FEMALE REPRODUCTIVE CANCERS

IS WORK A RISK FACTOR?

BACKGROUND

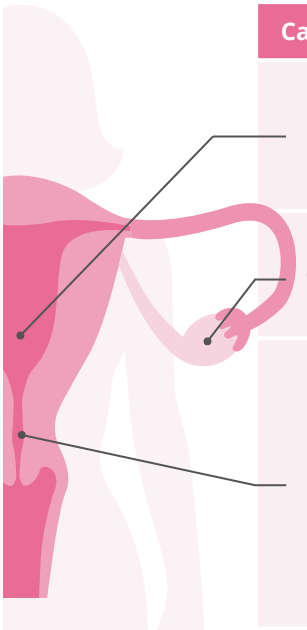
The participation of women in the labour force has increased over time, including those of reproductive age, but the impact that this may have on reproductive cancers is poorly understood. Women may be exposed to various chemical, physical, and biological factors in work environments that may impact the female reproductive system (e.g., altering sex hormone levels, ovarian dysfunction). This analysis focuses on cervical, uterine (also called endometrial), and ovarian cancers among female workers in Ontario.

RISK FACTORS

The International Agency for Research on Cancer (IARC) has identified various non-occupational agents associated with increased risk of reproductive cancers (1). However, little is known about the relationship between occupational risk factors and female reproductive cancers, such as cervical, ovarian, and uterine cancers. Exposure to asbestos is the only established occupational risk factor for ovarian cancer (1-3). There are no established occupational risk factors for cervical and uterine cancers, although a few studies have suggested links to metalworking fluids and organic solvents, particularly for cervical cancer (4-7).

There is also limited research on the risk of reproductive cancers among female workers in different occupational groups. A few studies have found higher risks of cervical cancer among construction workers, drivers, mechanics, and electricians; higher risks of ovarian cancer among teachers, managerial/administrative workers, accountants, hairdressers, and workers in the printing industry; and higher risks of uterine cancer among teachers and managerial/administrative workers (8-10).

The table below shows selected cancer sites and the known (sufficient evidence) and possible (limited evidence) risk factors associated with these sites, as classified by IARC (1).



Cancer Site	Known Risk Factors	Possible Risk Factors
Uterus	• Postmenopausal estrogen therapy • Estrogen-progesterone menopausal therapy • Tamoxifen	• Diethylstilbestrol (a nonsteroidal estrogen medication)
Ovaries	• Asbestos • Postmenopausal estrogen therapy • Tobacco smoking	• X- and Gamma- radiation • Talc-based body powder
Cervix	• Various types of human papillomavirus (HPV) infections • Human immunodeficiency virus (HIV) type 1 infection • Tobacco smoking • Estrogen-progesterone oral contraceptives • In-utero exposure to diethylstilbestrol	• Various types of human papillomavirus (HPV) infections

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OCCUPATIONAL DISEASE RISKS

The risk of cervical, uterine, and ovarian cancers was examined among approximately 800,000 female workers in Ontario's Occupational Disease Surveillance System (ODSS). The tables below display the percent increase in risk of cervical, uterine, ovarian cancers among certain groups of female workers compared to all other female workers in the ODSS (aged 15 to 85 years). Tables shown are based on selected occupation and industry groups.

The ODSS cohort includes

~800,000

female workers

Managerial and Administrative

Higher risks of uterine and ovarian cancer were observed among workers in managerial and administrative occupations. It is unclear what is causing this increased risk, although a few studies have suggested that sedentary workplace behaviours, such as reduced occupational physical activity and prolonged sitting may contribute to a higher risk of developing these cancers (11-13). There was no association between managerial occupations and cervical cancer risk in this study.

OCCUPATION	HIGHER RISK (%)	
	UTERINE CANCER	OVARIAN CANCER
Managerial, Administrative	↑ 39%*	↑ 22%
General managers and other senior officials	↑ 263%*	--
Accountants, auditors and financial officers	↑ 76%*	↑ 28%
Other managers and administrators	↑ 51%*	↑ 54%*

* Statistically significant (α=0.05)

Construction

Construction workers, specifically electricians, had a higher risk of invasive† cervical cancer, although no association was observed for in-situ‡ cervical cancer. Other studies have shown similarly elevated risks among construction workers (9,14). A few studies have proposed that diesel engine exhaust and lead exposure may increase the risk of cervical cancer (15,16). No association was observed for ovarian or uterine cancer risks in this study.

OCCUPATION	HIGHER RISK (%)
	INVASIVE CERVICAL CANCER
Construction (overall)	↑ 82%*
Electricians	↑ 172%*

* Statistically significant (α=0.05)

† Invasive cervical cancer: cancer that has grown and spread to surrounding tissue.
‡ In-situ cervical cancer: pre-cancer that starts in the cervix and has not grown or spread to surrounding tissue.

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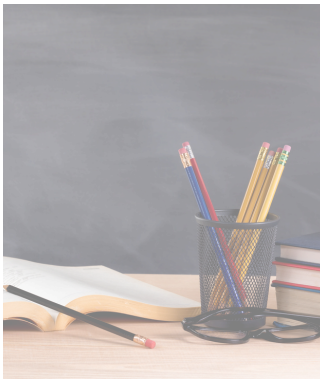
Teaching

Teachers had a higher risk of developing uterine cancer. Sedentary behaviour and reduced occupational physical activity may contribute to increased uterine cancer risk (11). No association was found between teaching occupations and ovarian or cervical cancer risks in this study.

OCCUPATION	HIGHER RISK (%) UTERINE CANCER
Teaching and related (overall)	↑ 38%*
Elementary and secondary school teaching	↑ 35%*
University teaching	↑ 67%*
Other teaching and related occupations	↑ 70%*

* Statistically significant (α=0.05)



Metalworking

Metalworkers had higher risks of developing both invasive and in-situ cervical cancer. There is some evidence linking cervical cancer and exposure to metalworking fluids and trichloroethylene, an organic solvent sometimes used as a metal degreaser (5,7,17). Higher risks of uterine and ovarian cancers were also observed among workers in certain metalworking occupations. The higher risk of ovarian cancer among these workers may be related to trichloroethylene exposure, which has been linked to ovarian cancer in some studies (18).

OCCUPATION / INDUSTRY	HIGHER RISK (%) IN-SITU CERVICAL CANCER	INVASIVE CERVICAL CANCER	UTERINE CANCER	OVARIAN CANCER
OCCUPATION				
Metal product fabricating	↑ 20%*	↑ 38%*	--	↑ 13%
Metal machining	↑ 59%*	--	↑ 60%*	↑ 72%*
Tool and die making	--	--	↑ 300%	--
Metal shaping and forming	↑ 44%*	↑ 34%	--	--
Metal processing	↑ 44%*	--	--	↑ 104%*
INDUSTRY				
Primary metal industries	↑ 13%	↑ 117%*	--	--

* Statistically significant (α=0.05)

Product fabricating, assembling, and repairing

Both in-situ and invasive cervical cancer risk were higher among product fabricating occupations in this study. Some product fabricating workers may be exposed to metalworking fluids and trichloroethylene, which may be associated with increased cervical cancer risk (4-6). In-situ cervical cancer risk was higher for workers in rubber and plastic product fabricating in this study. These workers may be exposed to Bisphenol A (BPA), which some studies have found may increase the risk of cervical cancer (19,20). No associations between product fabricating, assembling, and repairing occupations and ovarian and uterine cancers were observed in this study.

OCCUPATION	HIGHER RISK (%)	
	IN-SITU CERVICAL CANCER	INVASIVE CERVICAL CANCER
Product fabricating, assembling, and repairing	↑ 17%*	↑ 20%*
Metal products	↑ 20%*	↑ 38%*
Motor vehicles	↑ 37%*	↑ 48%*
Rubber, plastic	↑ 42%*	--
Other product fabricating, assembling, and repairing	↑ 15%	↑ 64%*

* Statistically significant (α=0.05)

IMPLICATIONS FOR PREVENTION

Female reproductive cancers are influenced by a variety of factors, and the role of occupational factors is still not well-understood. Further studies are needed to understand the relationship between female reproductive cancer risk and occupational exposures such as metalworking fluids, diesel engine exhaust, lead, and reduced occupational physical activity.

Improving the understanding of risk factors for reproductive cancers among female workers can provide valuable insights for developing occupational cancer prevention strategies, identifying high risk groups, and improving health outcomes for working women.

Among the general population of Ontario, some prevention strategies are already in place. To prevent HPV infection, the main risk factor for cervical cancer, HPV vaccinations have been offered in Ontario schools since the 2007-08 school year (21,22). Cervical cancer screening was introduced in Ontario in the 1970s and has resulted in a significant decrease in cervical cancer rates (23). Differences in screening participation may impact the observed cervical cancer risk among certain groups. Little is known regarding screening rates by occupation, but women with higher socioeconomic status may be more likely to participate in screening programs (24,25). There are no regular screening programs in place for uterine or ovarian cancer in Ontario (26,27).

The Occupational Disease Surveillance System (ODSS) Surveillance Bulletins provide summaries of occupational exposures and disease risks across different industries and occupational groups detected through occupational disease surveillance. At this time the ODSS includes workers from 1983-2019 and follows their health outcomes until 2020. This bulletin reflects only the diseases currently tracked within the ODSS. The system is updated and expanded on an ongoing basis. More information about the ODSS including data sources, methods and the most recent results can be found at occupationalcancer.ca/project/odss/ and occdiseasestats.ca.

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