICMS

Methodology Component	Methodology Component Details
Indicator	**Breast cancer screening wait time to diagnosis without tissue biopsy**
Indicator Definition	Percentage of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who were diagnosed (benign or breast cancer) without a tissue biopsy within five weeks of abnormal screen date
Calculations for the Indicator	(Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who were diagnosed (benign or breast cancer) within five weeks of the abnormal mammogram date ÷ Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who did not require a tissue biopsy (core or surgical) for a definitive diagnosis) × 100
Denominator	Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram in the reporting period, who did not require a tissue biopsy (core or surgical) for a definitive diagnosis • Average risk people ages 50 to 74 who had an abnormal OBSP mammogram in ICMS • Mammograms were identified in ICMS by OBSP mammogram records for screening purposes • People with abnormal OBSP screening mammograms were identified as those referred for further testing by the OBSP radiologist in ICMS • All mammograms in ICMS were counted, including those with partial views Exclusions • People without any assessment procedures • People who were lost to follow-up or whose final diagnosis was unknown • People with a missing or invalid HIN, date of birth
Numerator	Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram in the reporting period, who were diagnosed (benign or breast cancer) within five weeks of the abnormal mammogram date and did not require a tissue biopsy (core or surgical) for a definitive diagnosis • Date of diagnosis for benign cases was defined as date of last biopsy or procedure with benign finding • Date of diagnosis for breast cancer cases was defined as date of first fine needle aspiration (FNA) or tissue biopsy (core or open) procedure for breast cancer
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only • There is an eight-month reporting lag for this indicator, as the sites have eight months to close off assessment cases and enter the information in ICMS

Methodology Component	Methodology Component Details
Indicator	**Breast cancer screening wait time to diagnosis with tissue biopsy**
Indicator Definition	Percentage of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who were diagnosed (benign or cancer) with a tissue biopsy within seven weeks of abnormal screen date
Calculations for the Indicator	(Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who were diagnosed (benign or breast cancer) within seven weeks of the abnormal mammogram date ÷ Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram who required a tissue biopsy (core or surgical) for a definitive diagnosis) × 100
Denominator	Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram in the reporting period, who required a tissue biopsy (core or surgical) for a definitive diagnosis • Average risk people ages 50 to 74 who had an abnormal OBSP mammogram in ICMS • Mammograms were identified in ICMS by OBSP mammogram records for screening purposes • People with abnormal OBSP screening mammograms were identified as those referred for further testing by the OBSP radiologist in ICMS • All mammograms in ICMS were counted, including those with partial views Exclusions • People with a missing or invalid HIN, date of birth • People who were lost to follow-up or whose final diagnosis was unknown
Numerator	Total number of screen-eligible people 50 to 74 with an abnormal OBSP screening mammogram in the reporting period who were diagnosed (benign or breast cancer) within seven weeks of the abnormal mammogram date and required a tissue biopsy (core or surgical) for a definitive diagnosis • Date of diagnosis for benign cases was defined as date of last biopsy or procedure with benign finding • Date of diagnosis for breast cancer cases was defined as date of first fine needle aspiration (FNA) or tissue biopsy (core or open) procedure for breast cancer
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only • There is an eight-month reporting lag for this indicator, as the sites have eight months to close off assessment cases and enter the information in ICMS

Methodology Component	Methodology Component Details
Indicator	**Mammography positive predictive value**
Indicator Definition	Percentage of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram, who were diagnosed with breast cancer (DCIS or invasive)
Calculations for the Indicator	(Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram in a given calendar year, who were diagnosed with a screen-detected breast cancer (DCIS or invasive) ÷ Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram in a given calendar year) × 100
Denominator	Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram in a given year • Average risk people ages 50 to 74 who had an abnormal OBSP screening mammogram • Mammograms were identified in ICMS by OBSP mammogram records for screening purposes • People with abnormal program screening mammograms were identified as those referred for further testing by the OBSP radiologist in ICMS • All mammograms in ICMS were counted, including those with partial views Exclusions: • People with a missing or invalid HIN, date of birth • People who were lost to follow-up or whose final diagnosis was unknown
Numerator	Total number of screen-eligible people ages 50 to 74 with an abnormal OBSP screening mammogram, who were diagnosed with screen-detected breast cancer (DCIS or invasive) • All breast cancers reported by OBSP sites were counted
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only. • There is an eight-month reporting lag for this indicator, as the sites have up to eight months to close off assessment cases and enter the information in ICMS

Methodology Component	Methodology Component Details
Indicator	**Mammography sensitivity**
Indicator definition	Percentage of screen-eligible people ages 50 to 74 with breast cancer (DCIS or invasive) who had an abnormal OBSP mammogram.
Calculations for the indicator	(Number of true-positives ÷ Number of true-positives and false-negatives) × 100 True-positive = Abnormal OBSP screening mammogram result, DCIS/invasive breast cancer present False-positive = Abnormal OBSP screening mammogram result, DCIS/invasive breast cancer absent False-negative = Normal OBSP screening mammogram result, DCIS/invasive breast cancer present True-negative = Normal OBSP screening mammogram result, DCIS/invasive breast cancer absent

Denominator	Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram and were diagnosed with breast cancer (DCIS or invasive) within one year.
	
	• Average risk people ages 50 to 74 who had an OBSP screening mammogram
	• Breast cancer included screen-detected cancer and post-screen cancer
	• Post-screen cancer was defined as breast cancer diagnosed before the next scheduled screening mammogram visit and after a previous normal or benign screening episode.
	  ○ A normal screening episode was defined as a normal screening mammogram.
	  ○ A benign screening episode was defined as an abnormal screening mammogram followed by diagnostic assessments resulting in a final benign diagnosis.
	
	Exclusions:
	• People with a missing or invalid HIN, date of birth
	• People who were lost to follow-up or whose final diagnosis was unknown

Numerator	Total number of screen-eligible people ages 50 to 74 who were correctly diagnosed with breast cancer (DCIS or invasive) within one year following an abnormal OBSP mammogram. • An abnormal screening mammogram was defined as an OBSP screening mammogram referred for further testing by the OBSP radiologist
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments, and screen-detected cancer • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers • PCCF+ (Postal CodeOM Conversion File Plus) - Residence information
Data Availability & Limitations	• This indicator includes OBSP mammograms only • There is a two-year reporting lag for this indicator, as there is an approximate two-year data lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) in OCR

Methodology Component	Methodology Component Details
Indicator	**Mammography specificity**
Indicator definition	Percentage of screen-eligible people ages 50 to 74 without breast cancer (DCIS or invasive) who had a normal OBSP screening mammogram
Calculations for the indicator	(Number of true-negatives ÷ Number of true-negatives and false-positives) × 100 True-positive = Abnormal OBSP screening mammogram result, DCIS/invasive breast cancer present False-positive = Abnormal OBSP screening mammogram result, DCIS/invasive breast cancer absent False-negative = Normal OBSP screening mammogram result, DCIS/invasive breast cancer present True-negative = Normal OBSP screening mammogram result, DCIS/invasive breast cancer absent

Denominator	Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram and were not diagnosed with breast cancer (DCIS or invasive) within one year.
	
	• Average risk people ages 50 to 74 who had an OBSP screening mammogram
	• Breast cancer included screen-detected cancer and post-screen cancer
	• Post-screen cancer was defined as breast cancer diagnosed before the next scheduled screening mammogram visit and after a previous normal or benign screening episode
	  ○ A normal screening episode was defined as a normal screening mammogram
	  ○ A benign screening episode was defined as an abnormal screening mammogram followed by diagnostic assessments, resulting in a final benign diagnosis
	
	Exclusions:
	• People with a missing or invalid HIN, date of birth
	• People who were lost to follow-up or whose final diagnosis was unknown

Numerator	Total number of screen-eligible people ages 50 to 74 without breast cancer diagnosis (DCIS or invasive) who had a normal OBSP screening mammogram. • A normal screening mammogram result was defined as an OBSP screening mammogram that was not referred for further testing by the OBSP radiologist
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments, and screen-detected cancer • OCR (Ontario Cancer Registry) - Invasive and ductal carcinon-situ breast cancers • PCCF+ (Postal CodeOM Conversion File Plus) - Residence information
Data Availability & Limitations	• This indicator includes OBSP mammograms only • There is a two-year reporting lag for this indicator, as there is an approximate two-year data lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) in OCR

Methodology Component	Methodology Component Details
Indicator	**Ductal Carcinoma In-Situ (DCIS) detection rate**
Indicator Definition	Number of screen-eligible people ages 50 to 74 with a screen-detected DCIS per 1,000 people screened with an OBSP screening mammogram
Calculations for the Indicator	(Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram with a screen-detected DCIS diagnosis ÷ Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram in the reporting period) × 1000
Denominator	Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram in the reporting period • Average risk people ages 50 to 74 who had an OBSP screening mammogram Exclusions • People with a missing or invalid HIN, date of birth • People who were lost to follow-up or whose final diagnosis was unknown
Numerator	Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram with a screen-detected DCIS diagnosis
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only. • There is a two-year reporting lag for this indicator, as there is a two-year lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) from OCR.

Methodology Component	Methodology Component Details
Indicator	**Invasive breast cancer detection rate**
Indicator Definition	Number of screen-eligible people ages 50 to 74 with a screen-detected invasive breast cancer per 1,000 people screened
Calculations for the Indicator	(Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram with a screen-detected invasive breast cancer diagnosis ÷ Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram in the reporting period) × 1000
Denominator	Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram in the reporting period • Average risk people ages 50 to 74 who had an OBSP screening mammogram Exclusions • People with a missing or invalid HIN, date of birth • People who were lost to follow-up or whose final diagnosis was unknown
Numerator	Total number of screen-eligible people ages 50 to 74 who had an OBSP screening mammogram with a screen-detected invasive breast cancer diagnosis
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only. • There is a two-year reporting lag for this indicator, as there is a two-year lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) from OCR.

Methodology Component	Methodology Component Details
Indicator	**Breast cancer stage distribution**
Indicator Definition	Distribution of breast cancer by stage at diagnosis
Calculations for the Indicator	(Total number of people ages 50 to 74 who had an invasive breast cancer, by stage at diagnosis ÷ Total number of people ages 50 to 74 who had an invasive breast cancer diagnosis) × 100
Denominator	Total number of Ontario people ages 50 to 74 who had an invasive breast cancer diagnosis • Invasive breast cancer was defined as: ICD-O-3 codes C50, a morphology indicative of breast invasive cancer, microscopically confirmed with a pathology report • Reporting was based on the lung cancer diagnosis date Exclusions • People with a missing or invalid HIN, date of birth • People with invasive cancers that have unknown stage or are unstageable.
Numerator	Total number of Ontario people ages 50 to 74 who had invasive breast cancer stratified by stage I, II, III or IV at diagnosis
Data Sources	• OCR (Ontario Cancer Registry) - Invasive breast cancers and cancer stage at diagnosis • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• There is a two-year reporting lag for this indicator, as there is an approximate two-year data lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) from OCR

Methodology Component	Methodology Component Details
Indicator	**Screen-detected breast cancer stage distribution**
Indicator Definition	Distribution of screen-detected breast cancers by stage at diagnosis
Calculations for the Indicator	(Total number of screen-eligible people ages 50 to 74 who had screen-detected invasive breast cancer by stage at diagnosis ÷ Total number of screen-eligible people ages 50 to 74 who had a screen-detected invasive breast cancer) × 100
Denominator	Total number of screen-eligible people ages 50 to 74 who had screen-detected invasive breast cancer • Average risk people ages 50 to 74 who had an OBSP screening mammogram with screen-detected invasive breast cancer • Invasive breast cancer was defined as: ICD-O-3 codes C50, a morphology indicative of breast invasive cancer, microscopically confirmed with a pathology report • Reporting was based on the invasive breast cancer diagnosis date Exclusions • People with a missing or invalid HIN, date of birth • People with invasive cancers that have unknown stage or are unstageable
Numerator	Total number of screen-eligible people ages 50 to 74 who had screen-detected invasive breast cancer stratified by stage I, II, III or IV at diagnosis
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers and cancer stage at diagnosis • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator includes OBSP mammograms only. • There is a two-year reporting lag for this indicator, as there is an approximate two-year data lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) from OCR

High Risk Ontario Breast Screening Program

Methodology Component	Methodology Component Details
Indicator	**People screened within 90 days of confirmation of high risk status (High Risk OBSP)**
Indicator Definition	Percentage of people ages 30 to 69 screened with MRI or ultrasound within 90 days of confirmation of high risk status.
Calculations for the Indicator	(Total number of people ages 30 to 69 who were screened with MRI or ultrasound within 90 days of confirmation of high risk status ÷ Total number of people ages 30 to 69 confirmed to be at high risk) × 100

Denominator	Total number of people ages 30 to 69 confirmed to be at high risk
	
	• People ages 30 to 69 confirmed to be at high risk
	• Age was based on the High Risk OBSP screening date
	• Reporting was based on the high risk confirmation date
	  ○ Confirmation date for people referred by a physician (Category A) was defined as the most recent date between the registration date and the update date.
	  ○ For people referred to genetic assessment (Category B), confirmation date was defined as the most recent date among the registration date, referral date, genetic assessment date, generic assessment entered date, and the update date. Note: only generic assessment entered date and update date before the High Risk OBSP screening date were selected.
	• High Risk OBSP screens within one year of confirmation of high risk status
	
	Exclusions
	• People with a missing or invalid HIN, date of birth
	• People who declined to participate in High Risk OBSP screening or had no screens
	• People with a negative duration (confirmation date after screen date)
	• People with a positive duration but interval greater than 365 days

Numerator	Total number of people ages 30 to 69 screened with MRI or ultrasound within 90 days of confirmation of high risk status
Data sources	• ICMS (Integrated Client Management System) - OBSP screens, demographics, breast assessments and screen-detected cancer • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data availability and limitations	• High Risk OBSP data are available from July 1, 2011 • There is a four-month reporting lag for this indicator. Up to three months are required to allow follow-up of people for screening to occur after confirmation of high-risk status. Another month is required for the data entry of the screening results. • People can be referred to genetic assessment at age 29 but cannot be screened in the High Risk OBSP until age 30 (or 10 weeks short of their 30th birthday). • When a person is referred to the High Risk OBSP more than once in a year, the latest registration date is used

Methodology Component	Methodology Component Details
Indicator	**Retention (High Risk OBSP)**
Indicator Definition	Percentage of High Risk OBSP participants ages 30 to 68 who had a subsequent High Risk OBSP screen within 15 months of a previous High Risk OBSP screen.
Calculations for the Indicator	(Total number of people ages 30 to 68 who had a subsequent High Risk OBSP screen within 15 months of a previous High Risk OBSP screen ÷ Total number of people ages 30 to 68 had a High Risk OBSP screen in the reporting period) × 100

Denominator	Total number of people ages 30 to 68 screened with a High Risk OBSP MRI or ultrasound
	• People ages 30 to 68 at the index date, who were confirmed to be at high risk and had at least a High Risk OBSP MRI or ultrasound
	• Index date was the earliest OBSP mammogram or MRI/ultrasound date within a high risk OBSP screening episode
	• For people who had two high risk OBSP screening episodes within the same reporting period, both screening episodes were counted as people can be rescreened as early as 11 months following the previous screen
	Exclusions:
	• People with missing or invalid HIN, date of birth
	• People who were in decline or deferral OBSP operational status
	• People who died or had a total bilateral mastectomy during the 15-month follow-up period
	  ○ Total bilateral mastectomy was defined as >1 claims associated with the below total mastectomy OHIP fee codes or 1 claim for total mastectomy associated with >1 number of services for the same person
	  ○ Total mastectomy OHIP fee codes: R108A (Simple total mastectomy), R117A (simple total mastectomy with subcutaneous with nipple preservation), E505A (simple total mastectomy with limited axillary node sample), and R109A (Mastectomy- Radical or Modified Radical)
	• People who were not recalled to rescreening by the OBSP site following their index screen

Numerator	Total number of people ages 30 to 68 who had a subsequent High Risk OBSP screen within 15 months of a previous High Risk OBSP screen
Data sources	• ICMS (Integrated Client Management System) - OBSP screens, demographics, breast assessments and screen-detected cancer • OHIP's CHDB (Claims History Database) – Mastectomy claims • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information • ON-Marg Index (Ontario Marginalization Index) – Equity information
Data availability and limitations	• High Risk OBSP data are available from July 1, 2011 • There is a 16-month reporting lag for this indicator as 15 months are required to allow for follow-up of women for the second screening episode to occur and another complete month is required for the data entry of the screening result of the second screening episode into the ICMS

Methodology Component	Methodology Component Details
Indicator	**Abnormal call rate (High Risk OBSP)**
Indicator Definition	Percentage of high risk screened people ages 30 to 69 with an abnormal screen result
Calculations for the Indicator	(Total number of high risk screened people ages 30 to 69 with an abnormal screen result ÷ Total number of people ages 30 to 69 who had a High Risk OBSP screen) × 100
Denominator	Total number of people ages 30 to 69 who had a High Risk OBSP screen • People ages 30 to 69 confirmed to be at high risk who had a High Risk OBSP screen • People screened with at least an MRI (or ultrasound if MRI is contraindicated) • Partial screens where a normal complementary non-OBSP screening test was performed within the previous seven months were included • Each High Risk OBSP screening episode was counted; if a person had multiple High Risk OBSP screening episodes in a given year, all High Risk OBSP screening episodes were included • Age was determined by the earliest screening modality within each High Risk OBSP screening episode (mammogram date or MRI/ultrasound date) Exclusions • People with a missing or invalid HIN, date of birth • Mammogram only screens (i.e., with no previous MRI or subsequent MRI within seven months)
Numerator	Total number of high risk screened people ages 30 to 69 with an abnormal screen result • People ages 30 to 69 who were at high risk and had an abnormal screen result • An abnormal screen result was defined as at least one of the high risk screen tests (mammogram or MRI or ultrasound) referred for further testing by the OBSP radiologist in ICMS
Data sources	• ICMS (Integrated Client Management System) - OBSP screens, demographics, breast assessments and screen-detected cancer • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability & Limitations	• High Risk OBSP data are available from July 1, 2011 • People can be referred to genetic assessment at age 29 but cannot be screened in the High Risk OBSP until age 30 (or 10 weeks short of their 30th birthday) • There are separate screening records for each person screened during the same screening episode (e.g., one mammogram record and a separate MRI record); the seven-month rule is used to determine whether two screening tests belong to the same screening episode • There is at least an 8 month reporting lag for this indicator as the regions/sites have up to and including 1 month to enter the screen result (normal or abnormal) for each screening test within the OBSP high risk screening episode and the two high risk screening tests can be up to 7 months apart

Methodology Component	Methodology Component Details
Indicator	**Positive predictive value for mammography and MRI (High Risk OBSP)**
Indicator Definition	Percentage of high risk screened people ages 30 to 69 with an abnormal screen result who were diagnosed with breast cancer (DCIS or invasive)
Calculations for the indicator	(Total number of high risk screened people ages 30 to 69 with an abnormal screen result in the reporting period, who were diagnosed with a screen-detected breast cancer (DCIS or invasive) ÷ Total number of high risk screened people ages 30 to 69 with an abnormal screen result in the reporting period) × 100
Denominator	Total number of high risk screened people ages 30 to 39 with an abnormal screen result in the reporting period • People ages 30 to 69 confirmed to be at high risk who had an abnormal screen result • An abnormal screen result was defined as at least one of the high risk screen tests (mammogram or MRI or ultrasound) referred for further testing by the OBSP radiologist in ICMS • People screened with at least an MRI (or ultrasound if MRI is contraindicated) • Each abnormal High Risk OBSP screening episode was counted; if a person had multiple abnormal High Risk OBSP screening episodes in a given year, all abnormal OBSP high risk screening episodes were included • Partial screens where a normal complementary non-OBSP screening test was performed within the previous seven months were included • Age was determined by the earliest screening modality within each High Risk OBSP screening episode (mammogram date or MRI/ultrasound date) Exclusions • People with a missing or invalid HIN, date of birth • People who were lost to follow-up or whose final diagnosis was unknown • Mammogram only screens (i.e., with no previous MRI or subsequent MRI within seven months)
Numerator	Total number of high risk screened people ages 30 to 69 with an abnormal screen result who were diagnosed with a screen-detected breast cancer (DCIS or invasive)
Data sources	• ICMS (Integrated Client Management System) - OBSP screens, demographics, breast assessments and screen-detected cancer • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability & Limitations	• High Risk OBSP data are available from July 1, 2011 • People can be referred to genetic assessment at age 29 but cannot be screened in the High Risk OBSP until age 30 (or 10 weeks short of their 30th birthday). • There are separate screening records for each person screened during the same screening episode (e.g., one mammogram record and a separate MRI record); the seven-month rule is used to determine whether two screening tests belong to the same screening episode • There is an eight-month reporting lag for this indicator as regions/sites have up to eight months following the abnormal screen date to enter all of the assessment information and final diagnosis data into the ICMS

Methodology Component	Methodology Component Details
Indicator	**Ductal Carcinoma In-Situ (DCIS) detection rate (High Risk OBSP)**
Indicator Definition	Number of High Risk OBSP participants ages 30 to 69, with a screen-detected DCIS per 1,000 people screened
Calculations for the Indicator	(Total number of High Risk OBSP participants ages 30 to 69 with a screen-detected DCIS diagnosis ÷ Total number of people ages 30 to 69 who had a High Risk OBSP screen in the reporting period) × 1000
Denominator	Total number of people ages 30 to 69 who had a High Risk OBSP screen in the reporting period • People ages 30 to 69 confirmed to be at high risk who had a High Risk OBSP screen • People screened with at least an MRI (or ultrasound if MRI is contraindicated) • Each High Risk OBSP screening episode was counted; if a person had multiple High Risk OBSP screening episodes in a given year, all High Risk OBSP screening episodes were included • Partial screens where a normal complementary non-OBSP screening test was performed within the previous seven months were included • Age was determined by the earliest screening modality within each High Risk OBSP screening episode (mammogram date or MRI/ultrasound date) Exclusions • People with a missing or invalid HIN, date of birth • People who were lost to follow-up or whose final diagnosis was unknown • Mammogram only screens (i.e., with no previous MRI or subsequent MRI within seven months)
Numerator	Total number of High Risk OBSP participants ages 30 to 69 with a screen-detected DCIS diagnosis
Data sources	• ICMS (Integrated Client Management System) - OBSP screens, demographics, breast assessments and screen-detected cancer • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• High Risk OBSP data are available from July 1, 2011 • People can be referred to genetic assessment at age 29 but cannot be screened in the High Risk OBSP until age 30 (or 10 weeks short of their 30th birthday) • There are separate screening records for each person screened during the same screening episode (e.g., one mammogram record and a separate MRI record); the seven-month rule is used to determine whether two screening tests belong to the same screening episode • There is a two-year reporting lag for this indicator, as there is a two-year lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) from OCR

Methodology Component	Methodology Component Details
Indicator	**Invasive breast cancer detection rate (High Risk OBSP)**
Indicator Definition	Number of High Risk OBSP participants ages 30 to 69 with a screen-detected invasive breast cancer per 1,000 people screened
Calculations for the Indicator	(Total number of High Risk OBSP participants ages 30 to 69 with a screen-detected invasive breast cancer ÷ Total number of people ages 30 to 69 who had a High Risk OBSP screen in the reporting period) × 1000
Denominator	Total number of people ages 30 to 69 who had a High Risk OBSP screen in the reporting period • People ages 30 to 69 confirmed to be at high risk who had a High Risk OBSP screen • People screened with at least an MRI (or ultrasound if MRI is contraindicated) • Each High Risk OBSP screening episode was counted; if a person had multiple High Risk OBSP screening episodes in a given year, all High Risk OBSP screening episodes were included • Partial screens where a normal complementary non-OBSP screening test was performed within the previous seven months were included • Age was determined by the earliest screening modality within each High Risk OBSP screening episode (mammogram date or MRI/ultrasound date) Exclusions • People with a missing or invalid HIN, date of birth • People who were lost to follow-up or whose final diagnosis was unknown • Mammogram only screens (i.e., with no previous MRI or subsequent MRI within seven months)
Numerator	Total number of High Risk OBSP participants ages 30 to 69 with a screen-detected invasive breast cancer
Data sources	• ICMS (Integrated Client Management System) - OBSP screens, demographics, breast assessments and screen-detected cancer • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• High Risk OBSP data are available from July 1, 2011 • People can be referred to genetic assessment at age 29 but cannot be screened in the High Risk OBSP until age 30 (or 10 weeks short of their 30th birthday) • There are separate screening records for each person screened during the same screening episode (e.g., one mammogram record and a separate MRI record); the seven-month rule is used to determine whether two screening tests belong to the same screening episode • There is a two-year reporting lag for this indicator, as there is a two-year lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) from OCR

Methodology Component	Methodology Component Details
Indicator	**Screen-detected breast cancer stage distribution (High Risk OBSP)**
Indicator Definition	Distribution of screen-detected breast cancers by stage at diagnosis (High Risk OBSP)
Calculations for the Indicator	(Total number of High Risk OBSP participants ages 30 to 69 who had a screen-detected invasive breast cancer by stage at diagnosis ÷ Total number of High Risk OBSP participants ages 30 to 69 who had a screen-detected invasive breast cancer) × 100
Denominator	Total number of High Risk OBSP participants ages 30 to 69 who had screen-detected invasive breast cancer • People ages 30 to 69 confirmed to be at high risk who had a High Risk OBSP screen • People screened with at least an MRI (or ultrasound if MRI is contraindicated) • Each High Risk OBSP screening episode was counted; if a person had multiple High Risk OBSP screening episodes in a given year, all High Risk OBSP screening episodes were included • Partial screens where a normal complementary non-OBSP screening test was performed within the previous seven months were included • Age was determined by the earliest screening modality within each High Risk OBSP screening episode (mammogram date or MRI/ultrasound date) • Invasive breast cancer was defined as: ICD-O-3 codes C50, a morphology indicative of breast invasive cancer, microscopically confirmed with a pathology report • Reporting was based on the invasive breast cancer diagnosis date Exclusions • People with a missing or invalid HIN, date of birth • People who were lost to follow-up or whose final diagnosis was unknown • People with invasive cancers that have unknown stage or are unstageable • Mammogram only screens (i.e., with no previous MRI or subsequent MRI within seven months)
Numerator	Total number of High Risk OBSP participants ages 30 to 69 who had a screen-detected invasive breast cancer stratified by stage I, II, III or IV at diagnosis
Data Sources	• ICMS (Integrated Client Management System) - OBSP mammograms, demographics, breast assessments and screen-detected cancer • OCR (Ontario Cancer Registry) - Invasive and ductal carcinoma in-situ breast cancers and cancer stage at diagnosis • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• High Risk OBSP data are available from July 1, 2011 • People can be referred to genetic assessment at age 29 but cannot be screened in the High Risk OBSP until age 30 (or 10 weeks short of their 30th birthday). • There are separate screening records for each person screened during the same screening episode (e.g., one mammogram record and a separate MRI record); the seven-month rule is used to determine whether two screening tests belong to the same screening episode • There is a two-year reporting lag for this indicator, as there is an approximate two-year data lag in cancer stage details (tumour size, nodal status, invasive vs. DCIS) from OCR

Ontario Cervical Screening Program

Methodology Component	Methodology Component Details
Indicator	**Cervical screening participation**
Indicator Definition	Age standardized ercentage of Ontario screen-eligible people, ages 21 to 69, who completed at least one cytology test in a 42-month period
Calculations for the Indicator	(Total number of Ontario screen-eligible people, ages 21-69, who have completed at least one cytology test in a 42-month period ÷ Total number of Ontario screen-eligible people, ages 21-69, in the reporting period) × 100
Denominator	Total number of Ontario screen-eligible people, ages 21 to 69, in the reporting period • Ontario screen-eligible people with a cervix, ages 21-69 at the index date • Index date was defined as the midpoint of a reporting period. • The 2011 Canadian population was used as the standard population for calculating age-standardized rates • The RPDB address closest to the index date was used to assign postal code Exclusions • People with a missing or invalid HIN, date of birth, or postal code • People diagnosed with an invasive cervical cancer prior to January 1st of the reporting period; prior diagnosis of cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report • People who died before the end of the reporting period • People who had a colposcopy and/or treatment within 2 years prior to January 1st of the reporting period • Colposcopy and/or treatment were identified through OHIP, using the following fee codes: Colposcopy ○ Z731 - Initial investigation of abnormal cytology of vulva and/or vagina or cervix under colposcopic technique with or without biopsy(ies) and/or endocervical curetting ○ Z787 - Follow-up colposcopy with biopsy(ies) with or without endocervical curetting ○ Z730 - Follow-up colposcopy without biopsy with or without endocervical curetting Treatment ○ Z732 - Cryotherapy ○ Z724 - Electro ○ Z766 - Electrosurgical Excision Procedure (LEEP) ○ S744 - Cervix - cone biopsy - any technique, with or without D&C ○ Z729 - Cryoconization, electroconization or CO2 laser therapy with or without curettage for premalignant lesion (dysplasia or carcinoma in-situ), out-patient procedure

Methodology Component	Methodology Component Details
Denominator	• People with a hysterectomy prior to January 1st of the reporting period • People with a hysterectomy were identified through OHIP, using the following fee codes: ○ E862A – When hysterectomy is performed laparoscopically, or with laparoscopic assistance ○ P042A – Obstetrics – labour – delivery – caesarean section including hysterectomy ○ Q140A – Exclusion code for enrolled female patients aged 35-70 with hysterectomy ○ S710A – Hysterectomy - with or without adnexa (unless otherwise specified) – with omentectomy for malignancy ○ S727A – Ovarian debulking for stage 2C, 3B or 4 ovarian cancer and may include hysterectomy ○ S757A – Hysterectomy – with or without adnexa (unless otherwise specified) – abdominal – total or subtotal ○ S758A – Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior and posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered ○ S759A - Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior or posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered ○ S762A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical trachelectomy - excluding node dissection ○ S763A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical (Wertheim or Schauta) - includes node dissection ○ S765A – Amputation of cervix ○ S766A- Cervix uteri - Exc - cervical stump – abdominal ○ S767A- Cervix uteri - exc - Cervical stump – vaginal ○ S816A - Hysterectomy - with or without adnexa (unless otherwise specified) - vaginal
Numerator	Total number of Ontario screen-eligible people, ages 21 to 69, who have completed at least one cytology test in a 42-month period • Identifying cytology tests: Cytology tests were identified through CytoBase Cytology tests were also identified using fee codes through OHIP: ○ E430A: add-on to a003, a004, a005, a006 when pap performed outside hospital ○ G365A: Periodic-Pap smear ○ E431A: When Papanicolaou smear is performed outside of hospital, to G394. ○ G394A: Additional for follow-up of abnormal or inadequate smears ○ L713A: Lab.med.-anat pathology,hist,cyt-cytol-gynaecological specimen ○ L733A: Cervicovaginal specimen (monolayer cell methodology) ○ L812A: Cervical vaginal specimens including all types of cellular abnormality, assessment of flora, and/or cytohormonal evaluation ○ Q678A: Gynaecology – pap smear – periodic – nurse practitioners • All cytology tests in CytoBase were counted, including those with inadequate specimens • Each person was counted once regardless of the number of cytology tests performed in a 42-month time frame

Methodology Component	Methodology Component Details
Data Sources	• CytoBase - Cytology tests • OHIP's CHDB (Claims History Database) – Cytology tests, colposcopy procedures, treatment procedure claims, and hysterectomy claims • OCR (Ontario Cancer Registry) - Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • Statistics Canada: 2011 Canadian population values • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information • ON-Marg Index (Ontario Marginalization Index) - Equity information
Data Availability and Limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario. Cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase and/or OHIP was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

Methodology Component	Methodology Component Details
Indicator	**Cervical screening retention**
Indicator Definition	Percentage of Ontario screen-eligible people, ages 21 to 66, who had a subsequent cytology test within 42 months of a normal cytology test result
Calculations for the Indicator	(Total number of Ontario screen-eligible people, ages 21-66, who had a subsequent cytology test within 42 months of a previous normal cytology test result ÷ Total number of Ontario screen-eligible people, ages 21-66, who had a normal cytology test in a year) × 100

Denominator	Total number of Ontario screen-eligible people, ages 21 to 66, who had a normal cytology test in a year
	
	• Ontario screen-eligible people with a cervix, 21-66 years old at the index date, who had a normal cytology test result in a year
	• Index date was defined as the most recent normal cytology test date per person, by date of specimen collection in CytoBase for each year
	• The RPDB address closest to the index date was used to assign postal code
	• Normal cytology tests were defined through CytoBase (Bethesda codes 4.1, 4.2, 4.3.1, 4.3.2, 4.3 for version 2)
	• Everyone was counted once in a given year regardless of the number of cytology tests performed
	
	Exclusions:
	• People with a missing or invalid HIN, date of birth, or postal code
	• People diagnosed with an invasive cervical cancer before the subsequent cytology date or during the follow-up interval if there was no subsequent cytology test.
	• Diagnosis of cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• People with a hysterectomy before the subsequent cytology date or during the follow-up interval if there was no subsequent cytology test
	• People with a hysterectomy were identified through OHIP, using the following fee codes:
	  ○ E862A – When hysterectomy is performed laparoscopically, or with laparoscopic assistance
	  ○ P042A – Obstetrics – labour – delivery – caesarean section including hysterectomy
	  ○ Q140A – Exclusion code for enrolled female patients aged 35-70 with hysterectomy
	  ○ S710A – Hysterectomy - with or without adnexa (unless otherwise specified) – with omentectomy for malignancy
	  ○ S727A – Ovarian debulking for stage 2C, 3B or 4 ovarian cancer and may include hysterectomy
	  ○ S757A – Hysterectomy – with or without adnexa (unless otherwise specified) – abdominal – total or subtotal
	  ○ S758A – Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior and posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered
	  ○ S759A - Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior or posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered

Methodology Component	Methodology Component Details
Denominator	○ S762A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical trachelectomy - excluding node dissection ○ S763A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical (Wertheim or Schauta) - includes node dissection ○ S765A – Amputation of cervix ○ S766A- Cervix uteri - exc - cervical stump – abdominal ○ S767A- Cervix uteri - exc - cervical stump – vaginal S816A - Hysterectomy - with or without adnexa (unless otherwise specified) - vaginal
Numerator	Total number of Ontario screen-eligible people, ages 21 to 66, who had a subsequent cytology test within 42 months of a previous normal cytology test result • Subsequent cytology tests were identified through CytoBase • All tests were considered, regardless of test results
Data Sources	• CytoBase - Cytology tests • OHIP CHDB (Claims History Database) – Hysterectomy claims • OCR (Ontario Cancer Registry) - Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario. Cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase and/or OHIP was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes • Some people who had a scheduled cytology test (follow-up) may be included in this cohort

Methodology Component	Methodology Component Details
Indicator	**Abnormal cytology test result distribution**
Indicator Definition	Distribution of abnormal cytology results by low- and high- grade results
Calculations for the indicator	(Total number of Ontario screen-eligible people, ages 21-69, with an abnormal cytology result, stratified by low- and high-grade results ÷ Total number of people, ages 21-69, who had an abnormal cytology result in the reporting period) × 100

Denominator	Total number of Ontario screen-eligible people, ages 21 to 69, who had an abnormal result in the reporting period
	
	• People with a cervix, ages 21-69 at the index date, who had a high-grade or low-grade cytology result in CytoBase
	• Index date was defined as the date of specimen collection in CytoBase
	• If a person had multiple cytology tests in a year, the date of the most severe test was taken as the index date
	• Each person was counted once in each year regardless of the number of tests performed
	• The RPDB address closest to the index date was used to assign the postal code
	
	Exclusions
	• People with a missing or invalid HIN, date of birth or postal code
	• People diagnosed with an invasive cervical cancer prior to the index date; diagnosis of cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• People with an unsatisfactory cytology test result or normal cytology result, or a non-cervical-related result
	• People with a hysterectomy before the index date
	• People with a hysterectomy were identified through CHDB using the following fee codes:
	  ○ E862A – When hysterectomy is performed laparoscopically or with laparoscopic assistance
	  ○ P042A – Obstetrics – labour – delivery – caesarean section including hysterectomy
	  ○ Q140A – Exclusion code for enrolled female patients aged 35-70 with hysterectomy
	  ○ S710A – Hysterectomy - with or without adnexa (unless otherwise specified) – with omentectomy for malignancy
	  ○ S727A – Ovarian debulking for stage 2C, 3B or 4 ovarian cancer and may include hysterectomy
	  ○ S757A – Hysterectomy – with or without adnexa (unless otherwise specified) – abdominal – total or subtotal
	  ○ S758A – Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior and posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered

Methodology Component	Methodology Component Details
Denominator	○ S759A - Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior or posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered ○ S762A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical trachelectomy - excluding node dissection ○ S763A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical (Wertheim or Schauta) - includes node dissection ○ S765A – Amputation of cervix ○ S766A- Cervix uteri - Exc - cervical stump – abdominal ○ S767A- Cervix uteri - exc - Cervical stump – vaginal ○ S816A - Hysterectomy - with or without adnexa (unless otherwise specified) – vaginal
Numerator	Total number of Ontario screen-eligible people, ages 21 to 69, with an abnormal cytology result, stratified by low- and high-grade results • Low-grade and high-grade abnormal cytology results were defined using the Bethesda codes from CytoBase: ○ Low-grade abnormal - ASC: All 4.4 except 4.4.5 ○ Low-grade abnormal - LSIL: 4.7 ○ High-grade abnormal - ASC-H: 4.4.5 ○ High-grade abnormal - AGC: 4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.7, 4.5.9,4.5.10,4.5.11,4.5.12,4.5.13 ○ High-grade abnormal - Adeno in-situ: 4.5.8, 4.6 ○ High-grade abnormal - HSIL: 4.8
Data Sources	• CytoBase – Cytology tests • OHIP's CHDB (Claims History Database) – Hysterectomy claims • OCR (Ontario Cancer Registry) - Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data availability & limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario. Cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase and/or OHIP was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

Methodology Component	Methodology Component Details
Indicator	**Cervical high grade cytology test with no follow up within six months**
Indicator Definition	Percentage of Ontario screen-eligible people, ages 21 to 69, with a high-grade cervical abnormality on a cytology test, who did not undergo colposcopy or definitive treatment within 6 months of the high-grade cytology test
Calculations for the Indicator	(Total number of Ontario screen-eligible people, ages 21-69, with a high-grade cervical abnormality on a cytology test, who did not undergo colposcopy or definitive treatment within 6 months of the high-grade cytology test ÷ Total number of Ontario screen-eligible people, ages 21-69 with a high-grade cervical abnormality on a cytology test in a year) × 100

Denominator	Total number of Ontario Screen-eligible people, ages 21 to 69 at the index date, who had a high-grade cervical abnormality on a cytology test
	
	• Index date was defined as the date of the most recent high-grade cervical abnormality per person by result report date in CytoBase in each calendar year
	• High-grade cervical dysplasia was defined as (Version 2): ASC-H (4.4.5); AGC (4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.7, 4.5.9, 4.5.10, 4.5.11, 4.5.12, 4.5.13); Adeno in-situ(4.5.8, 4.6); HSIL (4.8).
	• Each person was counted once in year regardless of the number of tests performed
	• The RPDB address closest to the index date was used to assign postal code
	
	Exclusions:
	• People with a missing or invalid HIN, date of birth, or postal code
	• People who died during the follow-up period
	• People diagnosed with an invasive cervical cancer before the index date; prior diagnosis of cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• If a person had a colposcopy within +/- 7 days of the cytology test, the cytology test was assumed to be completed concurrently with colposcopy and not a cytology test that was followed up by colposcopy. This cytology test should not be defined as an index cytology test and therefore was removed.
	• People with a hysterectomy before the index cytology date
	• People with a hysterectomy were identified through OHIP, using the following fee codes:
	  ○ E862A – When hysterectomy is performed laparoscopically, or with laparoscopic assistance
	  ○ P042A – Obstetrics – labour – delivery – caesarean section including hysterectomy
	  ○ Q140A – Exclusion code for enrolled female patients aged 35-70 with hysterectomy
	  ○ S710A – Hysterectomy - with or without adnexa (unless otherwise specified) – with omentectomy for malignancy
	  ○ S727A – Ovarian debulking for stage 2C, 3B or 4 ovarian cancer and may include hysterectomy
	  ○ S757A – Hysterectomy – with or without adnexa (unless otherwise specified) – abdominal – total or subtotal
	  ○ S758A – Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior and posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered

Methodology Component	Methodology Component Details
Denominator	○ S759A - Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior or posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered ○ S762A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical trachelectomy - excluding node dissection ○ S763A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical (Wertheim or Schauta) - includes node dissection ○ S765A – Amputation of cervix ○ S766A- Cervix uteri - Exc - cervical stump – abdominal ○ S767A- Cervix uteri - exc - Cervical stump – vaginal ○ S816A - Hysterectomy - with or without adnexa (unless otherwise specified) – vaginal
Numerator	Total number of people with a high-grade cervical abnormality on cytology test who did not undergo colposcopy or definitive treatment within six months of the high-grade abnormal cytology test • Colposcopy was defined using the following fee codes in OHIP: ○ Z731 - Initial investigation of abnormal cytology of vulva and/or vagina or cervix under colposcopic technique with or without biopsy(ies) and/or endocervical curetting ○ Z787 - Follow-up colposcopy with biopsy(ies) with or without endocervical curetting ○ Z730 – Follow-up colposcopy without biopsy with or without endocervical curetting • If no record was found for a subsequent colposcopy after the high-grade cervical abnormality cytology test, other definitive procedures were included; these procedures were identified through OHIP claims as: ○ Z732-Cryotherapy ○ Z724-Electro ○ Z766-Electrosurgical Excision Procedure (LEEP) ○ S744-Cervix - cone biopsy - any technique, with or without D&C ○ Z729-Cryoconization, electroconization or CO2 laser therapy with or without curettage for premalignant lesion (dysplasia or carcinoma in-situ), out-patient procedure • If no record was found for a colposcopy or one of the procedures listed above, the person was still assumed to be followed up provided a hysterectomy was performed within six months following the high-grade abnormal cytology test • If a person had multiple colposcopies or multiple procedures, the earliest colposcopy or procedure was selected
Data Sources	• CytoBase - Cytology tests • OHIP CHDB (Claims History Database) – Previous cytology tests, colposcopies, definitive procedure claims, hysterectomy claims • OCR (Ontario Cancer Registry) - Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information • ON-Marg Index (Ontario Marginalization Index) - Equity information

Methodology Component	Methodology Component Details
Data Availability and Limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario; cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

Methodology Component	Methodology Component Details
Indicator	**Cytology test positive predictive value**
Indicator Definition	Percentage of Ontario screen-eligible people, ages 21 to 69, with an abnormal cytology test result who were diagnosed with pre-cancer or invasive cervical cancer after a follow-up colposcopy or a surgical procedure involving the cervix
Calculations for the Indicator	(Total number of people with an abnormal cytology test, who were diagnosed with pre-cancer or invasive cervical cancer after a follow up colposcopy or a surgical procedure involving the cervix ÷ Total number of people who had an abnormal cytology test followed by a colposcopy or a surgical procedure in the reporting period) × 100

Denominator	Total number of screen-eligible Ontario people, ages 21 to 69, who had an abnormal cytology test result followed by a colposcopy or a surgical procedure involving the cervix within 6 months of the abnormal cytology test.
	
	• People with a cervix, ages 21-69, who had an abnormal cytology test result followed by colposcopy or surgical procedure involving the cervix within 6 months of the abnormal cytology test
	• An abnormal cytology test was defined using the Bethesda codes in CytoBase. Abnormal cytology tests include cytology tests with results of ASC, ASC-H, AGC, Adeno in-situ, LSIL, HSIL, Carcinoma, Squamous cell carcinoma, Adenocarcinoma, and other malignancy.
	• Abnormal cytology test was followed by a colposcopy or a cervical surgical procedure such as: cervical biopsy, endocervical biopsy, LEEP, cone biopsy or hysterectomy within 6 months of the abnormal cytology test
	• Colposcopy was defined using the following fee codes in OHIP:
	  ○ Z731 - Initial investigation of abnormal cytology of vulva and/or vagina or cervix under colposcopic technique with or without biopsy(ies) and/or endocervical curetting
	  ○ Z787 - Follow-up colposcopy with biopsy(ies) with or without endocervical curetting
	  ○ Z730 – Follow-up colposcopy without biopsy with or without endocervical curetting
	• Cervical surgical procedures were identified using the following fee codes in OHIP:
	  ○ Z732: Cryotherapy
	  ○ Z724: Electro
	  ○ Z766: Electrosurgical Excision Procedure (LEEP)
	  ○ S744: Cervix - cone biopsy - any technique, with or without D&C
	  ○ Z729: Cryoconization, electroconization or CO2 laser therapy with or without curettage for premalignant lesion (dysplasia or carcinoma in situ), out-patient procedure
	
	Exclusions
	• People with a missing or invalid HIN, date of birth, or postal code
	• People diagnosed with an invasive cervical cancer before the cytology test date; diagnosis of cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• People with a hysterectomy before the cytology test date

Methodology Component	Methodology Component Details

Denominator	• People with a hysterectomy were identified through OHIP, using the following fee codes:
	  ○ E862A – When hysterectomy is performed laparoscopically, or with laparoscopic assistance
	  ○ P042A – Obstetrics – labour – delivery – caesarean section including hysterectomy
	  ○ Q140A – Exclusion code for enrolled female patients aged 35-70 with hysterectomy
	  ○ S710A – Hysterectomy - with or without adnexa (unless otherwise specified) – with omentectomy for malignancy
	  ○ S727A – Ovarian debulking for stage 2C, 3B or 4 ovarian cancer and may include hysterectomy
	  ○ S757A – Hysterectomy – with or without adnexa (unless otherwise specified) – abdominal – total or subtotal
	  ○ S758A – Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior and posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered
	  ○ S759A - Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior or posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered
	  ○ S762A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical trachelectomy - excluding node dissection
	  ○ S763A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical (Wertheim or Schauta) - includes node dissection
	  ○ S765A – Amputation of cervix
	  ○ S766A- Cervix uteri - Exc - cervical stump – abdominal
	  ○ S767A- Cervix uteri - exc - Cervical stump – vaginal
	  ○ S816A - Hysterectomy - with or without adnexa (unless otherwise specified) – vaginal
	• People with normal or unsatisfactory cervical cytology test results
	• People with endometrial or other abnormalities that are not indicative of cervical abnormalities

Numerator	Total number of screen-eligible people with an abnormal cytology test result, ages 21 to 69, who were diagnosed with pre-cancer or invasive cervical cancer after a follow up colposcopy or a surgical procedure involving the cervix
	
	• People with invasive cervical cancer
	  ○ Defined as ICD-O-3 code C53 with a behaviour code=3, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• People with pre-cancer
	  ○ Defined as ICD-O-3 code C53 with a behaviour code=2 and NAACCR_MOC_CD=1 (Histology, Autopsy, Pathology, Biopsy)
	• Pre-cancers or invasive cervical cancers were counted if the date of pre-cancer or cancer diagnosis in OCR occurred between 7 days before and up to 3 months after colposcopy or within ± 7 days of the surgical procedure

Methodology Component	Methodology Component Details
Data Sources	• CytoBase – Cytology tests • OHIP's CHDB (Claims History Database) – Colposcopy and surgical procedures involving the cervix • OCR (Ontario Cancer Registry) - Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability & Limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario. Cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

Methodology Component	Methodology Component Details
Indicator	**Cervical screening history in invasive cervical cancer**
Indicator Definition	Percentage of Ontario screen-eligible people, age 21 and older, who were diagnosed with invasive cervical cancer and had a history of cervical cancer screening
Calculation for the Indicator	(Total number of Ontario people, ages 21 and over, with invasive cervical cancer who had a history of cervical screening within a specific timeframe ÷ Total number of Ontario people ages 21 and over, diagnosed with invasive cervical cancer in the reporting period) × 100
Denominator	Total number of Ontario people, age 21 and over, diagnosed with invasive cervical cancer in the reporting period • Diagnosis of cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report • The RPDB address closest to the index date was used to assign the postal code Exclusions • People with a missing or invalid HIN, date of birth or postal code
Numerator	Total number of people with invasive cervical cancer who had a history of cervical screening within a specific timeframe • An individual's cervical screening history was assigned to one of the following mutually exclusive categories based on their most recent screening activity over the course of the observation period: ○ >2 to 3 years ○ >3 years to 5 years ○ >5 years to 10 years ○ No previous cytology test within 10 years • Identifying cytology tests: Cytology tests were identified through CytoBase Cytology tests were also identified using fee codes through OHIP: ○ E430A: add-on to a003, a004, a005, a006 when pap performed outside hospital
Numerator	○ G365A: Periodic-pap smear ○ E431A: When Papanicolaou smear is performed outside of hospital, to G394. ○ G394A: Additional for follow-up of abnormal or inadequate smears ○ L713A: Lab.med.-anat Pap ○ ology,hist,cyt-cytol-gynaecological specimen ○ L733A: Cervicovaginal specimen (monolayer cell methodology) ○ L812A: Cervical vaginal specimens including all types of cellular abnormality, assessment of flora, and/or cytohormonal evaluation ○ Q678A: Gynaecology – pap smear – periodic – nurse practitioners • All cytology tests in CytoBase were counted, including those with inadequate specimens Exclusions Cytology tests completed within 2 years prior to the cancer diagnosis date were excluded based on the assumption that these cytology tests may have been done for diagnostic purposes

Methodology Component	Methodology Component Details
Data Sources	• CytoBase – Cytology tests • OHIP's CHDB (Claims History Database) – Cytology tests claims • OCR (Ontario Cancer Registry) - Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• Cytology test results are available in CytoBase only • It is difficult to determine whether a cytology test in CytoBase and/or OHIP was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

Methodology Component	Methodology Component Details
Indicator	**Cervical cancer and pre-cancer detection rate**
Indicator Definition	Number of Ontario screen-eligible people, ages 21 to 69, with a screen-detected pre-cancer or invasive cervical cancer per 1,000 screened using a cytology test
Calculations for the Indicator	(Total number of Ontario screen-eligible people, 21-69 years old, with a screen-detected invasive cervical cancer or pre-cancer ÷ Total number of Ontario screen-eligible people, 21-69 years old, screened with a cytology test in the reporting period) × 1,000

Denominator	Total number of Ontario screen-eligible people, ages 21 to 69, screened with a cytology test in the reporting period
	
	• People with a cervix, ages 21-69 at the index date
	• Index date was defined as the date of specimen collection in CytoBase
	• Each person was counted once in a given year regardless of the number of tests performed
	• If a person had multiple tests in a given year, the specimen date of the most severe test was chosen as the index date
	
	Exclusions
	
	• People with a missing or invalid HIN, date of birth, postal code
	• People diagnosed with an invasive cervical cancer before the index date; diagnosis of cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• People with a hysterectomy before the index cytology date
	• People with a hysterectomy were identified through OHIP, using the following fee codes:
	  ○ E862A – When hysterectomy is performed laparoscopically, or with laparoscopic assistance
	  ○ P042A – Obstetrics – labour – delivery – caesarean section including hysterectomy
	  ○ Q140A – Exclusion code for enrolled female patients aged 35-70 with hysterectomy
	  ○ S710A – Hysterectomy - with or without adnexa (unless otherwise specified) – with omentectomy for malignancy
	  ○ S727A – Ovarian debulking for stage 2C, 3B or 4 ovarian cancer and may include hysterectomy
	  ○ S757A – Hysterectomy – with or without adnexa (unless otherwise specified) – abdominal – total or subtotal
	  ○ S758A – Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior and posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered
	  ○ S759A - Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior or posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered
	  ○ S762A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical trachelectomy - excluding node dissection
	  ○ S763A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical (Wertheim or Schauta) - includes node dissection

Methodology Component	Methodology Component Details
Denominator	○ S765A – Amputation of cervix ○ S766A- Cervix uteri - Exc - cervical stump – abdominal ○ S767A- Cervix uteri - exc - Cervical stump – vaginal ○ S816A - Hysterectomy - with or without adnexa (unless otherwise specified) – vaginal • People with unsatisfactory cervical cytology test results • People with endometrial or other abnormalities that are not indicative of cervical abnormalities • If a person had a colposcopy within +/- 7 days of the cytology test, the cytology test was assumed to be completed concurrently with colposcopy and not a cytology test that was followed up by colposcopy. This cytology test should not be defined as an index cytology test and therefore was removed.
Numerator	Total number of Ontario screen-eligible people with an abnormal cytology test result, ages 21 to 69, who were diagnosed with pre-cancer or invasive cervical cancer after a follow up colposcopy or a surgical procedure involving the cervix • People with invasive cervical cancer ○ Defined as ICD-O-3 code C53 with a behaviour code=3 • People with pre-cancer ○ Defined as ICD-O-3 code C53 with a behaviour code=2 and NAACCR_MOC_CD=1 (Histology, Autopsy, Pathology, Biopsy) • Pre-cancers or invasive cervical cancers were counted if ○ Abnormal cytology test was followed by a colposcopy or a cervical surgical procedure such as LEEP, cone biopsy or hysterectomy within 6 months ○ Date of pre-cancer or cancer diagnosis in OCR occurred between 7 days before and up to 3 months after colposcopy or within ± 7 days of the surgical procedure ○ An abnormal cytology test was defined using the Bethesda codes from CytoBase. Abnormal cytology tests include cytology tests with results of ASC, ASC-H, AGC, Adeno in-situ, LSIL, HSIL, Carcinoma, Squamous cell carcinoma, Adenocarcinoma, and other malignancy. • Colposcopy was defined using the following fee codes in OHIP: ○ Z731 - Initial investigation of abnormal cytology of vulva and/or vagina or cervix under colposcopic technique with or without biopsy(ies) and/or endocervical curetting ○ Z787 - Follow-up colposcopy with biopsy(ies) with or without endocervical curetting ○ Z730 – Follow-up colposcopy without biopsy with or without endocervical curetting • Cervical surgical procedures were identified using the following fee codes in OHIP: ○ Z732: Cryotherapy ○ Z724: Electro ○ Z766: Electrosurgical Excision Procedure (LEEP) ○ S744: Cervix - cone biopsy - any technique, with or without D&C ○ Z729: Cryoconization, electroconization or CO2 laser therapy with or without curettage for premalignant lesion (dysplasia or carcinoma in situ), out-patient procedure

Methodology Component	Methodology Component Details
Data Sources	• CytoBase - Cytology tests • OHIP's CHDB (Claims History Database) – Cytology tests, colposcopies, definitive procedure claims, hysterectomy claims • OCR (Ontario Cancer Registry) - Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal CodeOM Conversion File Plus) - Residence information
Data Availability and Limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario; Cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase and/or OHIP was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

Methodology Component	Methodology Component Details
Indicator	**High grade to colposcopy wait time**
Indicator Definition	Median and 90th percentile wait time in days from high-grade cytology test to colposcopy
Calculations for the indicator	Wait time in days = Date of colposcopy − Date of high-grade cervical cytology test Indicator was reported as the median and 90th percentile of the wait time in days

Cohort	Total number of Ontario Screen-eligible people, ages 21 to 69, with a high-grade cervical cytology test who underwent colposcopy within one year of the high-grade cytology test
	
	• People with a cervix, ages 21–69, who had a high-grade cytology test at the index date
	• Index date was defined as the date of the high-grade cervical abnormality per person by date of specimen collection in CytoBase. If a person had more than one high grade cytology test in a year, the first one was counted.
	• Colposcopy was defined using the following fee codes in OHIP:
	  ○ Z731 - Initial investigation of abnormal cytology of vulva and/or vagina or cervix under colposcopic technique with or without biopsy(ies) and/or endocervical curetting
	  ○ Z787 - Follow-up colposcopy with biopsy(ies) with or without endocervical curetting
	  ○ Z730 – Follow-up colposcopy without biopsy with or without endocervical curetting
	• All high-grade cervical cytology tests were included, such as ASC-H, AGC, Adeno in-situ, HSIL, Adenocarcinoma, Squamous cell carcinoma, and other cervical malignancies.
	• Each person was counted once within the reporting period regardless of the number of tests performed
	• Reporting is based on the colposcopy date.
	
	Exclusions:
	• People with a missing or invalid HIN, date of birth, or postal code
	• People diagnosed with an invasive cervical cancer prior to the index date; diagnosis of cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• People with a hysterectomy prior to the index date
	• People with a hysterectomy were identified through OHIP, using the following fee codes:
	  ○ E862A – When hysterectomy is performed laparoscopically, or with laparoscopic assistance
	  ○ P042A – Obstetrics – labour – delivery – caesarean section including hysterectomy
	  ○ Q140A – Exclusion code for enrolled female patients aged 35-70 with hysterectomy
	  ○ S710A – Hysterectomy - with or without adnexa (unless otherwise specified) – with omentectomy for malignancy
	  ○ S727A – Ovarian debulking for stage 2C, 3B or 4 ovarian cancer and may include hysterectomy
	  ○ S757A – Hysterectomy – with or without adnexa (unless otherwise specified) – abdominal – total or subtotal

Methodology Component	Methodology Component Details
Cohort	○ S758A – Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior and posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered ○ S759A - Hysterectomy - with or without adnexa (unless otherwise specified) – with anterior or posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered ○ S762A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical trachelectomy - excluding node dissection ○ S763A - Hysterectomy - with or without adnexa (unless otherwise specified) – radical (Wertheim or Schauta) - includes node dissection ○ S765A – Amputation of cervix ○ S766A- Cervix uteri - Exc - cervical stump – abdominal ○ S767A- Cervix uteri - exc - Cervical stump – vaginal ○ S816A - Hysterectomy - with or without adnexa (unless otherwise specified) – vaginal • If a person had a cytology test within 7 days prior to her colposcopy, the cytology test was assumed to be linked to the colposcopy and not a cause of the colposcopy and was removed People with no follow up colposcopy within one year of the high-grade cytology test
Data sources	• CytoBase – Cytology tests • OHIP's CHDB (Claims History Database) – Cytology tests, colposcopies, definitive procedure claims, hysterectomy claims • OCR (Ontario Cancer Registry) – Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal CodeOM Conversion File Plus) – Residence information
Data availability and limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario. Cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

Methodology Component	Methodology Component Details
Indicator	**Screen-detected cervical cancer stage distribution**
Indicator Definition	Distribution of screen-detected cervical cancer by stage at diagnosis
Calculations for the Indicator	(Total number of screen-eligible people, ages 21 to 69, who had screen-detected cervical cancer by stage at diagnosis ÷ Total number of screen-eligible people, ages 21 to 69, who had screen-detected cervical cancer) × 100

Denominator	Total number of Ontario screen-eligible people, ages 21 to 69, who had screen-detected invasive cervical cancer
	
	• Invasive cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• Index (reporting) date was defined as the cancer diagnosis date
	• Cervical cancer was defined as "screen-detected" if cancer was detected as a result of an abnormal cytology test.
	  ○ An abnormal cytology test was defined using the Bethesda codes in CytoBase. Abnormal cytology tests include cytology tests with results of ASC, ASC-H, AGC, Adeno in-situ, LSIL, HSIL, Carcinoma, Squamous cell carcinoma, Adenocarcinoma, and other malignancy
	  ○ Abnormal cytology test was followed by a colposcopy or a cervical surgical procedure such as LEEP, cone biopsy or hysterectomy within 6 months
	  ○ Date of cancer diagnosis in OCR occurred between 7 days before and up to 3 months after colposcopy or within ± 7 days of the surgical procedure
	• Colposcopy was defined using the following fee codes in OHIP:
	  ○ Z731 – Initial investigation of abnormal cytology of vulva and/or vagina or cervix under colposcopic technique with or without biopsy(ies) and/or endocervical curetting
	  ○ Z787 – Follow-up colposcopy with biopsy(ies) with or without endocervical curetting
	  ○ Z730 – Follow-up colposcopy without biopsy with or without endocervical curetting
	• Cervical surgical procedures were identified using the following fee codes in OHIP:
	  ○ Z732 – Cryotherapy
	  ○ Z724 – Electro
	  ○ Z766 – Electrosurgical Excision Procedure (LEEP)
	  ○ S744 – Cervix - cone biopsy - any technique, with or without D&C
	  ○ Z729 – Cryoconization, electroconization or CO2 laser therapy with or without curettage for premalignant lesion (dysplasia or carcinoma in situ), out-patient procedure
	
	Exclusions:
	• People with invasive cancers that have unknown stage or are unstageable
	• Individuals with a missing or invalid HIN, date of birth, or postal code
	• Individuals with a previous invasive cervical cancer before the cytology test date; prior diagnosis of invasive cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report
	• Individuals with a hysterectomy before the cytology test date; hysterectomy was identified through OHIP using the following fee codes:

Methodology Component	Methodology Component Details
Denominator	○ E862A – When hysterectomy is performed laparoscopically, or with laparoscopic assistance ○ P042A – Obstetrics – labour – delivery – caesarean section including hysterectomy ○ Q140A – Exclusion code for enrolled female patients aged 35-70 with hysterectomy ○ S710A – Hysterectomy - with or without adnexa (unless otherwise specified) – with omentectomy for malignancy ○ S727A – Ovarian debulking for stage 2C, 3B or 4 ovarian cancer and may include hysterectomy ○ S757A – Hysterectomy – with or without adnexa (unless otherwise specified) – abdominal – total or subtotal ○ S758A – Hysterectomy – with or without adnexa (unless otherwise specified) – with anterior and posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered ○ S759A – Hysterectomy – with or without adnexa (unless otherwise specified) – with anterior or posterior vaginal repair and including enterocoele and/or vault prolapse repair when rendered ○ S762A – Hysterectomy – with or without adnexa (unless otherwise specified) – radical trachelectomy - excluding node dissection ○ S763A - Hysterectomy – with or without adnexa (unless otherwise specified) – radical (Wertheim or Schauta) – includes node dissection ○ S765A – Amputation of cervix ○ S816A – Hysterectomy – with or without adnexa (unless otherwise specified) – vaginal • Individuals with a colposcopy within 7 days after the cytology test. A cytology test followed by a colposcopy within 7 days was assumed to be completed concurrently with the colposcopy and not a cytology test that was followed up by the colposcopy.
Numerator	Total number of screen-eligible people, ages 21 to 69, who had screen-detected invasive cervical cancer stratified by stage I, II, III or IV at diagnosis • Stage I cervical cancer was further classified into subcategories: Stage 1A1, 1A2, 1A not sub-staged, 1B, or stage 1 not sub-staged
Data Sources	• CytoBase – Cytology tests • OHIP's CHDB (Claims History Database) – Cytology tests, colposcopies, definitive procedure claims, and hysterectomy claims • OCR (Ontario Cancer Registry) – Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) – Residence information
Data Availability and Limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario. Cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase and/or OHIP was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

Methodology Component	Methodology Component Details
Indicator	**All cervical cancer stage distribution**
Indicator Definition	Distribution of cervical cancer by stage at diagnosis
Calculations for the Indicator	(Total number of people, ages 21-69, who had cervical cancer, by stage at diagnosis ÷ Total number of people, ages 21- 69, who had cervical cancer) × 100
Denominator	Total number of Ontario people, ages 21 to 69, who had invasive cervical cancer • Invasive cervical cancer was defined as: ICD-O-3 codes C53, a morphology indicative of cervical cancer, microscopically confirmed with a pathology report • Index (reporting) date was defined as the cancer diagnosis date Exclusions: • Individuals with a missing or invalid HIN, date of birth, or postal code • People with invasive cancers that have unknown stage or are unstageable
Numerator	Total number of Ontario people, ages 21 to 69, who had invasive cervical cancer stratified by stage I, II, III or IV at diagnosis • Stage I cervical cancer was further classified into subcategories: Stage 1A1, 1A2, 1A not sub-staged, 1B, or stage 1 not sub-staged
Data Sources	• CytoBase – Cytology tests • OCR (Ontario Cancer Registry) – Resolved invasive cervical cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) – Residence information
Data Availability and Limitations	• Cytology test results are available in CytoBase only • CytoBase includes only cytology tests analyzed in community-based laboratories in Ontario. Cytology tests analyzed in Ontario hospitals and Community Health Centres are not captured in CytoBase • It is difficult to determine whether a cytology test in CytoBase and/or OHIP was done for screening or diagnostic purposes, and therefore, some cytology tests included in these analyses may have been performed for diagnostic purposes

ColonCancerCheck

Methodology Component	Methodology Component Details
Indicator	**Overdue for colorectal cancer screening**
Indicator Definition	Age standardized percentage of Ontario screen-eligible individuals, ages 50 to 74, who were overdue for colorectal cancer screening
Calculations for the Indicator	(Total number of Ontario screen-eligible individuals, 50–74 years old, who were overdue for colorectal screening ÷ Total number of Ontario screen-eligible individuals, 50–74 years old in the reporting period) × 100
Denominator	Total number of Ontario screen-eligible individuals, 50–74 years old in each calendar year Inclusions: • Ontario residents ages 50–74 at the index date • Index date was defined as Jan 1 of a given year • The 2011 Canadian population was used as the standard population for calculating age-standardized rates Exclusions: • Individuals with a missing or invalid HIN, date of birth, or postal code • Individuals with an invasive colorectal cancer prior to Jan 1 of the calendar year of interest; prior diagnosis of colorectal cancer was defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report • Individuals with a total colectomy prior to Jan 1 of the calendar year; total colectomy was defined in OHIP by fee codes S169A, S170A, S172A
Numerator	Total number of Ontario screen-eligible individuals, 50–74 years old, who were overdue for colorectal screening by the end of the calendar year Inclusions: • Individuals were considered overdue for colorectal screening if they: (1) did not have a fecal test (gFOBT or FIT) with a valid test result within the last two years AND (2) did not have a colonoscopy in the last ten years AND (3) did not have a flexible sigmoidoscopy in the last ten years • Identifying fecal tests: FITs were identified in FIT DSP Program gFOBTs were identified in LRT or in OHIP by fee code L179A (L179A: ColonCancerCheck Fecal Occult Blood Testing) and completed by December 23, 2019 Non-program gFOBTs were identified in OHIP by fee code L181A (L181A: Lab Med - Biochem -Occult Blood) and completed by December 23, 2019 • Fecal tests with either normal or abnormal results were considered valid and were included • If a gFOBT identified in LRT occurred within (±) 2 days of a gFOBT identified in OHIP for the same individual, they were considered to be the same test • All gFOBTs identified in OHIP and not in LRT were considered “valid” • Colonoscopies were identified in OHIP by fee codes Z555A, Z491A-Z499A, or in CIRT or GI Endoscopy DSP • Flexible sigmoidoscopies were identified in OHIP by fee code Z580A • Each individual was counted once regardless of the number of tests performed

Methodology Component	Methodology Component Details
Data Sources	• LRT (Laboratory Reporting Tool) – CCC gFOBTs • FIT DSP (Data Submission Portal) – FITs • OHIP CHDB (Claims History Database) – Total colectomy claims, CCC and non-CCC gFOBTs, colonoscopy claims, flexible sigmoidoscopy claims • CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records (up to 2018) • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) – Hospital colonoscopy records (2018 and onward) • OCR (Ontario Cancer Registry) – Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information • ON-Marg Index (Ontario Marginalization Index) - Equity information
Data Availability and Limitations	• Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • gFOBTs in hospital labs could not be captured • A small proportion of gFOBTs performed as diagnostic tests could not be excluded from the analysis • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	**Fecal test participation**
Indicator Definition	Age standardized percentage of Ontario screen-eligible individuals, ages 50-74 who completed at least one fecal test in a 30-month period
Calculations for the Indicator	(Total number of Ontario screen-eligible individuals, ages 50–74 who completed at least one fecal test in a given 30-month period ÷ Total number of Ontario screen-eligible individuals ages 50–74) × 100
Denominator	Total number of Ontario screen-eligible individuals, 50–74 years old, in the reporting period Inclusions: • Ontario residents ages 50–74 at the index date • Index date was defined as the midpoint of the reporting period • The 2011 Canadian population was used as the standard population for calculating age-standardized rates Exclusions: • Individuals with a missing or invalid HIN, date of birth, or postal code • Individuals with an invasive colorectal cancer before Jan 1st of the reporting period; prior diagnosis of colorectal cancer was defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report • Individuals with a total colectomy before Jan 1st of the reporting period; total colectomy was defined in OHIP by fee codes S169, S170, and S172 • Individuals who had a colonoscopy or flexible sigmoidoscopy in the past ten years prior to the reporting period; colonoscopy was identified in OHIP using fee codes Z555A, Z491A-Z499A, or in CIRT or GI Endoscopy DSP; flexible sigmoidoscopy was identified in OHIP using fee code Z580A
Numerator	Total number of Ontario screen-eligible individuals, ages 50–74 who completed at least one fecal test in a given 30-months period • Identifying fecal tests: FITs were identified in FIT DSP Program gFOBTs were identified in LRT or in OHIP by fee code L179A (L179A: ColonCancerCheck Fecal Occult Blood Testing) and completed by December 23, 2019 Non-program gFOBTs were identified in OHIP by fee code L181A (L181A: Lab Med - Biochem - Occult Blood) and completed by December 23, 2019 • Program fecal tests (from FIT DSP or LRT) with normal or abnormal results were considered valid and were included • If a gFOBT identified in LRT occurred within (±) 2 days of a gFOBT identified in OHIP for the same individual, they were considered to be the same tests • All gFOBTs identified in OHIP and not in LRT were considered “valid” • Each individual was counted once regardless of the number of fecal tests performed in the reporting period Exclusion: • Rejected fecal tests or fecal tests with an invalid / indeterminate result

Methodology Component	Methodology Component Details
Data Sources	• FIT DSP (Data Submission Portal) – FITs • LRT (Laboratory Reporting Tool) – CCC gFOBTs • OHIP CHDB (Claims History Database) – Total colectomy, colonoscopy, gFOBT, and flexible sigmoidoscopy claims • CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records (up to 2018) • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) – Hospital colonoscopy records (2018 and onward) • OCR (Ontario Cancer Registry) – Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • Statistics Canada: 2011 Canadian population values • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • OHIP gFOBT data may include rejected or indeterminate tests • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	**Fecal test abnormal result**
Indicator definition	Percentage of Ontario screen-eligible individuals, ages 50 to 74, with an abnormal fecal test result among those with a valid test result
Calculations for the indicator	(Total number of Ontario screen-eligible individuals, ages 50–74, with an abnormal fecal test result ÷ Total number of Ontario screen-eligible individuals, ages 50–74 with a normal or abnormal fecal test result) × 100

Denominator	Total number of Ontario screen-eligible individuals, 50–74 years old, who had a normal or abnormal fecal test result in the reporting period
	
	Inclusions:
	▪ Individuals ages 50–74 at the index date
	▪ Index date was defined as the kit receipt date of LRT or FIT DSP
	  ○ the first abnormal fecal test if there was an abnormal fecal test result in the reporting period
	  ○ the first normal fecal test if there were no abnormal fecal test result in the reporting period
	▪ Each person was counted once regardless of the number of tests performed
	▪ If a person had multiple tests in a given period, an index date was the kit receipt date of the first fecal test
	▪ Residential postal code was used to identify RCP and individuals with unknown/missing RCPs were excluded from the analysis
	
	Exclusions
	▪ Individuals with a missing or invalid HIN, date of birth, sex or postal code
	▪ Rejected fecal tests or fecal tests with an invalid / indeterminate result

Numerator	Total number of Ontario screen-eligible individuals, 50–74 years old, with an abnormal fecal test result in a given year ▪ Individuals ages 50–74, who had an abnormal fecal test result in LRT or FIT DSP ▪ Abnormal fecal test results were defined as at least one abnormal flap out of three flaps in FOBT or one abnormal test result in FIT
Data Sources	▪ LRT (Laboratory Reporting Tool) – CCC FOBTs ▪ FIT DSP (Data Submission Portal) – FITs ▪ RPDB (Registered Persons Database) – Demographics ▪ PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability & Limitations	▪ Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods ▪ Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	Abnormal fecal test with no follow-up within six months
Indicator Definition	Percentage of Ontario screen-eligible individuals, ages 50 to 74, with an abnormal fecal test result who did not undergo colonoscopy within 6 months of the abnormal fecal test result
Calculations for the Indicator	(Total number of Ontario screen-eligible individuals ages 50–74, with an abnormal fecal test result who did not undergo colonoscopy within 6 months of the abnormal fecal test result ÷ Total number of Ontario screen-eligible individuals, ages 50-74, with an abnormal fecal test result in the reporting period) × 100
Denominator	Total number of Ontario screen-eligible individuals, 50-74 years old, with an abnormal fecal test result in the reporting period Inclusions: • Individuals ages, 50–74 at the abnormal fecal test result date • Index (reporting) date was defined as the abnormal fecal test result date • Fecal tests were identified by records in LRT or FIT DSP • Abnormal fecal test result date was defined using the lab report date in LRT and result report date in FIT DSP • If a person had multiple abnormal fecal tests during the reporting period, only their first abnormal fecal test was included Exclusions: • Individuals with a missing or invalid HIN, date of birth or postal code • Individuals with an invasive colorectal cancer before the fecal test result date; prior diagnosis of colorectal cancer was defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report • Individuals with a total colectomy before the fecal test result date; total colectomy was identified in OHIP by fee codes S169A, S170A and S172A • Abnormal fecal tests with follow-up colonoscopies performed in an inpatient setting • Colonoscopies performed within one day of the abnormal fecal test result date
Numerator	Total number of Ontario screen-eligible individuals, 50–74 years old, with an abnormal fecal test result in the reporting period, who did not undergo colonoscopy within 6 months of the abnormal fecal test result Inclusions • Individuals with an abnormal fecal test result who did not have a follow-up colonoscopy within 6 months of the abnormal fecal test result • Colonoscopy was identified in OHIP by fee codes Z555A, Z491A-Z499A, or in CIRT or GI Endoscopy DSP
Data Sources	• LRT (Laboratory Reporting Tool) – CCC gFOBTs • FIT DSP (Data Submission Portal) – FITs • OHIP's CHDB (Claims History Database) – Colonoscopy claims and total colectomy claims • CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) - Hospital colonoscopy records

Methodology Component	Methodology Component Details
Data Sources	• CIHI DAD/NACRS – Inpatient vs. outpatient hospital setting • OCR (Ontario Cancer Registry) - Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	**Colorectal cancer screening colonoscopy follow-up (8 weeks)**
Indicator Definition	Percentage of Ontario screen-eligible individuals, ages 50 to 74, with an abnormal fecal test result who underwent colonoscopy within 8 weeks of the abnormal fecal test result
Calculations for the Indicator	(Total number of Ontario screen-eligible individuals, ages 50–74, who underwent colonoscopy within 8 weeks of the abnormal fecal test result ÷ Total number of Ontario screen-eligible individuals, ages 50-74, with an abnormal fecal test result in the reporting period) × 100
Denominator	Total number of Ontario screen-eligible individuals, ages 50 to 74, with an abnormal fecal test result in the reporting period Inclusions: • Individuals, ages 50–74 at the abnormal fecal test result date • Index (reporting) date was defined as the abnormal fecal test result date • Abnormal fecal test result date was defined using the lab report date in LRT and result report date in FIT DSP • If a person had multiple abnormal fecal tests during the reporting period, only their first abnormal fecal test was included. Exclusions: • Individuals with a missing or invalid HIN, date of birth or postal code • Individuals with an invasive colorectal cancer before the fecal test result date; prior diagnosis of colorectal cancer was defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report • Individuals with a total colectomy before the fecal test result date; total colectomy was identified using OHIP fee code S169A, S170A and S172A • Abnormal fecal tests with follow-up colonoscopies performed in an inpatient setting • Colonoscopies performed within one day of the abnormal fecal test result date.
Numerator	Total number of Ontario screen-eligible individuals, ages 50 to 74, with an abnormal fecal test result in the reporting period, who underwent colonoscopy within 8 weeks of the abnormal fecal test result Inclusions: • Individuals with an abnormal fecal test result who had a colonoscopy within 8 weeks of the abnormal fecal test result • Colonoscopy was identified in OHIP by the fee codes Z555A, Z491A-Z499A, or in CIRT or GI Endoscopy DSP

Methodology Component	Methodology Component Details
Data Sources	• LRT (Laboratory Reporting Tool) – CCC gFOBTs • FIT DSP (Data Submission Portal) – FITs • OHIP's CHDB (Claims History Database) – Colonoscopy claims and total colectomy claims • CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) – Hospital colonoscopy records • CIHI DAD/NACRS – Inpatient vs. outpatient hospital setting • OCR (Ontario Cancer Registry) – Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information • ON-Marg Index (Ontario Marginalization Index) - Equity information
Data Availability and Limitations	• Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	**Colorectal cancer screening (fecal test) positive predictive value (PPV)**
Indicator Definition	Percentage of Ontario screen-eligible individuals ages 50-74 with a screen detected invasive colorectal cancer among those who had an abnormal fecal test result followed by large bowel endoscopy or surgical resection
Calculations for the Indicator	(Total number of Ontario screen-eligible individuals ages 50-74 with a screen-detected invasive colorectal cancer ÷ Total number of Ontario screen-eligible individuals ages 50-74 who had an abnormal fecal test followed by large bowel endoscopy or colonic surgical resection) × 100
Denominator	Total number of Ontario screen-eligible individuals ages 50-74 who had an abnormal fecal test result followed by large bowel endoscopy or colonic surgical resection within 183 days of the abnormal fecal test result date Inclusions: • Individuals, ages 50-74 at the abnormal fecal test result date • Index (reporting) date was defined as the abnormal fecal test date • Fecal tests were identified by records in LRT or FIT DSP • Abnormal fecal test date was defined using the lab report date in LRT and result report date in FIT DSP • If a person had multiple abnormal fecal tests during the reporting period, only their first abnormal fecal test was included • Abnormal fecal test was followed by large bowel endoscopy or colonic surgical resection within 183 days • Large bowel endoscopy was defined as a record in CIRT, GI Endo DSP, or in OHIP by fee codes Z555A, Z491A-Z499A and Z580A • Colonic surgical resections were defined in CIHI as resection with or without stoma, bypass or local excisions of colon and rectum, using the relevant Canadian Classification of Health Interventions (CCI) codes developed by the Canadian Institute for Health Information (CIHI). The codes used are listed in the Technical Appendix to Cancer Surgery in Ontario: ICES Atlas 2008. The Technical Appendix is located at http://www.ices.on.ca/file/Technical%20appendix%20full%20FINAL.pdf. Admission date was used as proxy of surgical date if surgical date was missing in CIHI database Exclusions: • Individuals with a missing or invalid HIN, date of birth, or postal code • Individuals with a previous invasive colorectal cancer before the fecal test result date; prior diagnosis of invasive colorectal cancer was defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report • Individuals with a previous total colectomy before the fecal test result date; total colectomy was identified in OHIP by fee codes S169A, S170A, S172A
Numerator	Total number of Ontario screen-eligible individuals, ages 50-74 with a screen detected invasive colorectal cancer among those who had an abnormal fecal test result in the year and followed by large bowel endoscopy or surgical resection Inclusions: • Invasive colorectal cancer was identified in OCR as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report

Methodology Component	Methodology Component Details

Numerator	• Only colorectal cancers detected as a result of an abnormal fecal test result were counted
	• Colorectal cancers were defined as "screen-detected" if the individual had:
	  ○ An abnormal fecal test was followed by large bowel endoscopy or colonic surgical resection within 183 days, and
	  ○ Colorectal cancer in OCR occurred up to 190 days after the abnormal fecal test result

Data sources	• LRT (Laboratory Reporting Tool) –CCC gFOBTs • FIT DSP (Data Submission Portal) – FITs • OHIP's CHDB (Claims History Database) – Large bowel endoscopy and total colectomy claims • CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records (up to 2018) • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) – Hospital colonoscopy records (2018 and onward) • CIHI DAD/NACRS – Colorectal related surgery records and hospital setting (outpatient vs. inpatient) • OCR (Ontario Cancer Registry) - Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data availability & limitations	• Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	**Perforation**
Indicator Definition	Number of outpatient colonoscopies followed by hospital admissions for perforation within 7 days of colonoscopy, per 1,000 colonoscopies
Calculations for the Indicator	(Total number of outpatient colonoscopies followed by hospital admissions for perforation within 7 days of colonoscopy ÷ Total number of outpatient colonoscopies performed in the reporting period) × 1000
Denominator	Total number of outpatient colonoscopies performed in the reporting period Inclusions: • Individuals, age 18 and older who had at least one colonoscopy in the reporting period • Colonoscopy was identified in OHIP by fee codes Z555A, Z491A-Z499A • Outpatient colonoscopies only, defined by linking OHIP claims to CIHI NACRS records Exclusions: • Individuals with a missing or invalid HIN, date of birth • Individuals with a total colectomy before the colonoscopy date; total colectomy was identified in OHIP by fee codes S169A, S170A and S172A

Numerator	Total number of outpatient colonoscopies followed by hospital admissions for perforation within 7 days of colonoscopy
	
	Inclusions:
	• Colonoscopy perforation was defined when a patient was admitted to hospital with T812, K631, K650, K658, K659, S36510, S36511, S36991 as one of the diagnosis codes, and associated with diagnosis type 1, 6, W, X, Y, or M within 7 days of the colonoscopy, AND with any of the following conditions:
	  ○ Patients with a diagnosis code Y604 (Unintentional cut, puncture, perforation or haemorrhage during endoscopic examination)
	  ○ Patients with no other procedures done
	  ○ Patients with procedures performed during the hospitalization that would likely be done to support perforation (e.g., surgery). The definition excludes patients with colorectal cancer undergoing surgery that could be used to treat colorectal cancer
	
	Exclusions:
	• Patients with a second colonoscopy during admission
	• Patients with splenectomy, control of bleeding outside of the colon, or cancer of GI tract
	• Patients with procedure codes suggesting hospital admission was for reasons other than to treat perforation

Data Sources	• OHIP's CHDB (Claims History Database) – Colonoscopy and total colectomy claims • CIHI DAD/NACRS – Inpatient/outpatient colonoscopy and hospital location • CIHI DAD – Perforation related hospital admissions and colorectal cancer diagnoses • OCR (Ontario Cancer Registry) - Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ – Residence information

Methodology Component	Methodology Component Details
Data Availability and Limitations	• Emergency department visits and same-day surgeries were included in the same NACRS file that has been used to identify inpatient or outpatient colonoscopies

Methodology Component	Methodology Component Details
Indicator	Post-polypectomy bleeding
Indicator Definition	Number of outpatient colonoscopies with polypectomy followed by hospital admissions for lower gastrointestinal bleeding within 14 days of colonoscopy per 1,000 colonoscopies
Calculations for the Indicator	(Total number of Ontario screen-eligible individuals, ages 50–74 with a normal or abnormal fecal test result ÷ Total number of outpatient colonoscopies where ≥1 polyp(s) were removed among Ontario individuals, age 50 or older) × 1000
Denominator	Total number of outpatient colonoscopies where ≥1 polyp(s) were removed in the reporting period • Individuals, age 50 and older who had at least one colonoscopy where ≥1 polyp(s) was removed in the reporting period. • Colonoscopy was defined as a record in OHIP by fee code: Z codes (Z555A, Z491A-Z499A), except Z555A+/-E740A alone and Z496A+/-E740A alone • Polypectomy was defined as a record in OHIP by fee code Z571A, Z570A or E685A. Polypectomy must be performed on the same day as colonoscopy for the same patient • Outpatient colonoscopies only, defined by linking OHIP claims to CIHI-NACRS records Exclusions • Individuals with a missing or invalid HIN, date of birth • Individuals with a total colectomy before the index date; total colectomy was identified using OHIP fee code S169A, S170A and S172A • Endoscopists whose billing number could not be associated with a CPSO number

Numerator	Total number of outpatient colonoscopies with polypectomy followed by hospital admissions for lower gastrointestinal bleeding within 14 days of colonoscopy
	
	• Polypectomy associated bleeding was defined when a patient was admitted to hospital with T810, K625, D62, K921, K922, R58 as one of the diagnosis codes, and associated with diagnosis type 1, 6, W, X, Y, or M, OR with K626, K633 as the most responsible diagnosis code and accompanied by any of the diagnosis code Y838, Y839, Y848, Y849, Y604, Y608, Y609 within 14 days of the colonoscopy, AND with any of the following conditions:
	  ○ Patients with at least one of the diagnosis codes Y604, Y608, Y609, Y838, Y839, Y848, Y849
	  ○ Patients with no procedures done
	  ○ Patients with procedures performed during the hospitalization that would likely be done to treat bleeding (e.g. surgery). The definition excludes patients with colorectal cancer undergoing surgery that could be used to treat colorectal cancer.
	
	Exclusions
	• Patients with splenectomy and control of bleeding outside of the colon, or cancer of GI tract
	• Patients with procedure codes suggesting hospital admission was for reasons other than to treat bleeding

Methodology Component	Methodology Component Details
Data Sources	• OHIP's CHDB (Claims History Database) – Colonoscopy and total colectomy claims • CIHI DAD/NACRS – Inpatient/outpatient colonoscopy and hospital location • CIHI DAD – Bleeding related hospital admissions and colorectal cancer diagnoses • RPDB (Registered Persons Database) – Patient demographics • CPDB (Corporate Provider Database) – Provider OHIP billing number mapping to CPSO number • OCR (Ontario Cancer Registry) - Resolved invasive colorectal cancers
Data Availability and Limitations	• Emergency department visits and same-day surgeries are included in the same NACRS file used to identify inpatient or outpatient colonoscopies

Methodology Component	Methodology Component Details
Indicator	Poor bowel preparation
Indicator Definition	Percentage of outpatient colonoscopies with poor bowel preparation in hospital
Calculations for the Indicator	(Total number of outpatient colonoscopies with poor bowel preparation ÷ Total number of outpatient colonoscopies performed during the reporting period) × 100
Denominator	Total number of outpatient colonoscopies performed during the reporting period • Individuals ages 18 and older, who had an outpatient colonoscopy • Only outpatient colonoscopies are included Exclusions • Individuals with a missing or invalid HIN, date of birth • Individuals with a total colectomy prior to colonoscopy; total colectomy was identified using OHIP fee code S169A, S170A and S172A
Numerator	Total number of outpatient colonoscopies with poor bowel preparation
Data Sources	• CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records (up to 2018) • GI Endoscopy DSP (Data Submission Portal) - Hospital colonoscopy records (2018 and onward) • OHIP's CHDB (Claims History Database) – Total colectomy claims
Data Availability and Limitations	• This indicator includes hospital colonoscopy data only

Methodology Component	Methodology Component Details
Indicator	**Post-colonoscopy colorectal cancer**
Indicator Definition	Percentage of false-negative colonoscopies among false-negative and true-positive colonoscopies
Calculations for the Indicator	(Number of false-negative[1] colonoscopies ÷ Number of false-negative[1] + number of true-positive[2] colonoscopies) × 100 • [1]False-negative colonoscopy: The colonoscopy closest to CRC diagnosis occurring within 6-36 months prior to a CRC diagnosis • [2]True-positive colonoscopy: The colonoscopy closest to CRC diagnosis occurring within 6 months prior to a CRC diagnosis

Denominator	Number of false-negative and true-positive colonoscopies
	
	Inclusions:
	• Individuals, age 18 and older (based on colonoscopy date) who had a diagnosis of invasive colorectal cancer and at least one outpatient/inpatient colonoscopy in the 36 months prior to CRC diagnosis
	  ○ Colonoscopy was defined as a record in OHIP by fee codes: Z codes (Z555A, Z491A-Z499A), except Z555A+/-E740A alone and Z496A+/-E740A alone
	  ○ Colonoscopies that were recorded or billed up to 14 days after CRC diagnosis were included in the denominator (considered as true-positive tests), if no colonoscopy was found within 6 months prior to CRC.
	  ○ Colorectal adenocarcinomas (excluding appendix site) were recorded in the Ontario Cancer Registry (OCR) and defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report
	• If a person had multiple colonoscopies, only 1 true-positive and 1 false-negative colonoscopy performed closest to the cancer diagnosis date were included
	
	Exclusions:
	• Individuals with a missing or invalid HIN, date of birth or postal code
	• Individuals with a total colectomy prior to colonoscopy; total colectomy was defined in OHIP by fee codes S169A, S170A, and S172A

Numerator	Number of false-negative colonoscopies • Among those in the denominator, the colonoscopy closest to CRC diagnosis occurring within 6-36 months prior to a CRC diagnosis
Data Sources	• OHIP's CHDB (Claims History Database) – Colonoscopy and total colectomy claims • CIHI DAD/NACRS – Inpatient/outpatient colonoscopy • CPDB (Corporate Provider Database) – Provider OHIP billing number mapping to CPSO number • OCR (Ontario Cancer Registry) - Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Patient demographics
Data Availability and Limitations	• There is a 4-year reporting lag for this indicator, as 3 years of follow-up are required to determine if an individual develops CRC and an additional 1-year lag for obtaining cancer data in OCR

Methodology Component	Methodology Component Details
Indicator	**Invasive cancer detection rate (fecal test)**
Indicator definition	Number of Ontario screen-eligible individuals, ages 50 to 74, with a program screen-detected invasive colorectal cancer per 1,000 screened using a fecal test
Calculations for the indicator	(Total number of Ontario screen-eligible individuals, ages 50-74, with a program screen-detected invasive colorectal cancer ÷ Total number of Ontario screen-eligible individuals, ages 50-74, screened using a fecal test) × 1000
Denominator	Total number of Ontario screen-eligible individuals, ages 50-74, screened using a fecal test Inclusions: • Individuals ages 50-74 who were screened using a fecal test • Index (reporting) date was defined as the fecal test date • Fecal tests were identified by records in LRT or FIT DSP • Fecal test date was defined using the lab report date in LRT and result report date in FIT DSP • Individuals who had completed both a fecal test and a family history colonoscopy were counted in the fecal test group • Each individual was counted once regardless of the number of tests completed • If multiple fecal tests were completed during the reporting period, the most severe fecal test was included. If multiple abnormal fecal tests were completed during the reporting period, only the first one was included Exclusions: • Individuals with a missing or invalid HIN, date of birth, or postal code • Individuals with rejected, indeterminate or invalid fecal test results • Individuals with a previous invasive colorectal cancer before the index date; prior diagnosis of invasive colorectal cancer was defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report • Individuals with a previous total colectomy before the index date; total colectomy was identified in OHIP by fee codes S169A, S170A, S172A

Numerator	Total number of Ontario screen-eligible individuals, ages 50-74, with a screen-detected invasive colorectal cancer among those screened using a fecal test
	
	Inclusions:
	• Invasive colorectal cancer was identified in OCR as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report
	• Only colorectal cancers detected as a result of an abnormal fecal test result were counted
	• Colorectal cancers were defined as "screen-detected" if the individual had:
	  ○ An abnormal fecal test was followed by large bowel endoscopy or colonic surgical resection within 183 days, and
	  ○ Colorectal cancer in OCR occurred up to 190 days after the abnormal fecal test result
	• Large bowel endoscopy was defined as a record in CIRT, GI Endo DSP or defined by OHIP fee codes Z555A, Z491A-Z499A and Z580A through OHIP data

Methodology Component	Methodology Component Details
Numerator	• Colonic surgical resections were defined in CIHI as resection with or without stoma, bypass or local excisions of colon and rectum, using the relevant Canadian Classification of Health Interventions (CCI) codes developed by the Canadian Institute for Health Information (CIHI). The codes used are listed in the Technical Appendix to Urbach DR, Simunovic M, Schultz SE, editors. Cancer Surgery in Ontario: ICES Atlas. Toronto: Institute for Clinical Evaluative Sciences, 2008. The Technical Appendix is located at - http://www.ices.on.ca/file/Technical%20appendix%20full%20FINAL.pdf. Admission date was used as proxy of surgical date if surgical date was missing in CIHI database
Data sources	• LRT (Laboratory Reporting Tool) –CCC gFOBTs • FIT DSP (Data Submission Portal) – FITs • OHIP's CHDB (Claims History Database) – Large bowel endoscopy and total colectomy claims • CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) – Hospital colonoscopy records • CIHI DAD/NACRS – Colorectal related surgery records and hospital setting (outpatient vs. inpatient) • OCR (Ontario Cancer Registry) - Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data availability & limitations	• Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	**Invasive cancer detection rate (family history colonoscopy)**
Indicator Definition	Number of Ontario screen-eligible individuals, ages 50 to 74, with a detected invasive colorectal cancer per 1,000 screened with colonoscopy in those with a family history (FH) of colorectal cancer
Calculations for the Indicator	(Total number of Ontario screen-eligible individuals, 50–74 years old, with a detected invasive colorectal cancer among those screened for family history colonoscopy ÷ Total number of Ontario screen-eligible individuals, 50–74 years old, screened with colonoscopy for family history indication) × 1000

Denominator	Total number of Ontario screen-eligible individuals screened, 50–74 years old, screened with colonoscopy for family history
	
	• Individuals, ages 50-74, who were screened with colonoscopy for family history (FH) indication
	• Index date was defined as the first FH colonoscopy date per person
	• Each individual was counted once regardless of the number of tests performed
	• Individuals who had completed both a fecal test and a FH colonoscopy were counted in the fecal test group
	
	Exclusions
	• Individuals with a missing or invalid HIN, date of birth or postal code
	• Individuals who were screened using a CCC program fecal test. These individuals were considered to be screened with fecal test and not the FH colonoscopy. They are included in the fecal test CRC detection rate calculation
	• Individuals with a previous invasive colorectal cancer before the index date, except for those diagnosed with colorectal cancer 7 days before FH colonoscopy
	  ○ Invasive colorectal cancer was defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report
	• Individuals with a previous total colectomy before the index date
	  ○ Total colectomy was identified in OHIP by fee codes S169A, S170A, S172A

Numerator	Total number of Ontario screen-eligible individuals, 50-74 years old, with a detected invasive colorectal cancer among those screened for family history colonoscopy • Only colorectal cancers detected as a result of screening for a FH colonoscopy were counted. • Invasive colorectal cancer was identified in OCR as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report • Colorectal cancers were defined as “screen-detected” if colorectal cancer diagnosis date occurred between 7 days before and up to 91 days after FH colonoscopy
Data Sources	• OHIP (Claims History OHIP's CHDB (Claims History Database) – Large bowel endoscopy and total colectomy claims • CIRT (Colonoscopy Interim Reporting Tool) – CCC program FH colonoscopy records (up to 2018) • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) – Hospital colonoscopy records (2018 and onward) • LRT (Laboratory Reporting Tool) – CCC FOBTs

Methodology Component	Methodology Component Details
Data Sources	• FIT DSP (Data Submission Portal) – FITs • CIHI DAD/NACRS – Colorectal related surgery records and hospital setting (outpatient vs. inpatient) • OCR (Ontario Cancer Registry) – Resolved invasive colorectal cancers • RPDB (Registered Personal Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator does not include OHIP billings for Ontarians screened outside of the CCC organized program as OHIP does not provide results of the test • Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	**Screen-detected colorectal cancer (CRC) stage distribution**
Indicator Definition	Distribution of screen-detected colorectal cancers by stage at diagnosis
Calculations for the Indicator	(Total number of screen-eligible people, ages 50 to 74, who had screen-detected colorectal cancer by stage at diagnosis ÷ Total number of screen-eligible people, ages 50 to 74, who had screen-detected colorectal cancer) × 100

Denominator	Total number of Ontario screen-eligible people, ages 50 to 74, who had screen-detected invasive CRC
	
	• Invasive colorectal cancer was identified in OCR as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report
	• Index (reporting) date was the cancer diagnosis date
	• Colorectal cancer was defined as "screen-detected" if cancer was detected as a result of an abnormal fecal test or screening for a family history colonoscopy.
	  ○ Screen-detected CRC (fecal test) was defined as:
	  ○ An abnormal fecal test was followed by large bowel endoscopy or colonic surgical resection within 183 days AND
	  ○ Colorectal cancer diagnosis in OCR occurred up to 190 days after the abnormal fecal test result
	  ○ Screen-detected CRC (family history colonoscopy) was defined as:
	  ○ Colorectal cancer diagnosis occurred between 7 days before and up to 91 days after family history colonoscopy
	• Abnormal fecal tests were identified in FIT DSP or LRT; family history colonoscopies were identified in GI Endoscopy DSP or CIRT.
	• Large bowel endoscopy was defined as a colonoscopy record identified in CIRT, GI Endo DSP or OHIP (fee codes Z555A, Z491A-Z499A) and/or a flexible sigmoidoscopy record identified in OHIP (fee codes Z580A)
	• Colonic surgical resections were defined in CIHI as resection with or without stoma, bypass or local excisions of colon and rectum, using the relevant Canadian Classification of Health Interventions (CCI) codes developed by the Canadian Institute for Health Information (CIHI). The codes used are listed in the Technical Appendix to Cancer Surgery in Ontario: ICES Atlas 2008. The Technical Appendix is located at - http://www.ices.on.ca/file/Technical%20appendix%20full%20FINAL.pdf. Admission date was used as proxy of surgical date if surgical date was missing in CIHI database
	
	Exclusions:
	• People with invasive cancers that have unknown stage or are unstageable
	• Individuals with a missing or invalid HIN, date of birth or postal code
	• Individuals with a previous invasive colorectal cancer before the index date; prior diagnosis of invasive colorectal cancer was defined as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a path report
	• Individuals with a previous total colectomy before the index date; total colectomy was identified in OHIP by fee codes S169A, S170A, S172A

Methodology Component	Methodology Component Details
Numerator	Total number of screen-eligible people, ages 50 to 74, who had screen-detected invasive CRC stratified by stage I, II, III or IV at diagnosis
Data Sources	• OHIP's CHDB (Claims History Database) – Large bowel endoscopy and total colectomy claims • CIHI DAD and NACRS – Colorectal related surgery records • CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records (up to 2018) • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) – Hospital colonoscopy records (2018 and onward) • LRT (Laboratory Reporting Tool) –CCC FOBTs • FIT DSP (Data Submission Portal) – FITs • OCR (Ontario Cancer Registry) - Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• This indicator does not include OHIP billings for Ontarians screened outside of the CCC organized program as OHIP does not provide results of the test • Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Methodology Component	Methodology Component Details
Indicator	**Colorectal cancers (CRC) stage distribution among people without prior screening**
Indicator Definition	Distribution of colorectal cancers among people without prior screening by stage at diagnosis
Calculations for the Indicator	(Total number of Ontario people without prior screening, ages 50 to 74, who had invasive colorectal cancer by stage at diagnosis ÷ Total number of Ontario people without prior screening, ages 50 to 74, who had an invasive colorectal cancer diagnosis) × 100

Denominator	Total number of Ontario people without prior screening, ages 50 to 74, who had invasive colorectal cancer
	
	• Invasive colorectal cancer was identified in OCR as: ICD-O-3 codes C18.0, C18.2-C18.9, C19.9, C20.9, a morphology indicative of colorectal cancer, microscopically confirmed with a pathology report
	• Index (reporting) date was the cancer diagnosis date
	• Invasive CRCs for those without prior screening were identified if individuals
	  ○ Had no prior fecal tests AND
	  ○ Had no prior flexible sigmoidoscopy AND
	  ○ Had no colonoscopy within 6 months prior to CRC diagnosis date
	• Fecal tests were identified in FIT DSP, LRT and OHIP:
	  FITs were identified in FIT DSP
	  Program CCC gFOBTs were identified in LRT or in OHIP by fee code L179A (L179A: ColonCancerCheck Fecal Occult Blood Testing) and completed by December 23, 2019
	  Non-program gFOBTs were identified in OHIP by fee code L181A (L181A: Lab Med - Biochem - Occult Blood) and completed by December 23, 2019
	• Flexible sigmoidoscopy was identified in OHIP using fee code Z580A
	• Colonoscopy was identified in OHIP using fee codes Z555A, Z491A-Z499A, or in CIRT or GI Endoscopy DSP
	
	Exclusions:
	• People with invasive cancers that have unknown stage or are unstageable
	• Individuals with a missing or invalid HIN, date of birth, or postal code

Numerator	Total number of Ontario people without prior screening, ages 50 to 74, who had invasive CRC stratified by stage I, II, III or IV at diagnosis
Data Sources	• CIRT (Colonoscopy Interim Reporting Tool) – CCC program colonoscopy records (up to 2018) • GI Endo DSP (Gastrointestinal Endoscopy Data Submission Portal) – Hospital colonoscopy records (2018 and onward) • LRT (Laboratory Reporting Tool) –CCC FOBTs • FIT DSP (Data Submission Portal) – FITs • OCR (Ontario Cancer Registry) - Resolved invasive colorectal cancers • RPDB (Registered Persons Database) – Demographics • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information
Data Availability and Limitations	• Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods • Ontario transitioned gFOBT to FIT as the recommended colorectal cancer screening test for people at average risk of colorectal cancer in June 2019 with an overlap period from June to December 2019.

Ontario Lung Screening Program

Methodology Component	Methodology Component Details
Indicator	**Smoking status at risk assessment**
Indicator Definition	Percentage of people who reported that they currently smoke at baseline risk assessment
Calculations for the Indicator	(Total number of baseline risk-assessed people who reported that they currently smoke ÷ Total number of people who completed a baseline risk assessment in the reporting period) × 100
Denominator	Total number of people who completed a baseline risk assessment in the reporting period • People ages 55 to 74 at risk triage who had a baseline risk assessment in the reporting period • Reporting was based on the risk assessment date Exclusions: • People with a missing risk assessment score
Numerator	Total number of baseline risk-assessed people who reported that they currently smoke • People who reported that they currently smoke at baseline risk assessment • A person who reported that they currently smoke was defined as a person who has smoked one or more cigarettes within 30 days before risk assessment
Data Sources	• OLSP (Ontario Lung Screening Program) – Risk Triage Appointment (TRIAGE data file), Risk Assessment Call (RA data file)
Data Availability and Limitations	• OLSP data are available from June 2017.

Methodology Component	Methodology Component Details
Indicator	**Lung cancer screening LDCT scan after risk assessment**
Indicator Definition	Percentage of screen-eligible people who had a LDCT scan after risk assessment
Calculations for the Indicator	(Total number of screen-eligible people who had a LDCT scan ÷ Total number of people who were eligible for a LDCT scan after risk assessment) × 100
Denominator	Total number of people who were eligible for a low-dose computed tomography (LDCT) scan • People ages 55 to 74 at risk triage who had a baseline risk assessment score >= 2% • Reporting was based on the risk assessment date Exclusions: • People who declined the LDCT scan
Numerator	Total number of screen-eligible people who had a LDCT scan • People who had a LDCT scan with a baseline indication. If people did not have a baseline LDCT scan, the first completed LDCT scan was used as a baseline scan
Data Sources	• OLSP (Ontario Lung Screening Program) – Risk Triage Appointment (TRIAGE data file), Risk Assessment Call (RA data file), Hospital Visit (LDCT data file) • PCCF+ (Postal Code^{OM} Conversion File Plus) - Residence information • ON-Marg Index (Ontario Marginalization Index) - Equity information
Data Availability and Limitations	• OLSP data are available from June 2017.

Methodology Component	Methodology Component Details
Indicator	**Lung cancer screening LDCT scans by Lung-RADS® score**
Indicator Definition	Percentage of LDCT scans by Lung-RADS® score
Calculations for the Indicator	(Total number of LDCT scans stratified by Lung-RADS® score ÷ Total number of LDCT scans) × 100
Denominator	Total number of low-dose computed tomography (LDCT) scans • People ages 55 to 74 at risk triage who had a baseline risk assessment score >=2% • People who completed a LDCT scan with a valid Lung-RADS® score in the reporting period • Reporting was based on the LDCT scan date Exclusions: • LDCT scans with a Lung-RADS® score 0 (i.e. incomplete scan)
Numerator	Total number of LDCT scans stratified by Lung-RADS® score as follows: a) Lung-RADS® 1 and 2 b) Lung-RADS® 3 and 4A c) Lung-RADS® 4B and 4X
Data Sources	• OLSP (Ontario Lung Screening Program) – Risk Triage Appointment (TRIAGE data file), Risk Assessment Call (RA data file), Hospital Visit (LDCT data file)
Data Availability and Limitations	• OLSP data are available from June 2017.

Methodology Component	Methodology Component Details
Indicator	**Actionable incidental findings detected on LDCT scans**
Indicator Definition	Percentage of LDCT scans with actionable incidental findings detected
Calculations for the Indicator	(Total number of LDCT scans with actionable incidental findings detected ÷ Total number of LDCT scans completed) × 100
Denominator	Total number of low-dose computed tomography (LDCT) scans completed in the reporting period • People ages 55 to 74 at risk triage who had a baseline risk assessment score >= 2% • People who completed a LDCT scan with a valid Lung-RADS® score in the reporting period • Reporting was based on the LDCT scan date Exclusions: • LDCT scans with a Lung-RADS® score 0 (i.e. incomplete scan)
Numerator	Total number of LDCT scans with actionable incidental findings detected
Data Sources	• OLSP (Ontario Lung Screening Program) – Risk Triage Appointment (TRIAGE data file), Risk Assessment Call (RA data file), Hospital Visit (LDCT data file)
Data Availability and Limitations	• OLSP data are available from June 2017.

Methodology Component	Methodology Component Details
Indicator	**Lung cancer screening abnormal follow-up**
Indicator Definition	Percentage of screen-eligible people with an abnormal lung screening result who underwent diagnostic assessment within 3 months
Calculations for the Indicator	(Total number of screen-eligible people with an abnormal lung screening result, who underwent diagnostic assessment within 3 months ÷ Total number of screen-eligible people with an abnormal lung screening result) × 100
Denominator	Total number of screen-eligible people with an abnormal lung screening result • People ages 55 to 74 at risk triage who had a baseline risk assessment score >= 2% • People who completed a low-dose computed tomography (LDCT) scan in the reporting period • An abnormal lung screening result was defined as an LDCT scan with a Lung-RADS® score of 4A*, 4B, or 4X • People who were referred for further diagnostic assessment outside of screening • Reporting was based on the LDCT scan date

Numerator	Total number of screen-eligible people with an abnormal lung screening result, who underwent diagnostic assessment within 3 months
	
	• People with an abnormal lung screening result who underwent lung cancer diagnostic workup within 3 months of the LDCT scan date
	• Lung cancer diagnostic workup was identified through OHIP, using the following fee codes:
	
	Consultation
	• A135: Internal and occupational medicine - Consultation
	• A645: General Thoracic Surgery - Consultation
	• A646: General Thoracic Surgery - Repeat Consultation
	• A935: General Thoracic Surgery - Special surgical consultation
	• A475: Respiratory disease - Consultation
	• A643: General Thoracic Surgery - Specific assessment
	
	Imaging
	• PET scan
	  ○ J700: PET scan, solid pulmonary nodule
	  ○ J706: PET scan, non-small cell lung cancer
	  ○ J709: PET scan, limited disease small cell lung cancer
	• CT scan - chest
	  ○ X406: CT scan, thorax, without IV contrast
	  ○ X407: CT scan, thorax, with IV contrast
	  ○ X125: CT scan, thorax, with and without IV contrast
	
	Procedure Codes
	• Bronchoscopy
	  ○ Z327: Bronchoscopy, trachea and bronchi, flexible or rigid, with or without bronchial biopsy, suction or injection of contrast material
	  ○ E635: With palliative endobronchial tumor resection including laser or cryotherapy

Methodology Component	Methodology Component Details
Numerator	○ E636: With broncho-alveolar lavage for diagnosis of malignancy or diagnosis and/or treatment of infection and includes obtaining specimens suitable for differential cellular analysis ○ E637: With selective brushings of all 18 segmental bronchi for occult carcinoma in situ ○ E638: With transbronchial lung biopsy under image intensification only ○ E677: Transbronchial needle aspiration (TBNA) of mediastinal and/or hilar lymph nodes ○ E678: TBNA of lung mass ○ G050: Endobronchial ultrasound (EBUS), for guided biopsy of hilar and/or mediastinal lymph nodes • Mediastinoscopy ○ Z329: Mediastinoscopy ○ Z330: Mediastinoscopy with bronchoscopy ○ Z333: Mediastinoscopy with transbronchial biopsy under image intensification (including bronchoscopy) ○ Z328: Mediastinoscopy with mediastinotomy ○ Z348: Mediastinoscopy with bronchoscopy and mediastinotomy • Needle biopsy ○ Z340: Lungs and pleura, incision, biopsy of lung, needle ○ Z336: Lungs and pleura, incision, biopsy of pleura, needle (incl. diagnostic aspiration) ○ X168: CT guidance of biopsy • Thoracoscopy ○ Z335: Lung & Pleura – Thoracoscopy (pleuroscopy) with or without pleural biopsy, suction • Thoracotomy (open surgery) ○ M137: Thoracotomy with or without biopsy ○ M138: Hilar lymph node or lung biopsy with full thoracotomy ○ M145: Wedge resection of lung ○ Z338: Biopsy of pleura or lung - with limited thoracotomy • Thoracentesis (Pleural fluid sampling) ○ Z331: Aspiration for diagnostic sample ○ Z332: Aspiration with therapeutic drainage with or without diagnostic sample
Data Sources	• OLSP (Ontario Lung Screening Program) – Risk Triage Appointment (TRIAGE data file), Risk Assessment Call (RA data file), Hospital Visit (LDCT data file) • OHIP CHDB (Claims History Database) – Lung cancer diagnostic assessment claims
Data Availability and Limitations	• OLSP data are available from June 2017. • People with a Lung-RADS® score 4X were referred for diagnostic assessment, as recommended by Lung-RADS®. From October 1, 2018, people with Lung-RADS® 4A scan score were scheduled to have a 3-month surveillance LDCT scan instead of being referred to a lung diagnostic assessment. From October 1, 2019, people with a Lung-RADS® score 4B were either be referred for lung diagnostic assessment or receive a follow-up LDCT scan in one month. ** Lung-RADS® score 4A was included only for data before October 1, 2018*

Methodology Component	Methodology Component Details
Indicator	**Lung cancer screening wait time from abnormal lung screening result to cancer diagnosis**
Indicator Definition	Wait time from abnormal LDCT scan date to date of confirmed lung cancer diagnosis
Calculations for the Indicator	Wait time in days = Date of lung cancer diagnosis − Date of abnormal lung screening result Indicator was reported as the median and 90th percentile of the wait time in days
Cohort	Total number of people, ages 55 to 74, with an abnormal lung screening result who subsequently had a lung cancer diagnosis • People ages 55 to 74 at risk triage who had a baseline risk assessment score >= 2% • People who completed a low-dose computed tomography (LDCT) scan in the reporting period • People with an abnormal lung screening result who subsequently had a lung cancer diagnosis • An abnormal lung screening result was defined as an LDCT scan with a Lung-RADS® score of 4A*, 4B, or 4X • Invasive lung cancers were identified in OCR as: ICD-O-3 code C34, a morphology indicative of invasive lung cancer, microscopically confirmed with a pathology report • Reporting was based on the LDCT scan date
Data Sources	• OLSP (Ontario Lung Screening Program) – Risk Triage Appointment (TRIAGE data file), Risk Assessment Call (RA data file), Hospital Visit (LDCT data file) • OCR (Ontario Cancer Registry) – Resolved lung cancers
Data Availability and Limitations	• OLSP data are available from June 2017. • People with a Lung-RADS® score 4X were referred for diagnostic assessment, as recommended by Lung-RADS®. From October 1, 2018, people with Lung-RADS® 4A scan score were scheduled to have a 3-month surveillance LDCT scan instead of being referred to a lung diagnostic assessment. From October 1, 2019, people with a Lung-RADS® score 4B were either be referred for lung diagnostic assessment or receive a follow-up LDCT scan in one month. ** Lung-RADS® score 4A was included only for data before October 1, 2018*

Methodology Component	Methodology Component Details
Indicator	**Lung cancer detection rate**
Indicator Definition	Number of screen-eligible people with a screen-detected lung cancer per 1,000 people screened receiving a LDCT scan
Calculations for the Indicator	(Number of screen-eligible people with a screen-detected lung cancer following a LDCT scan ÷ Number of screen-eligible people who completed a LDCT scan) × 1000
Denominator	Number of screen-eligible people who completed a LDCT scan • People ages 55 to 74 at risk triage who had a baseline risk assessment score >= 2% • People who completed a baseline or 12-month recall low-dose computed tomography (LDCT) scan in the reporting period • Each OLSP screening round was counted; if a person had multiple OLSP baseline or 12-month recall LDCT scans in a given year, all scans were included • Reporting was based on the LDCT scan date
Numerator	Number of screen-eligible people with a screen-detected invasive lung cancer diagnosis following a LDCT scan • People with a Lung-RADS® score result of 4A*, 4B, or 4X referred to lung diagnsosis assessment who subsequently had an invasive lung cancer diagnosis • Invasive lung cancers were identified in OCR as: ICD-O-3 code C34, a morphology indicative of invasive lung cancer, microscopically confirmed with a pathology report **Note:** The screen-detected lung cancer was attributed to the most recent screening round (baseline or 12-month recall). For example, a lung cancer diagnosed after a 6-month scan (with abnormal result) following baseline was attributed to the baseline screening round.
Data Sources	• OLSP (Ontario Lung Screening Program) – Risk Triage Appointment (TRIAGE data file), Risk Assessment Call (RA data file), Hospital Visit (LDCT data file) • OCR (Ontario Cancer Registry) – Resolved lung cancers
Data Availability and Limitations	• OLSP data are available from June 2017. • People with a Lung-RADS® score 4X were referred for diagnostic assessment, as recommended by Lung-RADS®. From October 1, 2018, people with Lung-RADS® 4A scan score were scheduled to have a 3-month surveillance LDCT scan instead of being referred to a lung diagnostic assessment. From October 1, 2019, people with a Lung-RADS® score 4B were either be referred for lung diagnostic assessment or receive a follow-up LDCT scan in one month. ** Lung-RADS® score 4A was included only for data before October 1, 2018*

Methodology Component	Methodology Component Details
Indicator	**Lung cancer stage distribution**
Indicator Definition	Distribution of lung cancers by stage at diagnosis
Calculations for the Indicator	(Total number of Ontario people with a lung cancer stratified by cancer stage at diagnosis ÷ Total number of Ontario people with a lung cancer diagnosis) × 100
Denominator	Total number of Ontario people with an invasive lung cancer diagnosis • Ontario people ages 55 to 74 with an invasive lung cancer diagnosis • Invasive lung cancers were identified in OCR as: ICD-O-3 code C34, a morphology indicative of invasive lung cancer, microscopically confirmed with a pathology report • Reporting was based on the lung cancer diagnosis date Exclusions: • People with invasive cancers that have unknown stage or are unstageable
Numerator	Total number of Ontario people with an invasive lung cancer stratified by cancer stage I, II, III or IV at diagnosis
Data Sources	• OCR (Ontario Cancer Registry) – Resolved lung cancer and cancer stage at diagnosis
Data Availability and Limitations	• There is an approximate 2-year data lag in the cancer stage data from OCR.

Methodology Component	Methodology Component Details
Indicator	**Screen-detected lung cancer stage distribution**
Indicator Definition	Distribution of screen-detected lung cancers by stage at diagnosis
Calculations for the Indicator	(Total number of screen-eligible people with a screen-detected lung cancer stratified by cancer stage at diagnosis ÷ Total number of screen-eligible people with a screen-detected lung cancer) × 100
Denominator	Total number of screen-eligible people with a screen-detected invasive lung cancer • People ages 55 to 74 at risk triage who had a baseline risk assessment score >= 2% • People who completed a low-dose computed tomography (LDCT) scan in reporting period • People with a Lung-RADS® score result of 4A*, 4B, or 4X that lead to a lung cancer diagnosis • Invasive lung cancers were identified in OCR as: ICD-O-3 code C34, a morphology indicative of invasive lung cancer, microscopically confirmed with a pathology report • Reporting was based on the lung cancer diagnosis date Exclusions • People with invasive cancers with unknown stage or unstageable
Numerator	Total number of screen-eligible people with a screen-detected invasive lung cancer stratified by stage I, II, III or IV at diagnosis
Data Sources	• OLSP (Ontario Lung Screening Program) – Risk Triage Appointment (TRIAGE data file), Risk Assessment Call (RA data file), Hospital Visit (LDCT data file) • OCR (Ontario Cancer Registry) – Resolved lung cancer and cancer stage at diagnosis
Data Availability and Limitations	• OLSP data are available from June 2017. • There is an approximate 2-year data lag in the cancer stage data from OCR. • People with a Lung-RADS® score 4X were referred for diagnostic assessment, as recommended by Lung-RADS®. From October 1, 2018, people with Lung-RADS® 4A scan score were scheduled to have a 3-month surveillance LDCT scan instead of being referred to a lung diagnostic assessment. From October 1, 2019, people with a Lung-RADS® score 4B were either be referred for lung diagnostic assessment or receive a follow-up LDCT scan in one month. ** Lung-RADS® score 4A was included only for data before October 1, 2018*

Bivariate Choropleth Mapping

Methodology Component	Methodology Component Details
Indicator	**Breast cancer screening participation**
Indicator Definition	Age-standardized percentage of Ontario screen-eligible women, ages 50 to 74, who completed at least one mammogram within a 30-month period
Calculations for the Indicator	(Total number of Ontario screen-eligible people ages 50 to 74 who completed at least one screening mammogram within a 30-month period ÷ Total number of Ontario screen-eligible women ages 50 to 74 in the reporting period) × 100 The 2011 Canadian population was used as the standard population for calculating age-standardized rates. Breast screening participation rates are sorted from highest to lowest and then grouped into tertiles (three equal numbers of regions per tertile). Tertile "A" below represents the tertile with the highest participation, while "B" is the middle third and "C" is the lowest tertile. • A: >57.8% • B: 52.5% to 57.8% • C: <52.5%

Methodology Component	Methodology Component Details
Indicator	**Cervical cancer screening participation**
Indicator Definition	Age-standarized percentage of Ontario screen-eligible people, ages 21 to 69, who completed at least one cytology test in a 42-month period
Calculations for the Indicator	(Total number of Ontario screen-eligible people, ages 21-69, who have completed at least one cytology test in a 42-month period ÷ Total number of Ontario screen-eligible people, ages 21-69, in the reporting period) × 100 The 2011 Canadian population was used as the standard population for calculating age-standardized rates. Cervical screening participation rates are sorted from highest to lowest and then grouped into tertiles (three equal numbers of regions per tertile). Tertile "A" below represents the tertile with the highest participation, while "B" is the middle third and "C" is the lowest tertile. • A: >58.7% • B: 52.2% to 58.7% • C: <52.2%

Methodology Component	Methodology Component Details
Indicator	**Overdue for colorectal cancer screening**
Indicator Definition	Age-adjusted percentage of Ontario screen-eligible individuals, ages 50 to 74, who were overdue for colorectal cancer screening
Calculations for the Indicator	(Total number of Ontario screen-eligible individuals, 50–74 years old, who were overdue for colorectal screening ÷ Total number of Ontario screen-eligible individuals, 50–74 years old in the reporting period) × 100 The 2011 Canadian population was used as the standard population for calculating age-standardized rates. Overdue for colorectal cancer screening rates are sorted from highest to lowest and then grouped into tertiles (three equal numbers of regions per tertile). Tertile "A" below represents the tertile with the lowest overdue rate (as this is an inverse indicator), while "B" is the middle third and "C" is the tertile with the highest overdue for screening rate. • A: <38.4% • B: 38.4% to 42.8% • C: >42.8%

Methodology Component	Methodology Component Details
Indicator	**Material deprivation (from the ON-Marg index)**
Indicator description	Inability for individuals and communities to access and attain basic material needs.
Calculations for the Indicator	Material deprivation is calculated at the dissemination area level using the following variables from the 2016 census: • Proportion of population age 20 and older without a high school diploma • Proportion of families that are lone parent families • Proportion of total income for people age 15 and older from government transfer payments • Proportion of population age 15 and older who are unemployed • Proportion of population considered low income • Proportion of households living in dwellings in need of major repair Material deprivation is calculated as an index from 1 to 5, with quintile 5 representing areas of the highest degree of material deprivation, and quintile 1 representing areas with the lowest degree of material deprivation.
Bivariate mapping	For the purposes of the mapping analysis presented in this report, the quintiles were collapsed into tertiles. The bottom and top 20% (quintiles 1 and 5) became tertiles 1 and 3 respectively, and quintiles 2 to 4 were combined to form the middle tertile. Dissemination area-level material deprivation scores were aggregated into scores at the FSA level for this analysis.

Methodology Component	Methodology Component Details
Indicator	**Bivariate choropleth maps (participation/overdue for screening and material deprivation)**
Geographic level of analysis	Forward sortation area (FSA.) The FSA represents the first three digits of a person's residential postal code. There are 513 FSAs in Ontario.
Mapping	For each FSA, participation/overdue and material deprivation are combined to create one of nine classifications, denoted on the map by a unique colour on the map.