

**Review of Public Health  
Services in Middlesex County**

Report Appendices



September 2018

# Appendix A

## *Community Health Status Report*

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## Executive Summary

An understanding of the overall health and wellbeing of the residents of Middlesex County<sup>1</sup> is key to effectively plan where to focus public health efforts. This information helps to assess where Middlesex County is doing well and understand where improvements can be made.

This report uses a collection of social and health indicators to create a picture of the health status of the Middlesex County population. It begins with an overview of population and geographic structure characteristics of the Middlesex County population, as well as the social factors, “social determinants” that influence people’s health, including income, employment and education. It then looks specifically at health indicators based on local data available to public health related to deaths, illness and injury, behavioural risk factors, reproductive health and child health. Comparisons are provided, where the data permits, with Ontario and by sex and age group. This helps to identify priority groups in the population experiencing or at increased risk of poor health outcomes which may require special attention. Trends over time were also examined to indicate whether the health status in the Middlesex County community is improving or getting worse.

This report tells us that overall the population of Middlesex County is experiencing good health on a number of measures. Middlesex County residents are generally better off than the province in terms of three key determinants of health: income, education and employment. It is also worth noting that some issues of public health importance are lower in Middlesex County than the province including teen pregnancies, as well as opioid and cannabis-related emergency department visits. In addition, Middlesex County’s average life expectancy at birth is similar to Ontario’s overall at 81.0 years and residents that reach age 65 can expect to live 19.7 more years on average. A long life-expectancy is an indicator that a population is overall doing well on many factors that collectively influence our health.

While overall, Middlesex County is doing very well, there are some areas that warrant our attention. Chronic diseases (including cancers and cardiovascular diseases) and unintentional injuries continue to be the leading causes of avoidable death. Behavioural risk factors that contribute to the development of chronic disease and injury (e.g., alcohol consumption, physical inactivity and smoking), while not different than Ontario, continue to be higher in the population than is ideal for health and wellbeing. For instance, only about half of the population reported being active or moderately active during their leisure time. Preventable injuries of particular concern in the County include: falls, being struck or cut by objects, overexertion, motor vehicle crashes, off-road collisions and concussions. Concussion related emergency department visits have been on the rise in recent years in Middlesex County and are substantially higher than in the province overall.

In addition, some residents within Middlesex County are not as healthy as others or are at higher risk for poor health outcomes. For example, almost a quarter of children entering school in Middlesex County in

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<sup>1</sup> In this report, “Middlesex County” refers to the eight lower tier municipalities (i.e., North Middlesex, Southwest Middlesex, Thames Centre, Strathroy-Caradoc, Middlesex Centre, Adelaide Metcalfe, Lucan Biddulph and the Village of Newbury) but excludes the City of London and the three First Nations communities (i.e., Chippewas of the Thames First Nation (Anishinaabeg of the territory of Deshkan Ziiibiing), Munsee-Delaware Nation (Lenni Lenape) and Oneida (iOnyota’a:ka)) which are politically independent of the County. In addition, to honour the First Nations Ownership, Control, Access and Possession (OCAP) principles, data from the First Nations communities are not included in some of our public health data sources (e.g., BORN).

2015 were vulnerable on a least one area of the Early Development Instrument, and physical health and wellbeing was the single area with the greatest proportion of vulnerable children in Middlesex County.

In summary, this health status report provides a picture to understand and act on health gaps in Middlesex County. While continuing to provide programs and services that support and maintain the population's high levels of health, Middlesex County may benefit from additional efforts in chronic disease prevention including behavior risk factor reduction as well as injury prevention and targeted investments in children's early development.

# 1. Population characteristics

## 1.1. Summary

Meeting the public health needs of a population involves understanding the size and demographic characteristics of the population. For example, knowing that there is a high proportion of young children in a population might focus public health services on preventing childhood illnesses and injuries, while supporting families, and orienting communities, to ensure that children get the very best start in life as possible.

Middlesex County's population was 71,551 people according to the 2016 Census. The population of Middlesex County is concentrated in the three municipalities of: Strathroy-Caradoc, Middlesex Centre, Thames Centre. These three municipalities account for nearly three quarters of Middlesex County's population and one in five of the residents of Middlesex County live in the town of Strathroy itself.

Overall, there were similar numbers of males and females in Middlesex County in 2016. However, there were greater numbers of females than males in the oldest age group, 85 years and older (females 1025: males 545) which is consistent with the longer life expectancy for women in Middlesex County and may indicate that public health could continue to work to close this gap by reducing risk factors for males. Generally, the age pyramid of Middlesex County was constricted in the young adult category (ages 20-39). This may be consistent with a general pattern seen in Ontario where youth and young adults migrate to more urban areas in search of education and employment opportunities (R.A. Malatest & Associates Ltd., 2002). Compared to the population of Ontario, the population of Middlesex County lacks younger adults aged 20-39 years and has a higher proportion of older children and older adults particularly older adult males. This can become a health concern in places that are facing an aging population, as it may become more difficult for the working population to provide for those that may be more vulnerable in the non-working population (i.e., dependents generally considered aged 15 or younger or those 65 and older that are not typically working) (Williams, 2005) (United Nations, "n.d.").

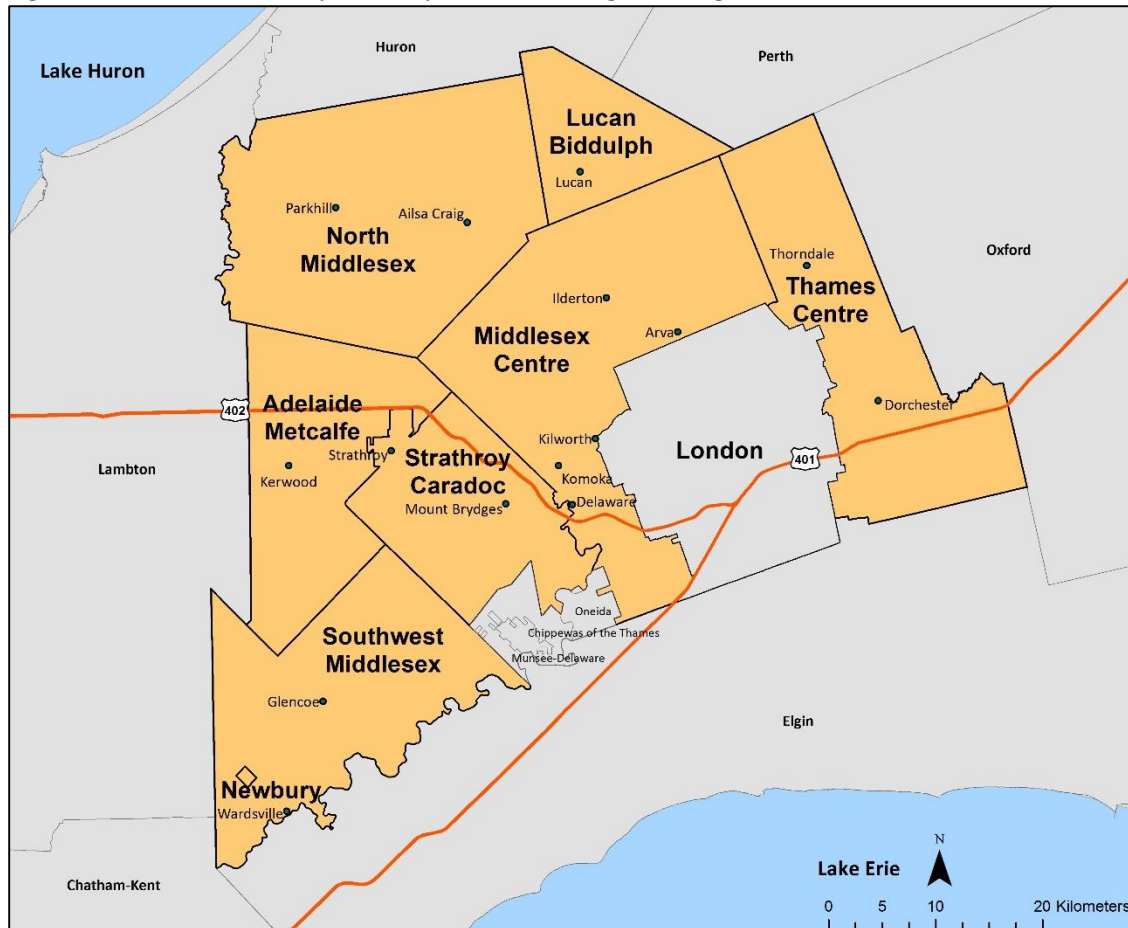
Middlesex County had few immigrants in the past five years, approximately 165 people in total in 2016. They made up a much lower percent of the population (0.2%) than in Ontario overall (3.5%) Recent immigrants were concentrated in the three largest municipalities that surround the City of London. In general, the health of immigrants tends to be better than that of the overall population. This is largely due to the fact that immigrants must generally be healthy to immigrate and often have better diets and health behaviours initially than the Ontario population. However, resettlement may create vulnerabilities and require tailored public health services to reduce the health risks and promote well-being to stay healthy.

About 97% of the population of Middlesex County spoke English most often at home in 2016. Middlesex County had approximately 90 people who spoke French most often at home in 2016. The Middlesex-London Health Unit is a designated French language service area, and therefore endeavors to provide services in both official languages. However, 2.4% of the Middlesex County population spoke neither English nor French at home on a regular basis and may require public health services that meet their specific language needs. This proportion is much lower compared to the 14.4% in Ontario that do not regularly speak an official language at home.

## 1.2. Geography

- Middlesex County covers an area of 2,821 square kilometres in Southwestern Ontario.
- It includes eight municipalities in order of geographic size: North Middlesex, Middlesex Centre, Thames Centre, Southwest Middlesex, Adelaide Metcalfe, Strathroy-Caradoc, Lucan Biddulph and the Village of Newbury (Figure 1).

Figure 1. Middlesex County, municipalities and neighbouring areas, 2018.



## 1.3. Total population and distribution

- The population of Middlesex County in 2016 was 71,551 (Table 1).
- Middlesex County was home to approximately 16% of the total population living in the Middlesex-London Health Unit's catchment area (MLHU's population was 455,526 including the City of London and the First Nations communities that participated in 2016 census).
- Strathroy-Caradoc had the largest population in Middlesex County (29.2%), followed by Middlesex Centre (24.1%) and Thames Centre (18.4%) (Table 1).
- The population of the town of Strathroy (14,401) accounted for 20.1% of Middlesex County's population.



- While the 2016 Census provides the most recent and comprehensive picture of the population, some people were missed during the count. Adjusted population figures will be released by Statistics Canada to more precisely account for this undercount, however until these are released the population in 2016 can generally be adjusted upward by 3.5% to 74,059 (Poirier & Vanderwerff, 2018). Population estimates for 2016 indicate that the count may be higher, closer to 76,093. For the purposes of calculating health indicators for this report, population estimates have been used to estimate the population denominators.

Table 1. Population of Middlesex County and the lower tier municipalities, 2016.

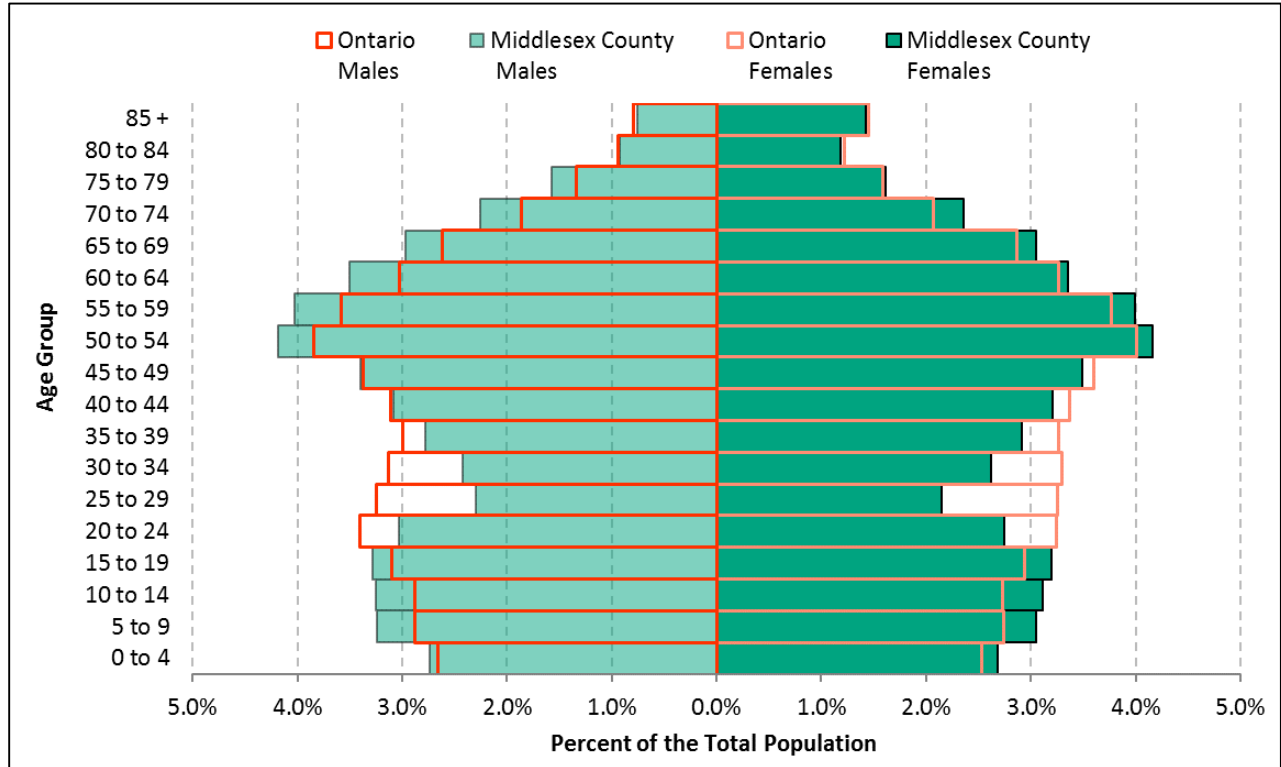
Region	Population	
	Count	Percent (%)
Strathroy-Caradoc	20,867	29.2
Middlesex Centre	17,262	24.1
Thames Centre	13,191	18.4
North Middlesex	6,352	8.9
Southwest Middlesex	5,723	8.0
Lucan Biddulph	4,700	6.6
Adelaide-Metcalf	2,990	4.2
Newbury	466	0.7
<b>Middlesex County</b>	<b>71,551</b>	<b>100</b>

Source: Statistics Canada. 2016 Census of Population (Unadjusted)

#### 1.4. Sex and age distribution

- There were similar numbers of males (35,640) and females (36,075) in Middlesex County. Much of this difference can be accounted for by the greater number of females than males in the oldest age group of 85 years and older (females 1025: males 545).
- Generally, the age pyramid was constricted in the young adult category (ages 20-39).
- Compared to the population of Ontario, Middlesex County had a greater proportion of children (both males and females) between the ages of 5 and 19 years. Middlesex County also had a greater proportion of older adults 50-79 years, particularly older adult males compared to Ontario (Figure 2).
- Middlesex County had a lower proportion of younger adults (both males and females) aged 20-39 (Figure 2). This finding was particularly interesting given the higher proportion of young children that might have parents in this age group.

Figure 2. Population Pyramid, percent of the population, by sex, by age group, Middlesex County and Ontario, 2016.



Data source: Statistics Canada. 2016 Census of Population (Unadjusted)

### 1.5. Recent immigrants

- In Middlesex County in 2016, approximately 165 people (0.2% of the population) were newcomers having recently immigrated to Canada (between 2011–2016; the five years prior to the 2016 Census). This is much lower than Ontario overall (3.5%) (Table 2). This is the most recent comprehensive information available, however it may not fully capture recent immigration waves, e.g., immigrants from Syria.
- Recent immigrants in Middlesex County were concentrated in the three largest municipalities adjacent to the City of London, specifically: Middlesex Centre, Thames Centre and Strathroy-Caradoc (Table 2 2).

Table 2. Number and percent of recent immigrants (immigrated between 2011–2016), Middlesex County and Ontario, 2016.

Region	Recent Immigrants	
	Number	Percent (%)
Adelaide-Metcalf	10	0.3
Lucan Biddulph	15	0.3
Middlesex Centre	50	0.3
Newbury	0	0.0
North Middlesex	0	0.0
Southwest Middlesex	10	0.2
Strathroy-Caradoc	30	0.1
Thames Centre	50	0.4
<b>Middlesex County</b>	165	0.2
Ontario	472,170	3.5

Data source: Statistics Canada. 2016 Census of Population (Unadjusted)

## 1.6. Language

- 1,505 people (2.4%) of the population of Middlesex County spoke one of the non-official languages at home on a regular basis compared to 14.4% in Ontario (Table 3).
- 90 people in Middlesex County (0.02%) were estimated to speak French at home on a regular basis compared to 2.1% in Ontario in 2016 (Table 3).
- For those people in Middlesex County that spoke a non-official language at home, over half spoke Portuguese (505) or German (310). This is followed by Dutch, Polish and Spanish in the top five non-official languages spoken at home in Middlesex County (Table 4).

Table 3. Number and percent of the population, by language spoken most often at home, Middlesex County, lower tier municipalities and Ontario, 2016.

Region	English		French		Non-official language	
	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)
Adelaide-Metcalf	2,890	96.8	0	0.0	65	2.2
Lucan Biddulph	4,575	98.6	0	0.0	30	0.6
Middlesex Centre	16,480	97.0	25	0.1	295	1.7
Newbury	460	97.9	0	0.0	5	1.1
North Middlesex	6,045	98.3	0	0.0	55	0.9
Southwest Middlesex	5,625	98.3	0	0.0	45	0.8
Strathroy-Caradoc	19,615	95.4	35	0.2	600	2.9
Thames Centre	12,655	95.9	20	0.2	405	3.1
<b>Middlesex County</b>	<b>68,500</b>	<b>96.7</b>	<b>90</b>	<b>0.02</b>	<b>1,505</b>	<b>2.4</b>
Ontario	10,328,680	77.6	277,045	2.1	1,916,315	14.4

Data source: Statistics Canada. 2016 Census of Population (Unadjusted)

Table 4. Number of the population speaking non-official languages, by top five languages spoken at home in Middlesex County, Middlesex County, lower tier municipalities and Ontario, 2016.

Region	Portuguese	German	Dutch	Polish	Spanish	Other
Adelaide-Metcalf	25	15	15	0	0	10
Lucan Biddulph	0	10	10	5	0	20
Middlesex Centre	15	20	20	50	30	140
Newbury	0	0	0	0	0	0
North Middlesex	5	5	15	5	0	15
Southwest Middlesex	10	15	10	0	0	5
Strathroy-Caradoc	430	5	20	5	10	115
Thames Centre	20	240	15	25	10	95
<b>Middlesex County</b>	<b>505</b>	<b>310</b>	<b>100</b>	<b>85</b>	<b>60</b>	<b>470</b>
Ontario	67,415	37,255	4,450	52,555	104,820	1,636,025

Data source: Statistics Canada. 2016 Census of Population (Unadjusted)

## 2. Social determinants of health

### 2.1. Summary

Understanding the conditions in which people are born, grow up, live, work and play—are known as the social determinants of health and contribute to the population health needs of communities. Public health aims to reduce the negative impact of social determinants that contribute to avoidable differences in the health status of populations (i.e., health inequities) (Ontario Ministry of Health and Long-Term Care, 2018). Better health is associated with better socio-economic status (Williams, 2018). Generally, Middlesex County is better off than the province in terms of three key determinants of health: income, employment and education. However, within Middlesex County some disparities persist.

Median household income was higher in five out of the eight municipalities and Middlesex County had a much lower percent of the population that was relatively worse-off financially living in low-income after tax in 2015 (2.8%) compared with Ontario (9.8%). However, children are disproportionately affected by low income within Middlesex County compared with seniors aged 65 and older.

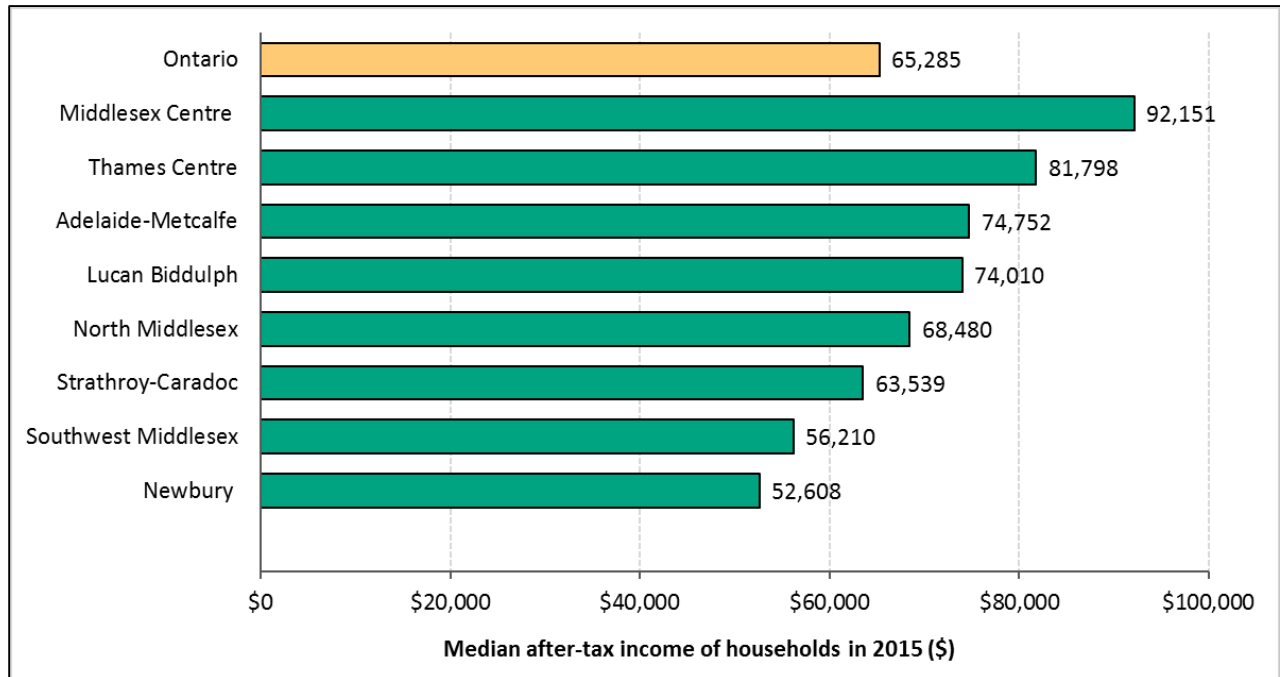
Unemployment rates in Middlesex County were generally better than the province and seven out of eight of the municipalities (all but the Village of Newbury) had rates lower than the province.

Post-secondary education levels in Middlesex County have increased over time from 58.6% in 2006 to 64.1% in 2016 and became similar to the province in 2016 (65.1%). However, the type of postsecondary education differed. The residents of Middlesex County were more likely to have a college, apprenticeship or trades certificate and less likely to have a university degree than Ontarians as a whole.

## 2.2. Income

- The 2015 median after-tax income for households was higher in five of the eight municipalities in Middlesex County compared with Ontario, specifically: Middlesex Centre, Thames Centre, Adelaide-Metcalfe, Lucan Biddulph and North Middlesex (Figure 3).
- Middlesex Centre households had a notably higher median income at \$92,151.

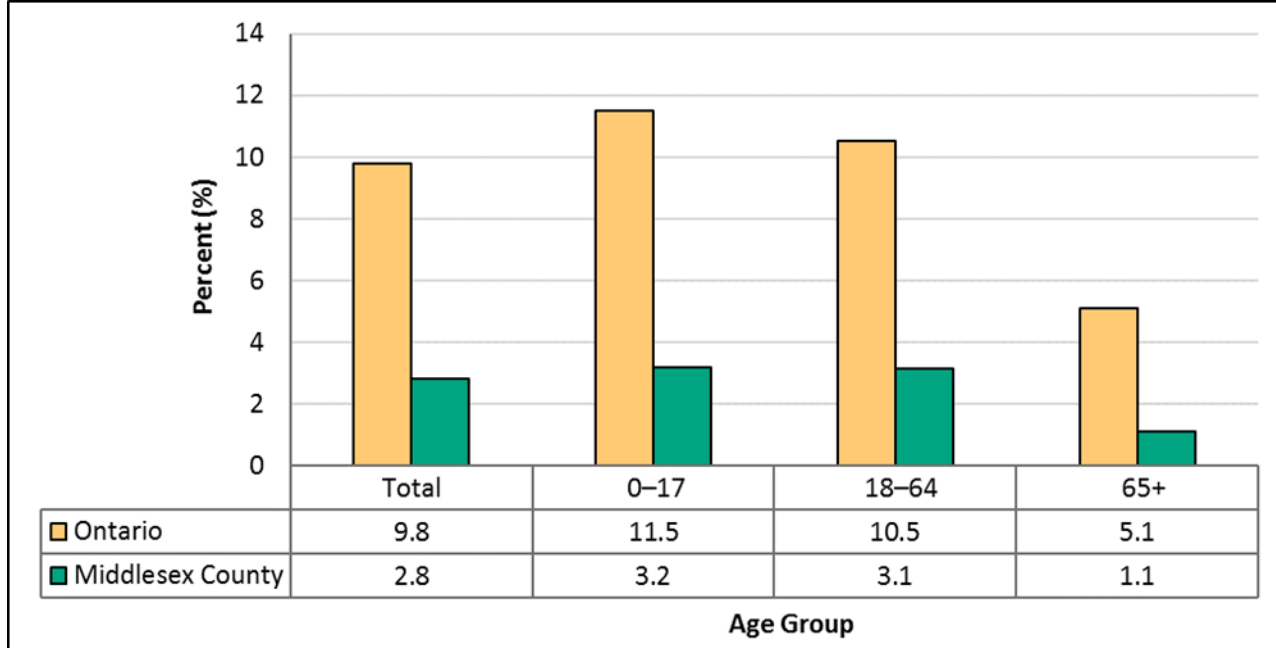
Figure 3. Median after-tax income of households, Middlesex County by lower tier municipality and Ontario, 2015.



Data source: Statistics Canada. 2016 Census of Population

- Overall, approximately 1,975 (2.8 %) of the population lived below the low-income cut-off (LICO) after-tax in 2015 in Middlesex County (Figure 4). Low-income cut-offs are used as a measure of those who are relatively worse-off financially, and not as an absolute measure of poverty. This measure reports the income level at which a family may be in financial difficulty because they will have to spend a greater proportion of their household income on food, clothing and shelter than the average family of a similar size. The cut-offs vary by family size and by size of community (“Table 4.3,” 2017).
- The proportion of people living in low-income in Middlesex County was better (i.e., lower) than Ontario (9.8%).
- A greater percent of young people (less than 18 years of age) lived below the LICO in 2015 (3.2%) compared to seniors (aged 65+) (1.1%) in Middlesex County.

Figure 4. Percent of the population below the low income cut-off after tax, by age group, Middlesex County and Ontario, 2015.



Data source: Statistics Canada. 2016 Census of Population.

### 2.3. Employment

- In Middlesex County in 2015, approximately 1,835 or 4.6% were unemployed of those participating in the labour force aged 15 years and older (Table 5).
- Overall, the unemployment rate of Middlesex County was lower than the Ontario rate (7.4%). The 2015 unemployment rate by County municipality was lower than or the same as the Ontario rate for seven of the eight municipalities. The unemployment rate was higher in the Village of Newbury (18.4%) (Table 5).
- More recent information and time trends are not available for Middlesex County, however in general the employment rates in Ontario peaked in 2009 at 9.2% and have since improved.

Table 5. Unemployment count and rate for population aged 15+, Middlesex County lower tier municipalities and Ontario, 2015.

Region	Number Unemployed	Number Participating in Labour Force	Unemployment Rate (%)
Newbury	35	190	18.4
Lucan Biddulph	130	2,730	7.4
Strathroy-Caradoc	545	11,235	4.9
Southwest Middlesex	135	3,000	4.5
Thames Centre	345	7,680	4.5
Middlesex Centre	425	9,690	4.4
North Middlesex	155	3,535	4.4
Adelaide-Metcalf	65	1,715	3.8
<b>Middlesex County</b>	<b>1,835</b>	<b>39,775</b>	<b>4.6</b>
Ontario	529,525	7,141,675	7.4

Data source: Statistics Canada - 2016 Census, 25% Sample Data. Catalogue Number 98-400-X2016365.

## 2.4. Education

- In 2016, in Middlesex County, 9.9% of adults aged 25-64 had not completed high school; 26.1% had a high school certificate or equivalent and 64.1% had a postsecondary certificate, diploma or degree (Table 6).

Table 6. Percent of the population (age 25–64) by highest educational attainment, Middlesex County and Ontario, 2016.

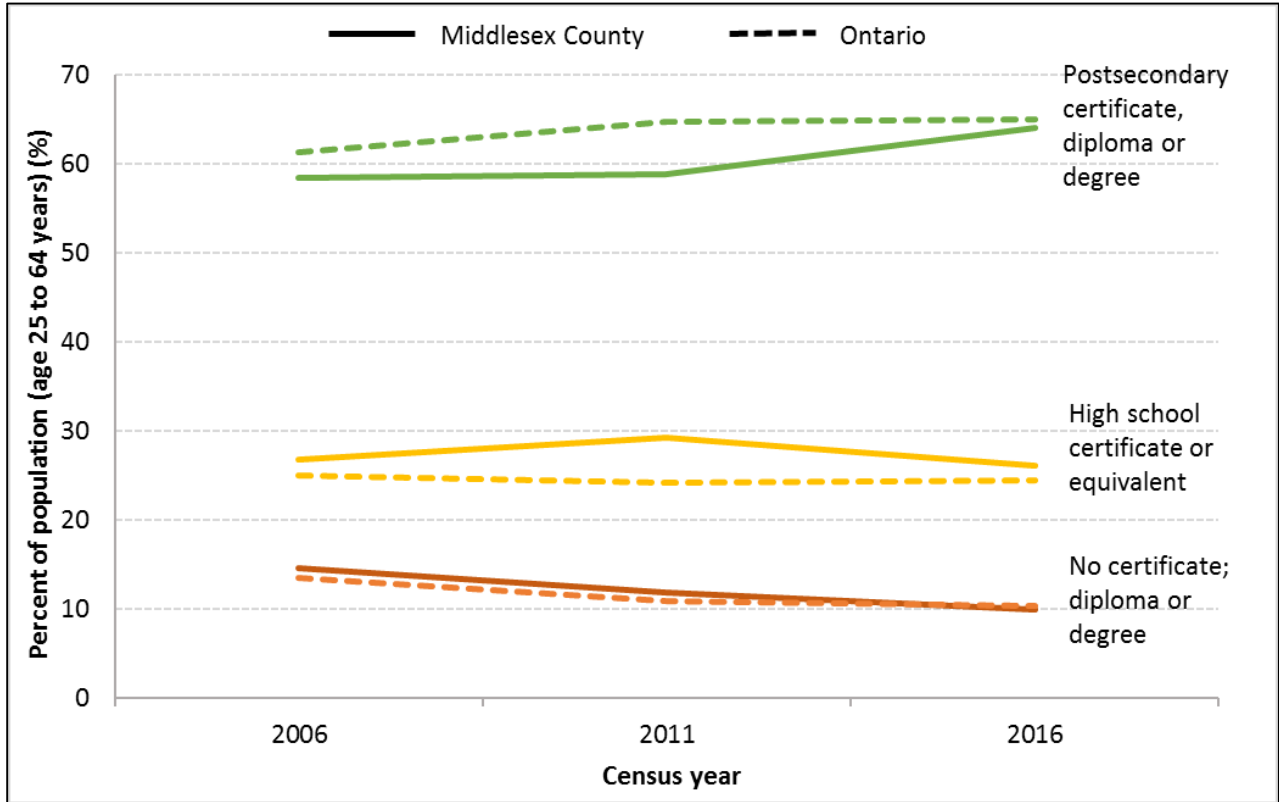
Highest Level of Educational Attainment	Middlesex County (%)	Ontario (%)
No certificate, diploma or degree	9.9	10.4
High school certificate or equivalent	26.1	24.5
Postsecondary certificate, diploma or degree	64.1	65.1
Apprenticeship or trades certificate or diploma	9.2	6.2
College, CEGEP or other non-university certificate or diploma	33.7	24.7
University certificate or diploma below the bachelor level	2.2	2.4
University certificate, diploma or degree	19.0	31.9

Data source: Statistics Canada, 2016 Census of the Population.

- The percent of the population aged 25–64 with postsecondary education in Middlesex County increased over time from 58.5% in 2006 to 64.1% and is now similar to Ontario (65.1%) (Figure 5)
- The type of postsecondary educational certificate obtained by the population in Middlesex County differs from Ontario. The residents of Middlesex County were more likely to have a college diploma (County 33.7%; Ontario 24.7%) or certificate in the apprenticeship or trades (County 9.2%; Ontario 6.2%) and less likely to have a university diploma (County 19.0%; Ontario 31.9%) (Figure 5).



Figure 5. Trends over time in highest level of educational attainment, percent of the population (25–64 years), Middlesex County and Ontario, 2006–2016.



Data source: Statistics Canada, 2006 Census, 2011 NHS, 2016 Census.

## 3. Deaths

### 3.1. Summary

Death rates, also referred to as mortality rates, are frequently used as indicators of the overall health of a population. Trends in mortality can illustrate the health problems in our community that have the biggest impact on the population. Changes in mortality rates over time may be due to several different factors taking place in the community such as changes in the standard of living, the environment or other social determinants of health. Changes may also be due to access to quality health care, improved diagnosis and treatment of illness or the emergence of new health issues not seen before. Health protection and promotion efforts, such as those related to smoking prevention and cessation, may also have an important impact on mortality rates in populations. Rates of leading causes of death indicate which diseases affect a community in the biggest way. Looking at the age and sex of people who die from each disease gives an idea of who is affected most by each cause of death.

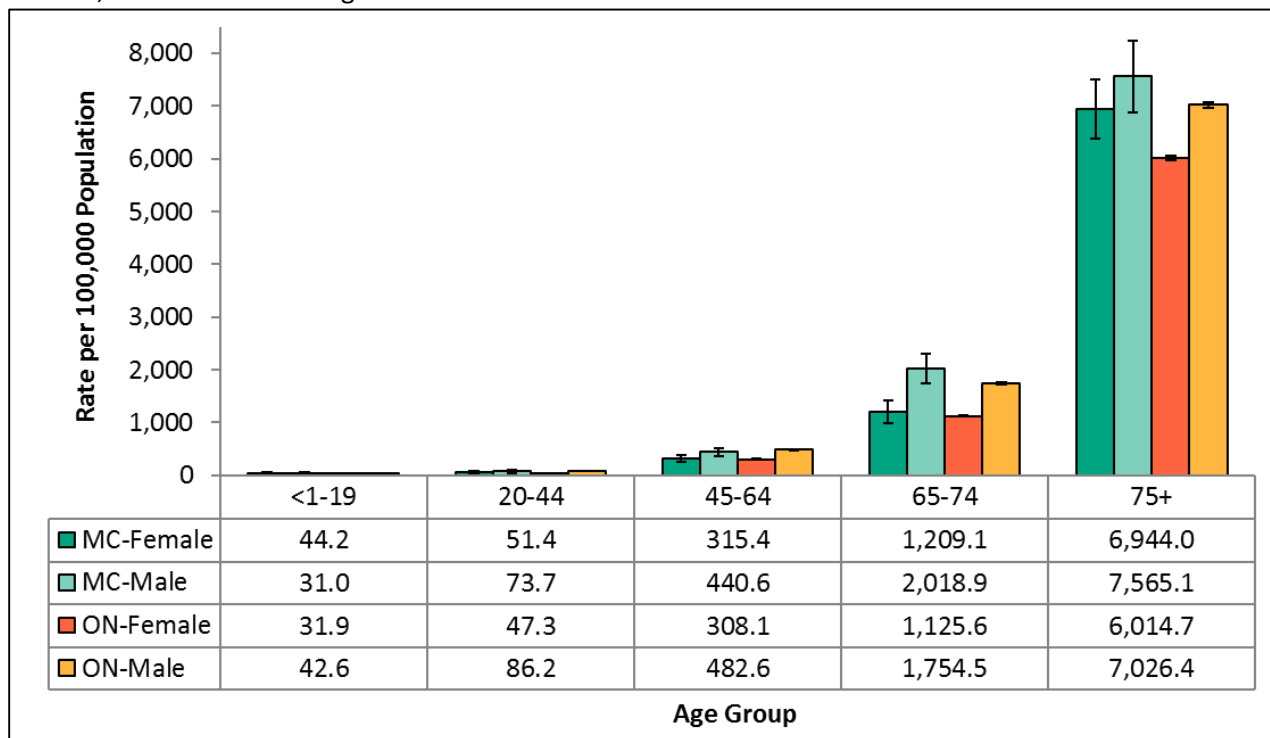
Life expectancy is the average length of time that an individual will live if subjected to the mortality experience for the specified population and time period. Using data from 2010 to 2012, Middlesex County residents can expect to live on average 81.0 years at birth and 19.7 more years at age 65. The life expectancy for males was lower than females and the mortality rate for males was higher than for females.

Males were much more likely to die prematurely than females in Middlesex County, generally reflecting higher rates of deaths in males at younger ages. Deaths due to breast cancer and lung cancer were the most common cause of premature death for females in Middlesex County; whereas for males it was ischemic heart disease.

### 3.2. Deaths by age group

- Death rates in Middlesex County and Ontario show an expected large rise in older age groups, particularly among those aged 75 years and older (Figure 6). For both sexes, mortality rates among those 75 years and older were higher for Middlesex County than Ontario, however the rates were only significantly different for females.
- For all groups above 20 years of age, age-specific mortality rates in Middlesex County were higher for males than for females. In Ontario, age-specific mortality rates were higher for males in age all groups.

Figure 6. All cause mortality rates per 100,000 population, by sex, by age group, Middlesex County and Ontario, 2010 to 2012 average.



Data source: Ontario Mortality Data, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: June 21, 2018; Population Estimates, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario, Date Extracted: May 11, 2018.

### 3.3. Leading causes of death

- The top eight leading causes of death between 2010 and 2012 in Middlesex County were chronic diseases (Table 7): ischemic heart disease, dementia and Alzheimer’s disease, lung cancer, cerebrovascular diseases, lower respiratory diseases, colorectal cancer, diabetes and lymph and blood cancer. These accounted for 58.4% of all deaths. The ninth and tenth leading causes of death were influenza and pneumonia, and falls, respectively.
- The top ten leading causes of death were the same for Middlesex County and Ontario, with the top eight causes following the same ranking order.
- Ischemic heart disease, the leading cause of death in Middlesex County, accounted for 80% more deaths as lung cancer, the second leading cause of death.
- The categories used for leading causes of death are based on a standard list derived by Becker *et al.* (2006) using the International Statistical Classification of Diseases and Related Health Problems tenth revision (ICD-10). They are ranked to demonstrate and compare the most frequently occurring causes out of the total number of deaths in a population. The number of deaths presented is the average number per year during this time period.

Table 7. Number, percent and rank of the leading causes of death, Middlesex County and Ontario, 2010 to 2012 annual average.

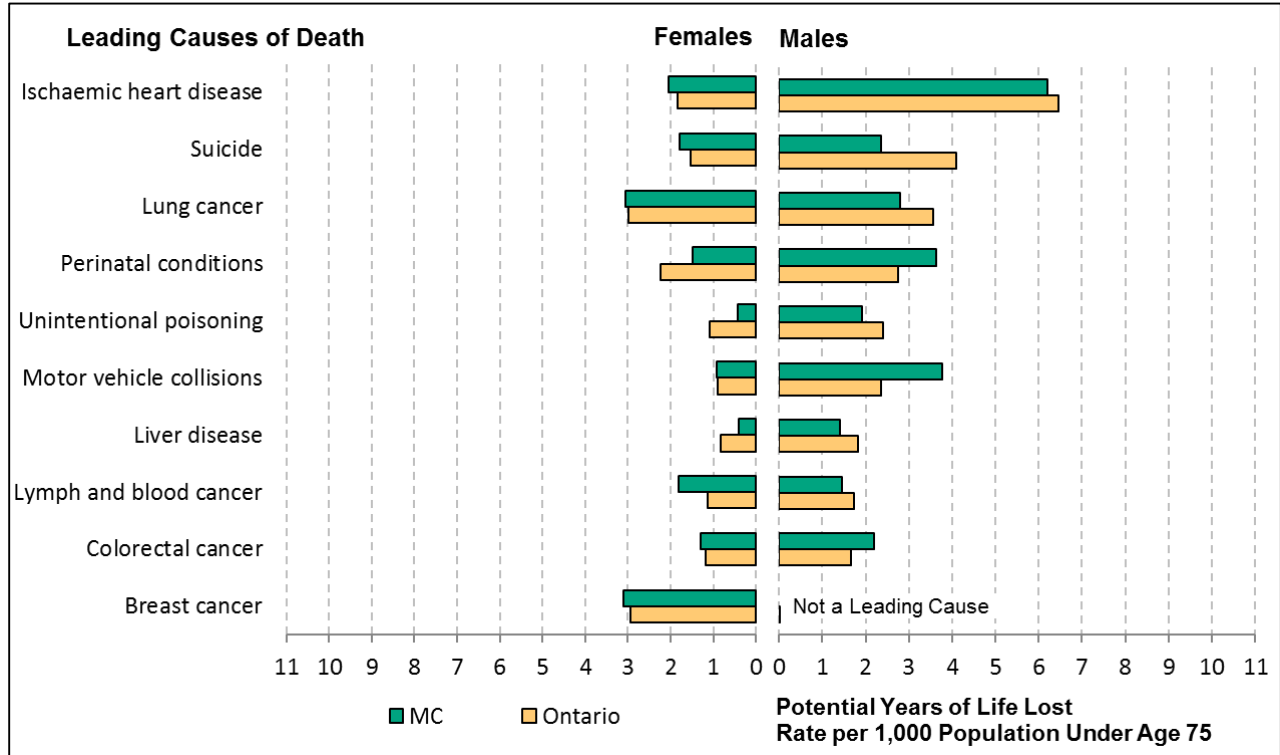
Leading Causes of Death	Average Annual Number of Deaths Middlesex County	Percent of All Deaths Middlesex County (%)	Ontario Rank
Ischemic Heart Disease	92	18.2	1
Dementia and Alzheimer’s Disease	51	10.1	2
Lung Cancer	38	7.5	3
Cerebrovascular Diseases, incl. Stroke	31	6.2	4
Lower Respiratory Diseases	26	5.2	5
Colorectal Cancer	21	4.2	6
Diabetes	20	4.0	7
Lymph and Blood Cancer	14	2.9	8
Influenza and Pneumonia	14	2.7	10
Falls	13	2.7	9

Data source: Ontario Mortality Data, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: June 21, 2018.

### 3.4. Potential years of life lost (PYLL)

- PYLL is an indicator of premature mortality. It measures the number of years lost from deaths before age 75. The younger a person is when they die, the greater the number of potential years of life that are lost.
- As was the case in Ontario, males showed higher rates of PYLL than females in Middlesex County, generally reflecting higher rates of deaths in males at younger ages (Figure 7).
- Deaths due to breast cancer and lung cancer showed the highest PYLL rates for females in Middlesex County. The PYLL rates for both were slightly higher in Middlesex County females compared to Ontario females.
- Ischaemic heart disease had the highest PYLL rate for males in both Middlesex County and Ontario. The PYLL rate for Middlesex County males was slightly lower than that for Ontario.
- Deaths due motor vehicle collisions had the 2nd highest PYLL rate for males in Middlesex County; a rate higher than that for Ontario.
- The presence of deaths due to perinatal conditions in this list of PYLL rates is largely reflective of the very young ages at which people die of these conditions. Compared to Ontario, the rate among women was lower for Middlesex County females, but higher for Middlesex County males.
- For all cancers on the list (i.e., lung, lymph and blood, colorectal and breast), the PYLL rates for women were higher for Middlesex County than Ontario.

Figure 7. Potential years of life lost (PYLL) for leading causes of death, by sex, Middlesex County Ontario, 2010 to 2012 average.



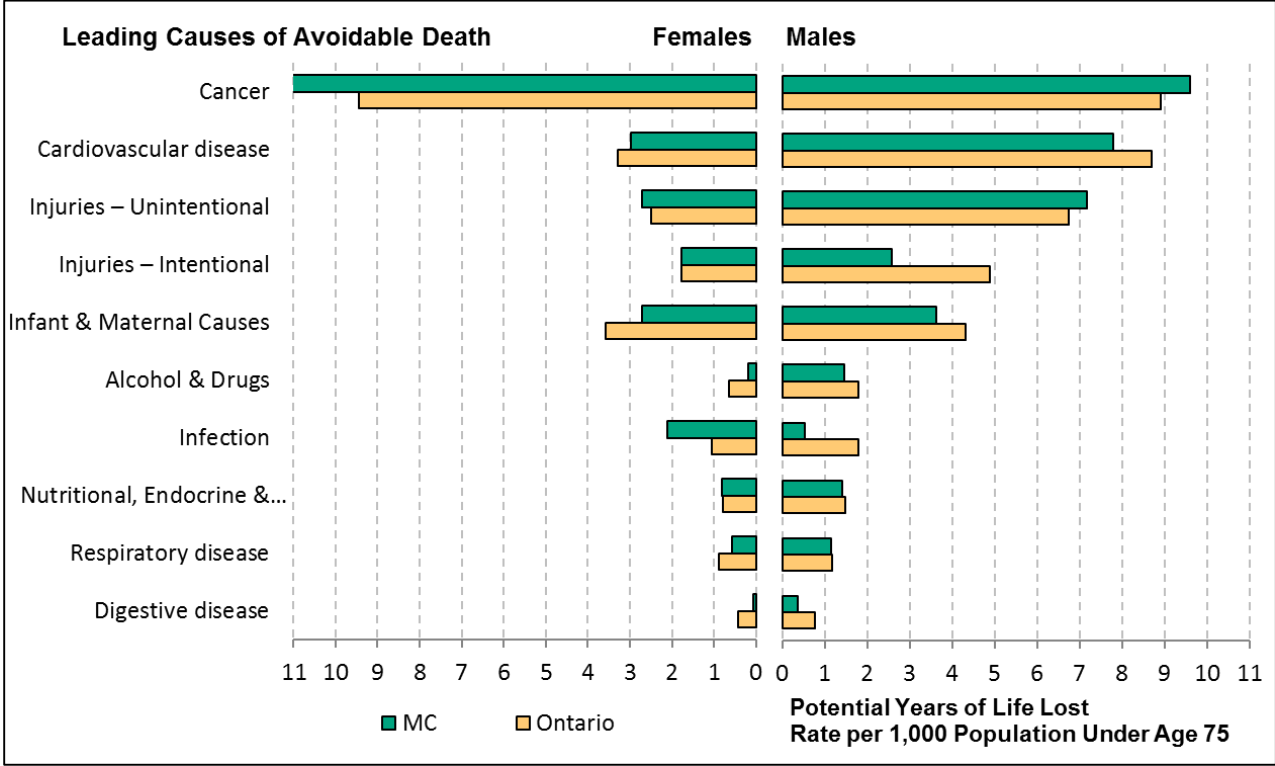
Data source: Ontario Mortality Data, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: June 21, 2018. Population Estimates, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario, Date Extracted: May 11, 2018.

### 3.5. Avoidable death

- Avoidable death refers to the number of deaths for every 1,000 people that could potentially have been avoided through effective health care, health promotion and disease prevention policies (CIHI, 2012).
- The lower the number the better; it means that fewer individuals died prematurely from preventable or treatable causes.
- As was the case in Ontario, males showed higher rates of PYLL from avoidable causes than females in Middlesex County, generally reflecting higher rates of deaths in males at younger ages (Figure 8).
- For both sexes, cancer was the leading cause of avoidable death in both Middlesex County and Ontario. The PYLL rates for both sexes were higher for Middlesex County residents compared to Ontario.
- Cardiovascular diseases, such as ischaemic heart disease, cerebrovascular disease, and rheumatic heart disease, were the second leading cause of avoidable death for both sexes in Middlesex County. PYLL rates for both females and males in Middlesex County were lower than Ontario.
- Among females in Middlesex County, the third leading causes of avoidable death were due to unintentional injuries (e.g., falls, accidental poisoning, drowning) and infant and maternal causes (e.g., complications of perinatal period, congenital malformations, chromosomal anomalies).

- Among males in Middlesex County, the third leading cause of avoidable death was unintentional injuries and the PYLL rate was higher than Ontario.

Figure 8. Potential years of life lost from leading causes of avoidable death, by sex, Middlesex County and Ontario, 2010 to 2012 average.



Data source: Ontario Mortality Data, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: June 21, 2018. Population Estimates, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario, Date Extracted: May 11, 2018.

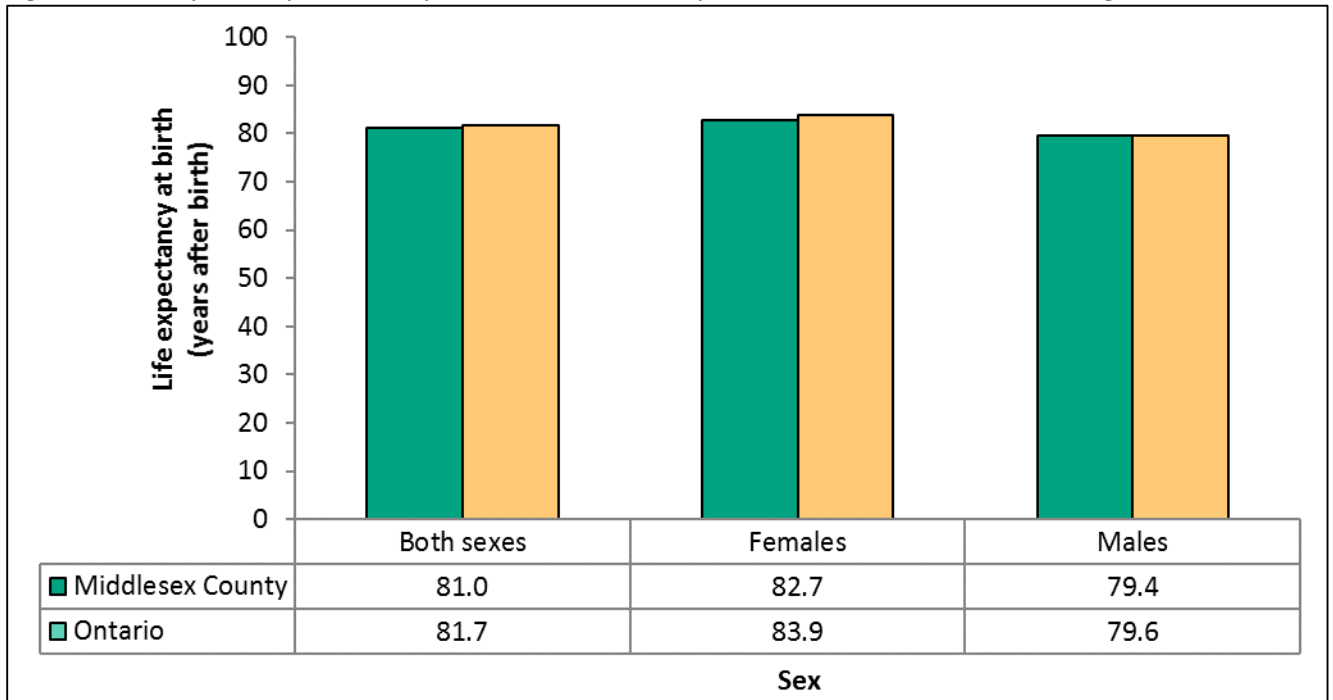
### 3.6. Life expectancy

- Life expectancy is the average length of time that an individual will live if subjected to the mortality experience for the specified population and time period.
- Years of life expectancy are based on life tables containing mortality rates specific to sex and age groups for Middlesex County during 2008 to 2012. The resulting life expectancies are averages which are assumed to hold true for as long as the mortality picture for that time period remains the same.
- Middlesex County residents can expect to live on average 81.0 years at birth and 19.7 more years at age 65.

#### 3.6.1. Life expectancy at birth

- Life expectancies were higher for females than males at birth and at age 65 (Figure 9).
- Life expectancy at birth and at age 65 were slightly lower for Middlesex County compared to Ontario.

Figure 9. Life expectancy at birth, by sex, Middlesex County and Ontario, 2008 to 2012 average.

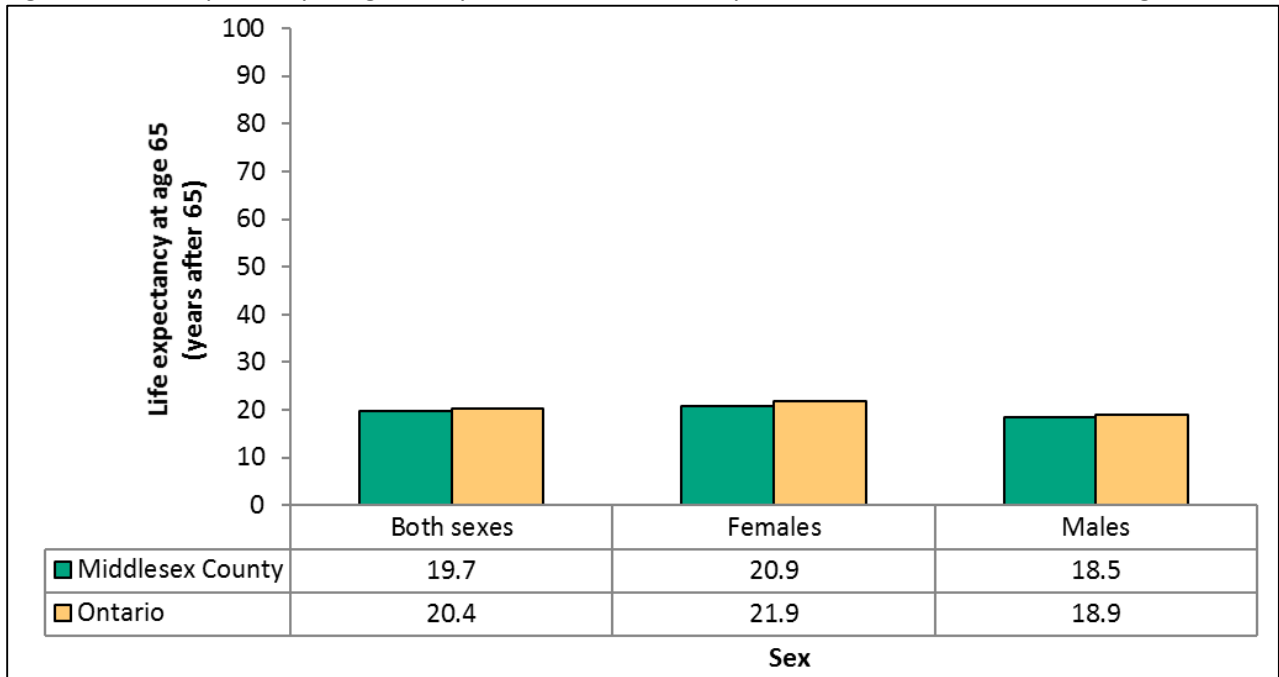


Data source: Ontario Mortality Data, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: June 21, 2018.

### 3.6.2. Life expectancy at age 65

- Life expectancy at age 65 was higher for females than males for both Middlesex County and Ontario (Figure 10).
- Middlesex County residents can expect to live on average an additional 19.7 years at age 65, compared to 20.4 years for Ontario.

Figure 10. Life expectancy at age 65, by sex, Middlesex County and Ontario, 2008 to 2012 average.



Data source: Ontario Mortality Data, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: June 21, 2018.



## 4. Illness and Injury

### 4.1. Summary

Chronic diseases make up the leading cause of premature death and potential years of life lost in Middlesex County. While less impactful than chronic disease, injuries are also within the top causes of death and show a large burden in potential years of life lost. Looking at trends of health services use for chronic conditions and injuries gives a sense of the diseases and conditions that affect people throughout their lives. By combining this information with leading causes of death and behavioural risk factor data, public health agencies can determine how to effectively focus health promotion and protection activities.

Healthy weight has been measured by body mass index (BMI). This is ratio of weight to height ( $\text{kg}/\text{m}^2$ ). Normal weight is classified as a BMI of 18.5–24.9, overweight is a BMI of 25.0–29.9 and obese is a BMI 30.0 and above. It is an important predictor of many chronic conditions including several of the leading preventable causes of death in Middlesex County. Over 60% the population was considered overweight or obese in Middlesex County in 2013/14. This represents an area of population health risk. Diabetes is a chronic condition for which BMI is a predictor. Looking at the rates of diabetes in the population we see a fairly steady rate over time between the years of 2004 to 2017. In general, the Middlesex County rate is lower than that of the province and males are disproportionately affected with higher rates.

Injuries commonly bring people to the emergency department for care and Middlesex County is no exception. In fact, rates of emergency department (ED) visits for injury were significantly higher in Middlesex County (127.3 per 1,000 people) compared to Ontario (101.1 per 1,000 people). The rate of deaths from injuries, however, was not higher than Ontario. This indicates that residents of Middlesex County experienced more non-fatal injuries than those in the province overall. The most common reason for an injury-related visit to the ED was falls; which was higher in females than males. Being struck against or cut by objects and overexertion were the next most common causes for both sexes. Motor vehicle crashes were the fifth most common injury for females and sixth most common for males. Off-road vehicle collision rates were higher than the provincial rate; whereas, pedestrian-related injury visits are lower. There is no difference with cycling collisions.

Intentional injuries such as the ED visit rate for self-harm in Middlesex County was similar to the Ontario rate. The rate of assault-related ED visits was significantly lower than the province.

Concussion-related ED visits have also been on the rise in recent years and those in Middlesex County experience a substantially higher rate than in the province overall. Local research indicates children in rural populations who experience concussions are much more likely to have sustained the injury in a motor vehicle crash compared to their urban counterparts (Stewart, Gilliland & Fraser, 2014).

The harms associated with drug use is important to consider in light of the public health crisis related to opioids and cannabis legalization in Canada. In Ontario there has been an increase over time in emergency department visits associated with each of these substances both for poisonings and related mental or behavioural disorders. It is worth noting that rates of ED visits in Middlesex County are lower than Ontario and the difference is statistically significant for both cannabis and opioids. Cannabis visit rates have increased significantly since 2004. However, opioid ED visits have not shown a statistically

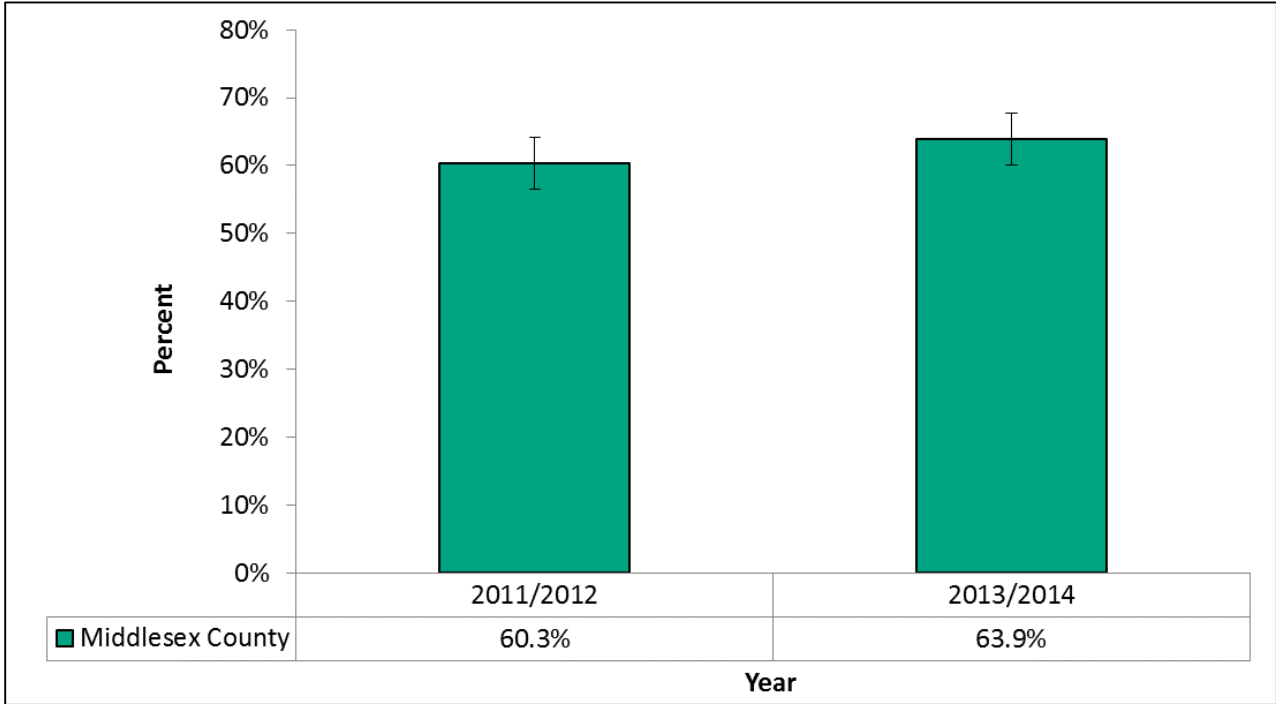
significant increase between 2004 and 2017. This is a marked difference from the trend seen in Ontario and surrounding communities.

There are approximately 70 diseases of public health significance that are reported to the local Medical Officer of Health under the *Health Protection and Promotion Act*. Between 2005 and 2017, the average reported incidence rates of HIV/AIDS, hepatitis C, and active tuberculosis cases was lower among Middlesex County residents compared to the provincial rate.

**4.2. Healthy weights**

- In 2013/2014, 63.9% of the adults aged 18 and over were considered overweight or obese based on their body mass index (BMI) (Figure 11).
- This was not significantly higher than the rate seen in 2011/2012 in Middlesex County.

Figure 11. Percent of population (age 18+) overweight or obese according to body mass index category, Middlesex County and Ontario, 2011–2012 and 2013-2014.

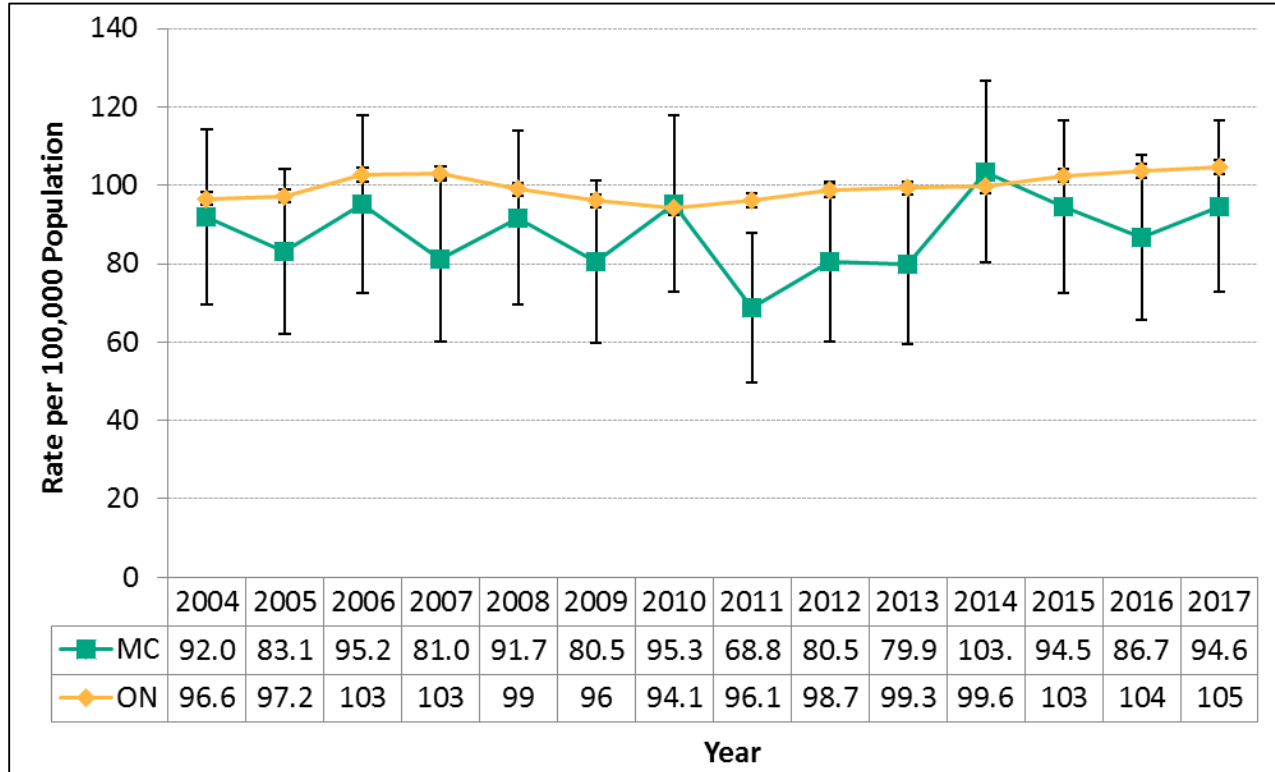


Data source: Rapid Risk Factor Surveillance System [Jan 2011 – Dec 2014], Extracted August 24, 2018

**4.3. Diabetes**

- The rate of hospitalizations for diabetes was 94.6 per 100,000 in 2017 (Figure 12).
- Between the years 2004 and 2017 the rate of diabetes-related hospitalizations in Middlesex County did not change significantly.
- Rates of hospitalizations for diabetes in Middlesex County were generally lower than provincial rates but not significantly. Because of small population numbers the rates varied from year to year but no clear upward or downward trend emerged over the time period.
- Males tended to have higher rates compared to females, but this difference was not statistically significant in all years (data not shown).

Figure 12. Diabetes hospitalizations, unadjusted rates per 100,000 population, Middlesex County and Ontario, 2004 to 2017.



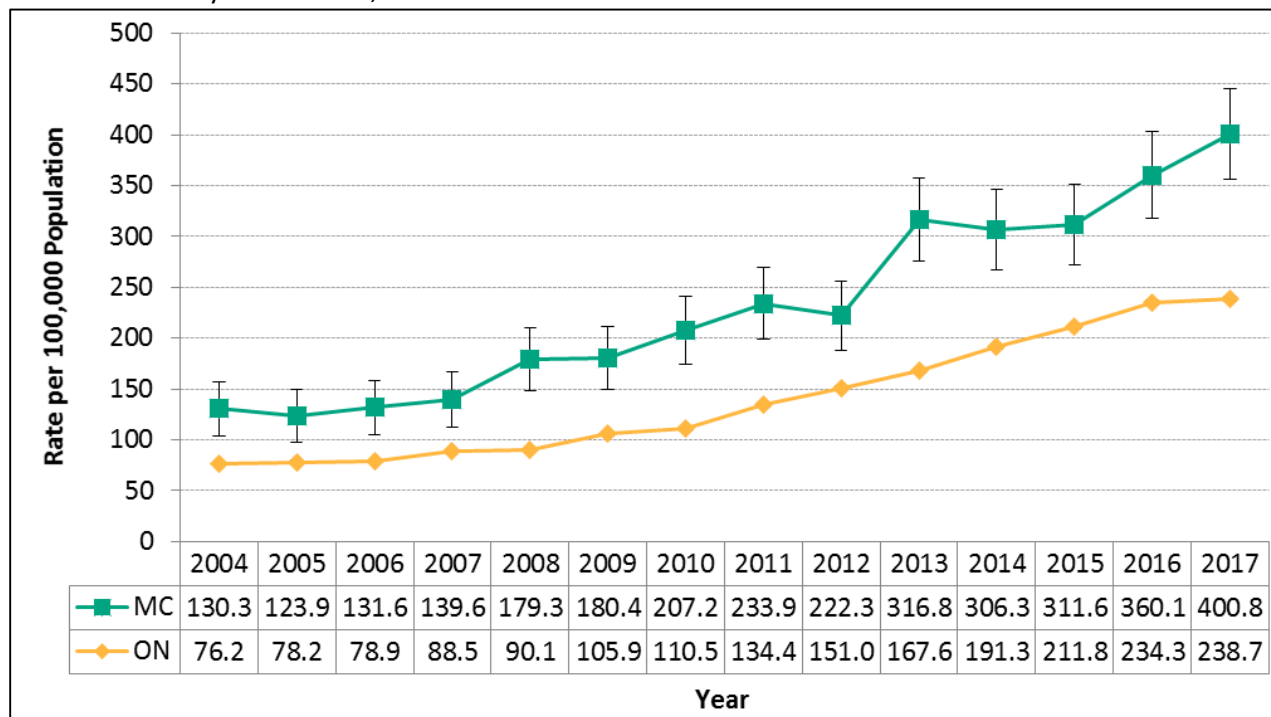
Data source: Inpatient Discharges 2004-2017, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: June 16, 2018.

#### 4.4. Injuries

##### 4.4.1. Concussions

- Concussion-related visits to the emergency department have been on the rise since 2004 for both Middlesex County and Ontario residents (Figure 13). The rate in 2017 was more than three times higher than it was in 2004 jumping to 400 visits per 100,000 people. This change over time is statistically significant.
- Over the entire time period the rate in Middlesex County has been significantly higher than the provincial rate.
- There was no statistically significant difference in the rate between males and females (data not shown).

Figure 13. Unadjusted rates of emergency department visits for concussions per 100,000 population, Middlesex County and Ontario, 2004 to 2017.

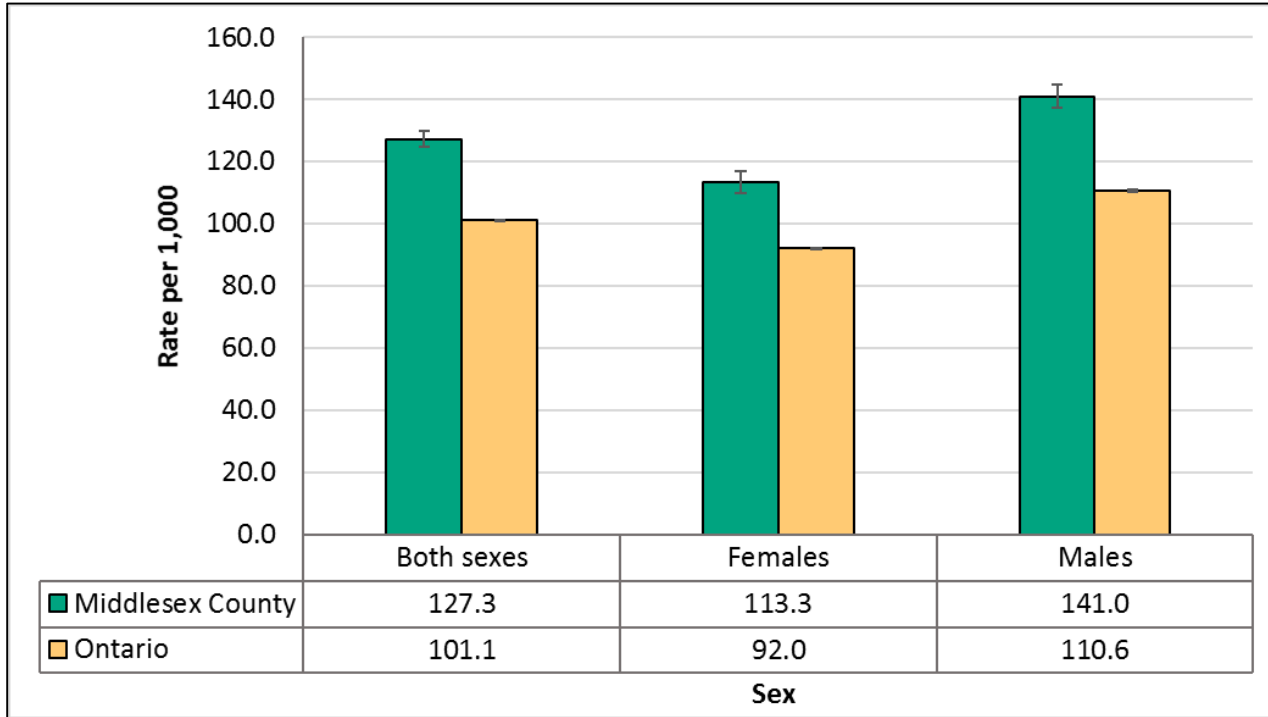


Data source: National Ambulatory Care Reporting System (NACRS), Ontario Ministry of Health and Long-term Care, IntelliHEALTH ONTARIO, Extracted: August 9, 2018.

#### 4.4.2. Unintentional injuries

- Unintentional injury ED visit rates were significantly higher in Middlesex County than Ontario for both sexes. The rate in males was significantly higher than females (Figure 14).
- Falls were the leading cause of injuries bringing people in Middlesex County to the emergency department between 2015 and 2017. This is, by far, the injury cause with the largest number of ED visits for females (Table 8).
- Falls were also the leading cause of death due to injury in both men and women and transport collisions the 2<sup>nd</sup> leading cause of death (data not shown).
- Injuries related to being struck or cut by objects and overexertion were the next most common causes of emergency department visits.
- Motor vehicle collisions were the fifth leading cause of injury related ED visits in females and the sixth most common in males.
- Included within the motor vehicle and other land transport collisions categories are injuries related to cycling ( $148.7 \pm 27.5$  visits per 100,000 people) off-road vehicle ( $110.4 \pm 23.7$ ) and pedestrian-related ( $30.8 \pm 12.5$ ) collisions. Note that off-road vehicle collision rates were higher than the provincial rate; whereas, pedestrian-related injury visits were lower. There is no difference with cycling collisions.
- Emergency department visit rates for intentional injuries such as self-harm in Middlesex County ( $124.1 \pm 25.1$  visits per 100,000 people) was similar to the Ontario rate whereas assault-related ED visits ( $160.1 \pm 28.5$ ) were significantly lower than the province.

Figure 14. Emergency department visits for all injuries, unadjusted rates per 1,000 population, by sex, Middlesex County and Ontario, 2015 to 2017 annual average.



Data source: National Ambulatory Care Reporting System (NACRS), Ontario Ministry of Health and Long-term Care, IntelliHEALTH ONTARIO, Extracted: August 16, 2017.

Table 8. Counts and unadjusted rates per 100,000 population, by sex, Middlesex County, 2015 to 2017 annual average.

Middlesex County rank	Cause	
	Unadjusted rate per 100,000 ± 95% Confidence Interval (Count)	
	Females	Males
1	Falls* 4,049.6 ± 203.1 (1527)	Falls* 3,377.3 ± 184.7 (1285)
2	Struck by/against object* 1,708.4 ± 131.9 (644)	Struck by/against object* 2,812 ± 168.5 (1,070)
3	Overexertion* 1,004.0 ± 101.1 (379)	Cut/pierced by object* 1,687.3 ± 130.5 (642)
4	Cut/pierced by object* 742.4 ± 87 (280)	Overexertion* 1,063.6 ± 103.6 (405)
5	Motor vehicle collision 637.2 ± 81 (240)	Foreign body in eye/orifice* 1,049.5 ± 102.9 (399)
6	Bite by Dog or other Mammal* 332.3 ± 58.2 (125)	Motor vehicle collision* 807.7 ± 90.3 (307)
7	Caught/crushed between objects* 295.2 ± 54.8 (111)	Caught/crushed between objects* 437.2 ± 66.4 (166)
8	Foreign body in eye/orifice 281.0 ± 53.5 (106)	Bite by dog or other mammal* 261.9 ± 51.4 (100)
9	Insect bite 198.9 ± 45.0 (75)	Other land transport collisions 223.4 ± 47.5 (85)
10	Other land transport collisions* 197.1 ± 44.8 (74)	Poisoning 184.9 ± 43.2 (70)
All unintentional injuries*	11,008.6 ± 334.9 (4,152)	13810.5 ± 373.4 (5,254)

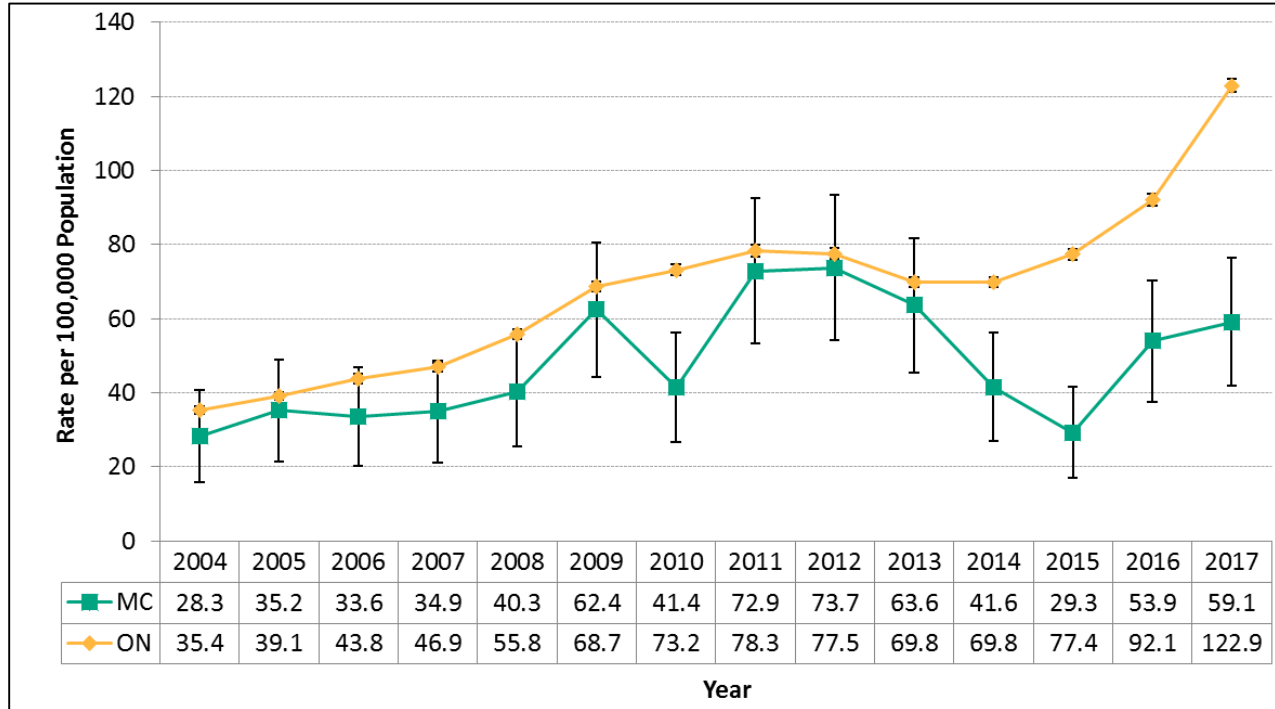
Data source: National Ambulatory Care Reporting System (NACRS), Ontario Ministry of Health and Long-term Care, IntelliHEALTH ONTARIO, Extracted: August 16, 2017.

Note: \* indicates the MC sex-specific rate is statistically significantly higher than the ON sex-specific rate.

#### 4.5. Opioids

- Emergency department visits related to opioid poisonings combined with mental or behavioural disorders due to opioids have increased in Ontario over time, however rates in Middlesex County have not (Figure 15).
- Due to small numbers the yearly rates fluctuate. Since 2013 rates declined in Middlesex County and then increased again in 2016.
- Since 2014 there has been a lower rate of opioid-related ED visits in Middlesex County compared to Ontario. This difference is statistically significant.
- Differences between males and females were not seen in Middlesex County data, whereas males have a significantly higher proportion of visits than females in province overall (data not shown).

Figure 15. Opioid-related emergency department visits, counts and unadjusted rates per 100,000 population, Middlesex County and Ontario, 2004 to 2017.

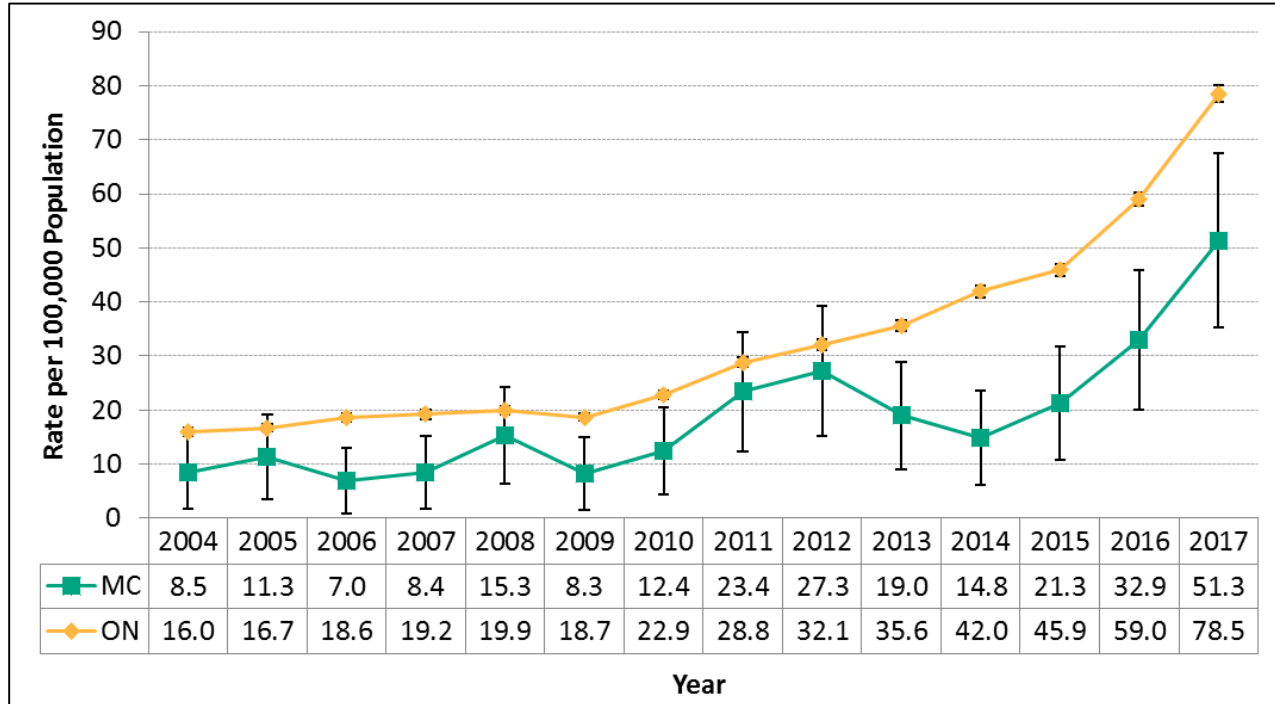


Data source: National Ambulatory Care Reporting System (NACRS), Ontario Ministry of Health and Long-term Care, IntelliHEALTH ONTARIO, Extracted: August 23, 2018.

#### 4.6. Cannabis

- Cannabis-related visits to the emergency department have been on the rise since 2004 for both Middlesex County and Ontario residents (Figure 16). The rate in 2017 was more than five times higher than it was in 2004 jumping from 8.5 to 51.3 visits per 100,000 people. This difference is statistically significant.
- Cannabis-related visits include poisonings and mental or behavioural disorders due to cannabis use.
- Rates since 2012 declined briefly and then began to rise steadily after 2014 until 2017.
- Since 2013, the rate in Middlesex County has been significantly lower than the provincial rate.
- Males tended to have higher rates than females but the differences between them was not significant (data not shown).

Figure 16. Cannabis-related emergency department visits, counts and unadjusted rates per 100,000 population, Middlesex County and Ontario, 2004 to 2017.



Data source: National Ambulatory Care Reporting System (NACRS), Ontario Ministry of Health and Long-term Care, IntelliHEALTH ONTARIO, Extracted: August 23, 2018.

#### 4.7. Infectious diseases

- There are approximately 70 diseases of public health significance that are reported to the local Medical Officer of Health under the Health Protection and Promotion Act. Among these, HIV/AIDS\*, hepatitis C†, and active tuberculosis§ are all infections that can have long-term impacts on effected individuals and, once diagnosed, require follow up with a health care provider.
- Between 2005 and 2017, the average reported incidence rates of HIV/AIDS, hepatitis C, and active tuberculosis cases was lower among Middlesex County residents compared to the provincial rate (Table 9).



Table 9. Reported incidence rate of HIV/AIDS, hepatitis C, and active tuberculosis, Middlesex County and Ontario, 2005–2017 average.

Infectious disease	Rate per 100,000 population	
	Middlesex County	Ontario
HIV/AIDS*	1.5	6.5
Hepatitis C†	16.9	33.3
Tuberculosis (active)§	<1.0	4.8

Data source: Middlesex County data: Middlesex London Health Unit integrated Public Health Information System (iPHIS) Cognos Report Net: custom report. Ontario Ministry of Health and Long-Term Care; Extracted August 13, 2018. Ontario data: Public Health Ontario. Infectious Diseases Query: Ontario: Case counts and crude rates of reportable diseases by public health unit and year. Ontario Agency for Health Protection and Promotion; Extracted August 15, 2018.

\* HIV/AIDS cases are reported by encounter date, which is the date that public health was first notified of the case.

† Hepatitis C cases are reported by episode date, which is the earliest available of symptom onset date, specimen collection date, laboratory test date, or date reported to public health. Hepatitis C cases include all cases with a positive antibody test, and therefore includes people with acute infections, spontaneously resolved acute infections, chronic infections, and those who have received effective anti-viral therapy (cured).

§ Active tuberculosis cases are reported by the date the individual was diagnosed with active tuberculosis.

## 5. Behavioural Risk Factors

### 5.1. Summary

Historically, the leading causes of death in Middlesex County are chronic diseases and injuries which are linked to behavioural risk factors such as alcohol consumption, physical inactivity and smoking. In data from community health surveys from the years 2011 to 2014, a substantial portion of the population reported behaviours that put them at risk for chronic diseases and injuries. For instance, only about half the population reported being active or moderately active during their leisure time, averaging 1.5 or more kcal/kg/day of energy expenditure from leisure-time physical activity. This is approximately the amount of exercise that is required to experience some health benefits.

In the same time frame, only about half did not exceed the low risk alcohol drinking guidelines. These guidelines outline the maximum number of daily and weekly drinks that can be consumed to reduce the risk of both long term chronic health conditions and the risk of injury (Butt, Beirness, Gliksman, Paradis & Stockwell, 2011). Current smoking continues in about 20% of the adult population.

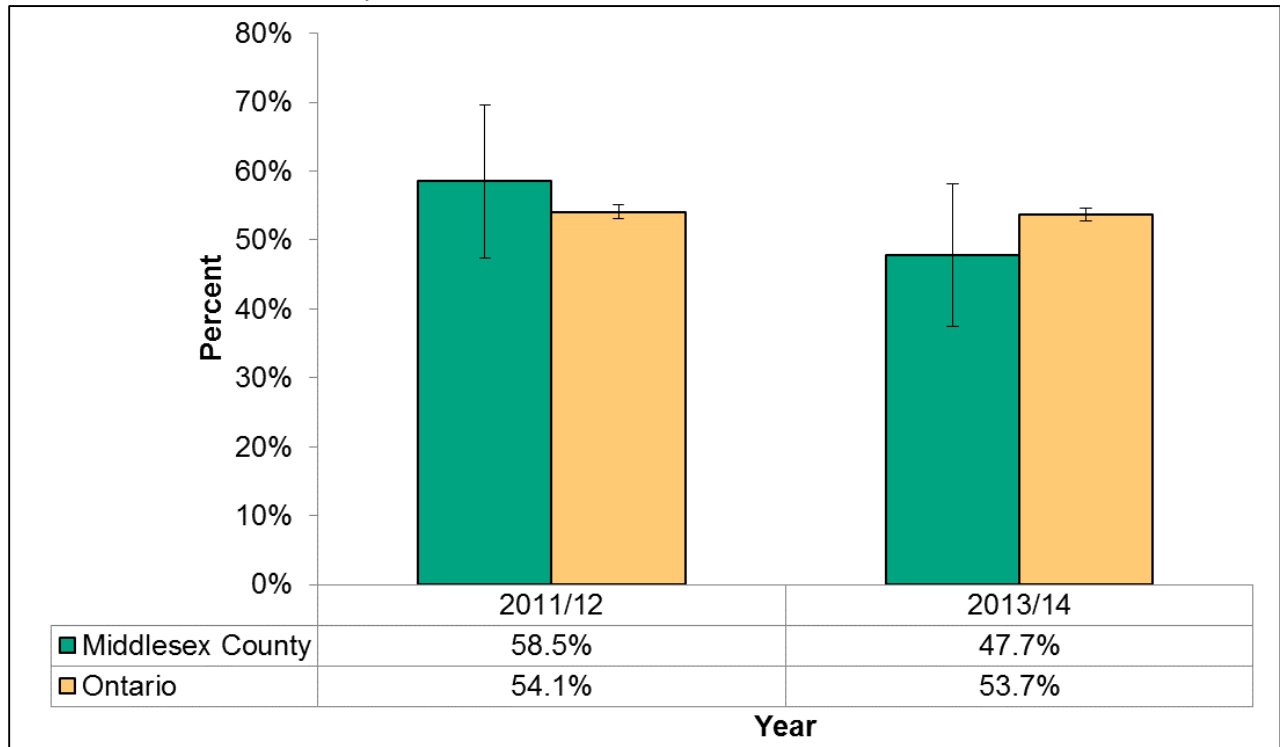
Self-rated health is a self-assessment of an individual's current health status that encompasses both experiences and understanding of the causes and impacts of disease. It has been shown to be predictive of the development of chronic conditions and mortality. Over 90% of people rated their overall health as good, very good or excellent after taking physical, mental and social well-being into consideration. Respondents are asked to consider health, not just from the perspective of absence of disease and injury but also to consider social, mental and physical aspects of their well-being.

Data indicates that Middlesex County patterns of behavioural risk factors are not different from Ontario. This could be due, partly, to a small number of people responding to the survey in Middlesex County. However, it likely indicates that lifestyle behaviour rates in Middlesex County are similar to the province.

## 5.2. Physical activity

- In 2013/2014, 47.7% of the Middlesex County population reported being moderately active or active during leisure time activities (Figure 17).
- While lower, there was no significant difference between Middlesex County and Ontario (Figure 17). It is also not different than the rate in 2011/2012.

Figure 17. Percent of population (age 12 years and older) who were moderately active or active during leisure time, Middlesex County and Ontario, 2011/2012 and 2013/2014.

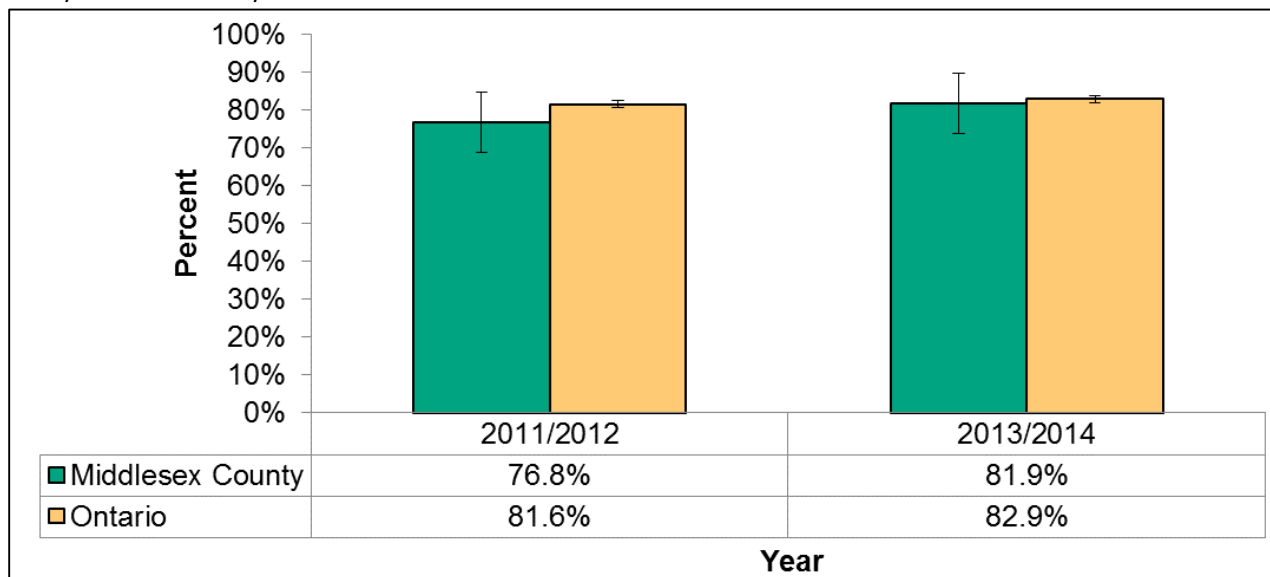


Data source: Canadian Community Health Survey, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care.

## 5.3. Smoking

- In 2013/2014, 81.9% of adults aged 19 years and over in Middlesex County reported that they were non smokers (Figure 18). Compared to the province, Middlesex County had a similar proportion of non smokers.

Figure 18. Percent of non-smokers among adults age 19 years or older, Middlesex County and Ontario, 2011/2012 and 2013/2014.

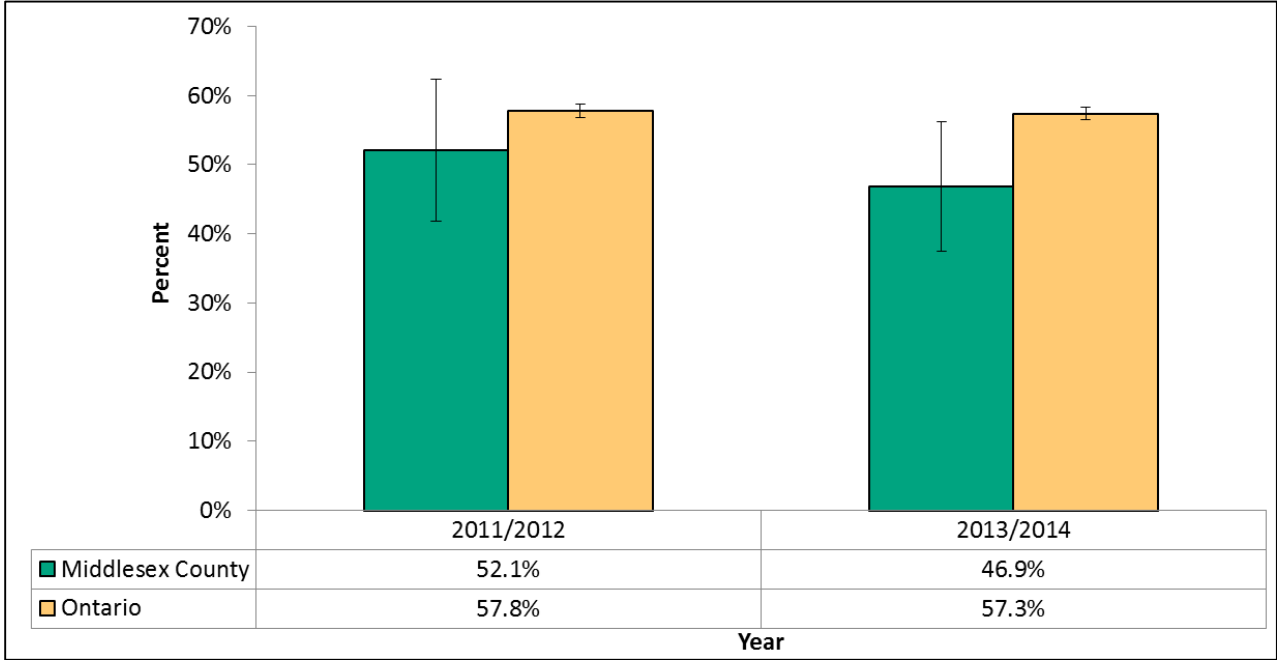


Data source: Canadian Community Health Survey, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care.

#### 5.4. Alcohol use

- The proportion of those aged 19 and older, in Middlesex County, who did not exceed the low risk drinking guidelines in 2013/2014 was 46.9% (Figure 19).
- There are two parts to Canada’s low risk alcohol drinking guidelines (Butt *et al.*, 2011):
  - Reducing your long term health risks by drinking no more than 2 standard drinks on any one day for women and no more than 3 standard drinks on any one day for men with a maximum of 10 and 15 standard drinks a week for women and men, respectively. A couple of days with no alcohol drinking should be taken each week.
  - Women can reduce their risk of injury by drinking 3 or fewer drinks and 4 or fewer drinks, for men, on any single occasion.
- The rate in Middlesex County was significantly lower than that of Ontario (57.3%) in 2013/2014, however only approximately half did not exceed the drinking guideline in both 2011/2012 and 2013/2014 (Figure 19).

Figure 19. Percent of population (age 19 years and older) who did not exceed the Low Risk Drinking Guidelines, Middlesex County and Ontario, 2011/2012 and 2013/2014.

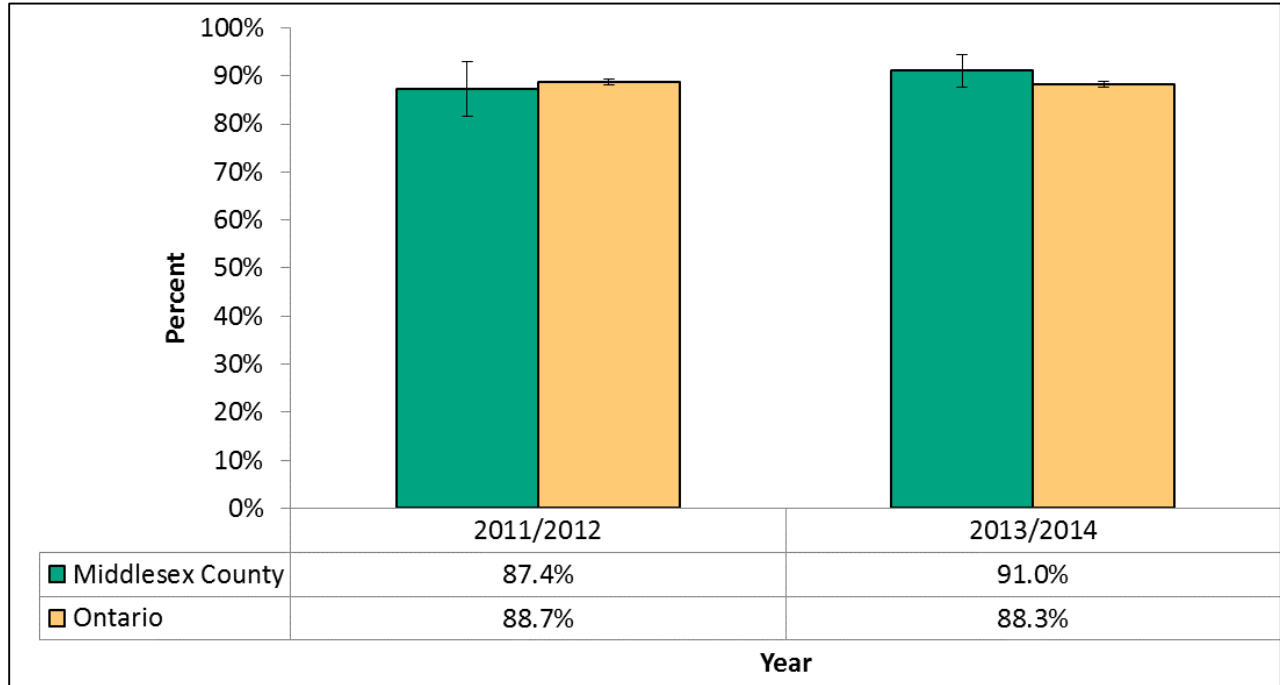


Data source: Canadian Community Health Survey, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care.

5.5. Self-reported health

- In 2013/2014, 89.1% of the population of Middlesex County reported “excellent”, “very good” or “good health”. This was not significantly higher than the rate in Ontario (Figure 20).

Figure 20. Percent of the population (age 12 years or older) who reported “excellent”, “very good” or “good health”, Middlesex County and Ontario, 2011/2012 and 2013/2014.



Data source: Canadian Community Health Survey, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care.

## 6. Reproductive Health

### 6.1. Summary

Pregnancy rates in Middlesex County have remained relatively stable, at a rate of approximately 8 births per 1,000 population. While stable, pregnancy rates in Middlesex County are consistently lower than those for Ontario.

Pregnant women who are particularly young (i.e., teenagers) or old (i.e., ages 35 and older) tend to experience more problems delivering the baby and with various birth outcomes—such as prematurity, low birth weight, and neonatal death. These mothers may therefore require more supports before and after birth than mothers in their twenties and early thirties.

In recent years, teen pregnancy (ages 14 to 19) rates in Middlesex County have been significantly lower than that for Ontario. And the rates have declined each year from 2013 to 2016; a downward trend also observed in the province.

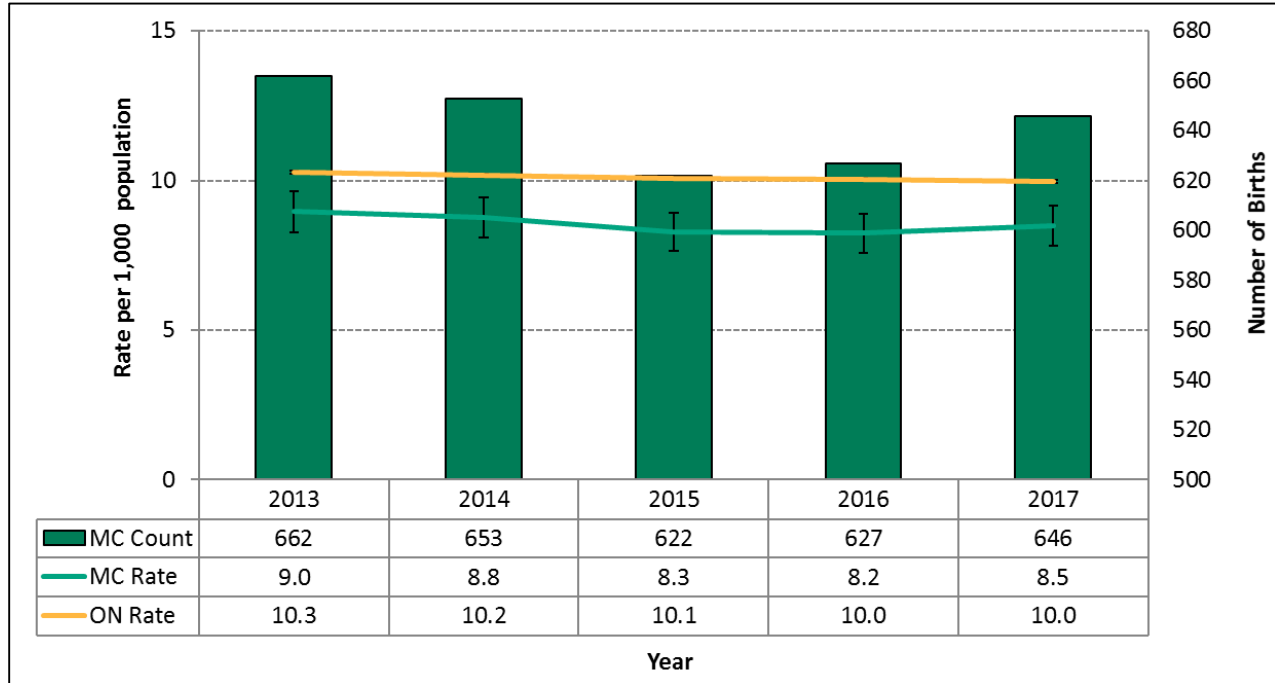
In Middlesex County and Ontario, the highest pregnancy rates are among women aged 30 to 34, followed by those aged 25 to 29. Compared to Ontario, females in Middlesex County tend to give birth at slightly younger ages: the third highest pregnancy rate is among women age 25 to 29, and pregnancy rates are significantly lower among women 35 years and older.

### 6.2. Pregnancy rates

#### 6.2.1. Overall pregnancy rate

- In 2017, there were 646 pregnancies in Middlesex County, corresponding to a pregnancy rate of 8.5 per 1,000 population (Figure 21).
- Pregnancy rates in Middlesex County and Ontario were relatively stable from 2013 to 2017. During this period, pregnancy rates in Middlesex County were consistently lower than those in Ontario.

Figure 21. Count and crude birth rates per 1,000 population, Middlesex County and Ontario, 2013 to 2017.



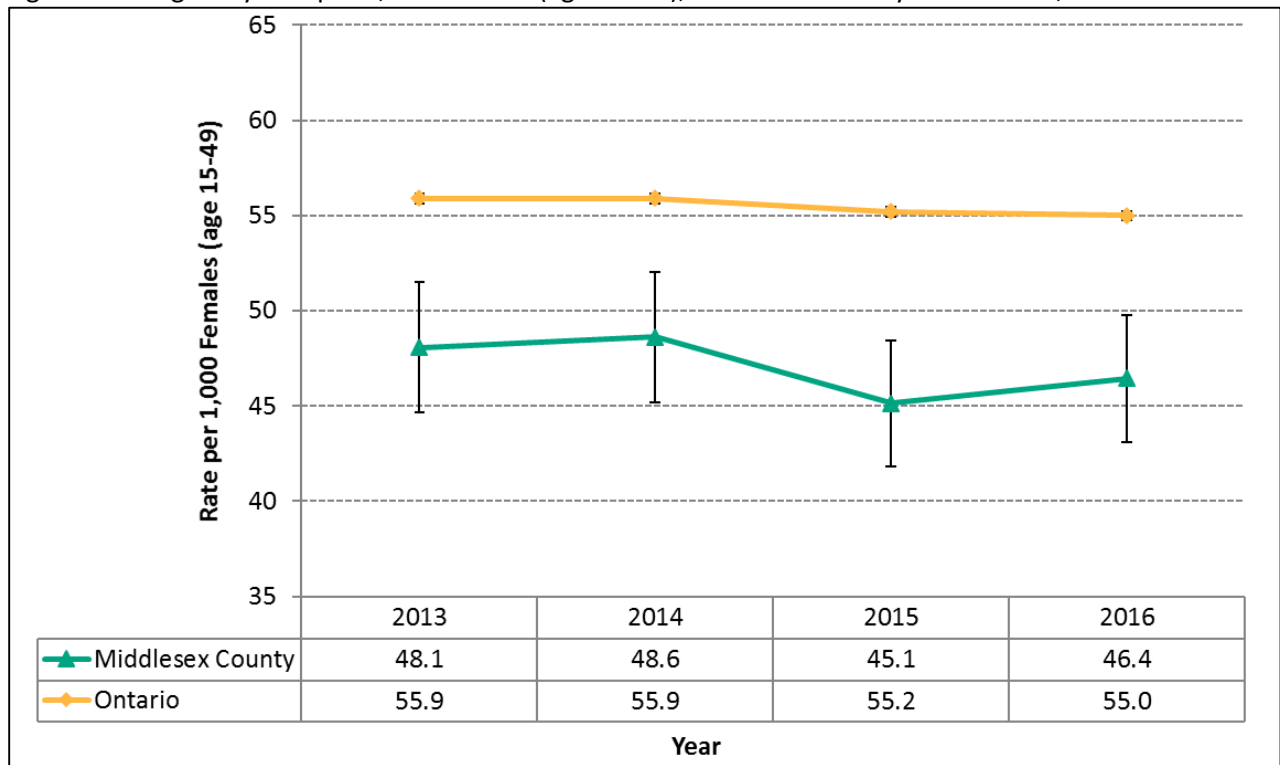
Data source: BORN Information System, BORN Ontario. Information accessed on: July 7, 2018; Therapeutic abortions, Date Extracted: June 19, 2018 & Population Estimates, Date Extracted: May 11, 2018, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario.

### 6.2.2. Pregnancy rate per 1,000 females

- Pregnancy rates have been relatively stable from 2013 to 2016 in Ontario and Middlesex County (Figure 22).
- Between 2013 and 2016, pregnancy rates in Middlesex County were significantly lower than Ontario.



Figure 22. Pregnancy rate per 1,000 females (age 15–49), Middlesex County and Ontario, 2013 to 2016.

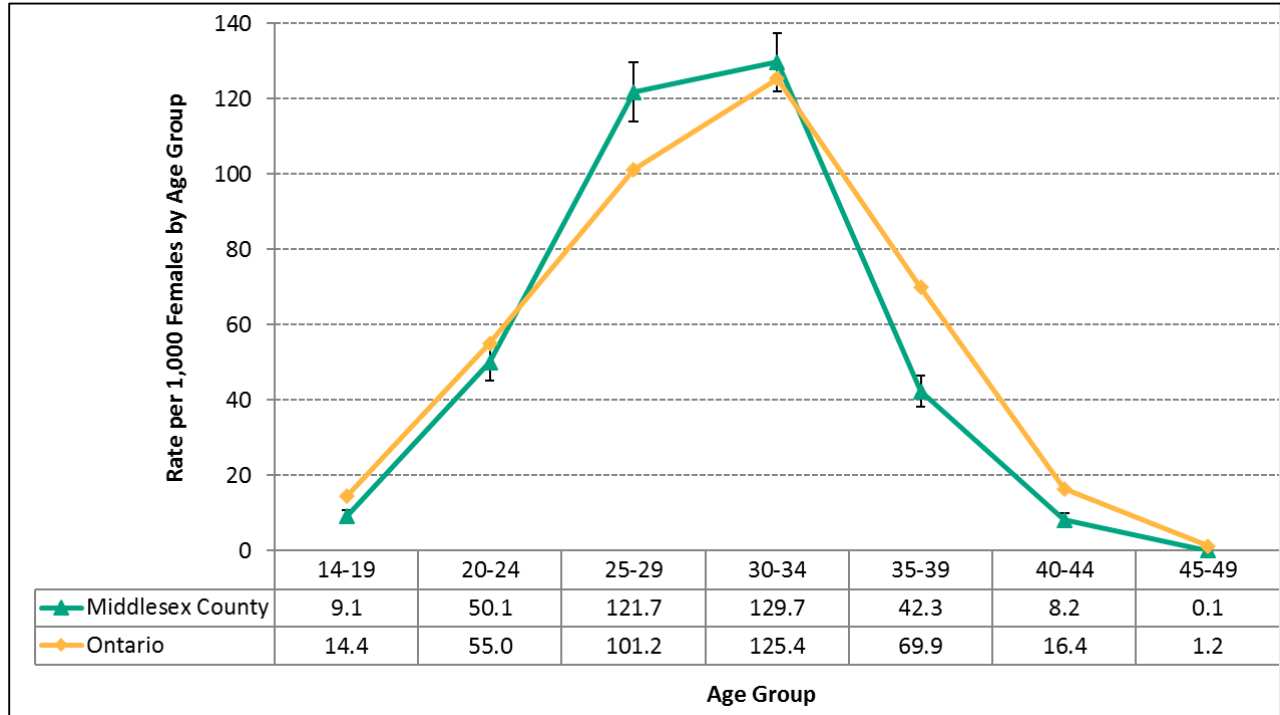


Data source: BORN Information System, BORN Ontario. Information accessed on: July 7, 2018; Therapeutic abortions, Date Extracted: June 19, 2018 & Population Estimates, Date Extracted: May 11, 2018, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario.

### 6.3. Pregnancy rate by maternal age group

- Between 2013 and 2016, pregnancy rates across age groups in Middlesex County followed a trend similar to Ontario with a peak among women age 30–34 (Figure 23).
- Compared to Ontario, females in Middlesex County tended to be pregnant at slightly younger ages, with a significantly higher pregnancy rate among women age 25 to 29 and lower rates among women age 35 to 44.

Figure 23. Pregnancy rate per 1,000 females, by age group, Middlesex County and Ontario, 2013–2016 average.

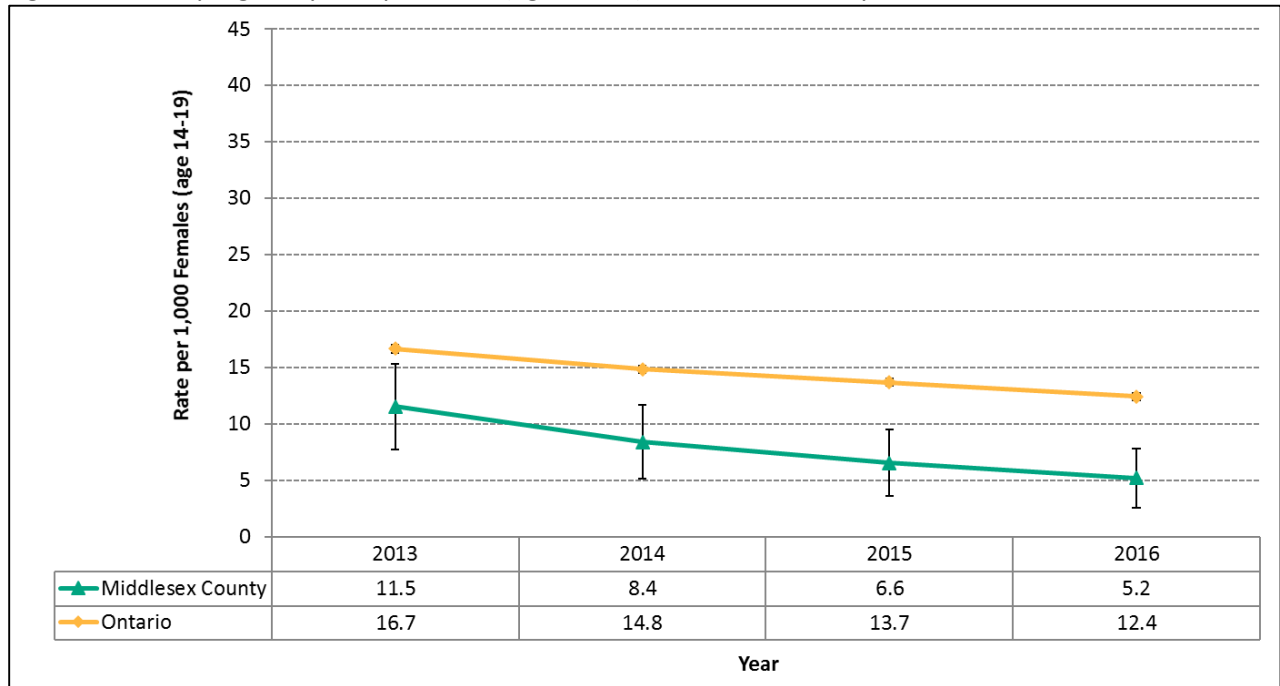


Data source: BORN Information System, BORN Ontario. Information accessed on: July 7, 2018; Therapeutic abortions, Date Extracted: June 19, 2018 & Population Estimates, Date Extracted: May 11, 2018, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario.

### 6.3.1. Teenage pregnancy rates

- Between 2013 and 2016, pregnancy rates for teens (14–19) in Middlesex County were significantly lower than for Ontario (Figure 24).
- For both Middlesex County and Ontario, rate of teen pregnancy decreased from 2013 to 2016.

Figure 24. Teen pregnancy rate per 1,000 (age 14–19), Middlesex County and Ontario, 2013 to 2016.

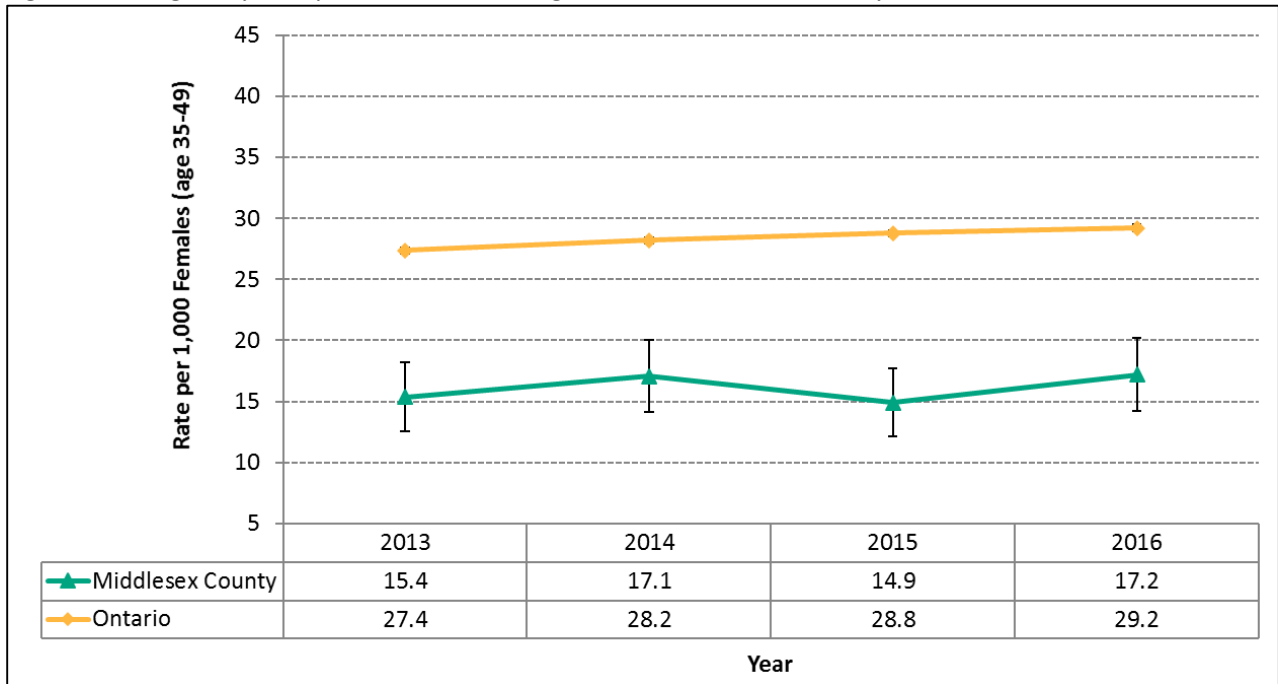


Data source: BORN Information System, BORN Ontario. Information accessed on: July 7, 2018; Therapeutic abortions, Date Extracted: June 19, 2018 & Population Estimates, Date Extracted: May 11, 2018, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario.

### 6.3.2. Pregnancy rate for females 35 years of age and older

- Pregnancy rates for females age 35 to 49 in Middlesex County were significantly lower than those for Ontario from 2013 to 2016 (Figure 25).
- For Ontario, there was a slight increase over time in the rate of pregnancy among women age 35–49.

Figure 25. Pregnancy rate per 1,000 females age 35–49, Middlesex County and Ontario, 2013 to 2016.



Data source: BORN Information System, BORN Ontario. Information accessed on: July 7, 2018; Therapeutic abortions, Date Extracted: June 19, 2018 & Population Estimates, Date Extracted: May 11, 2018, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario.

## 7. Child Health

### 7.1. Summary

Breastfeeding is the biologically natural way to provide infants with the nutrition they need for healthy growth and development. Health Canada recommends breastfeeding exclusively for the first six months, with continued breastfeeding for up to two years and beyond (Canadian Institute for Health Information, 2012). In 2017, over 93% of infants in Middlesex County were fed breastmilk at discharge from the hospital or midwifery practice group; a proportion slightly higher than the province and which has increased gradually over time since 2013.

The Early Development Instrument (EDI) is a population level measure of children's developmental health at school entry (Janus & Offord, 2007). Every three years all children in senior kindergarten in publically funded schools are assessed by their The EDI assists communities in assessing the educational and social needs of their young children, as well as monitoring children's developmental health across time. The EDI measures five areas (domains) of development: physical health and well-being, social competence, emotional maturity, language and cognitive development, communication skills and general knowledge. In Middlesex County, the proportion of children identified as vulnerable in at least one domain was lower than Ontario for all time periods. Physical health and well being was the area with the greatest proportion vulnerable when measured in 2015. This domain assesses whether children are physically ready for the school day with questions about appropriate dress for school, being late, hungry or tired. It also measures physical independence and gross and fine motor skills. Since vulnerability levels above 10% may be avoidable (Kershaw, Anderson, Warburton, and Hertzman 2009), this area represents an opportunity for improvement.

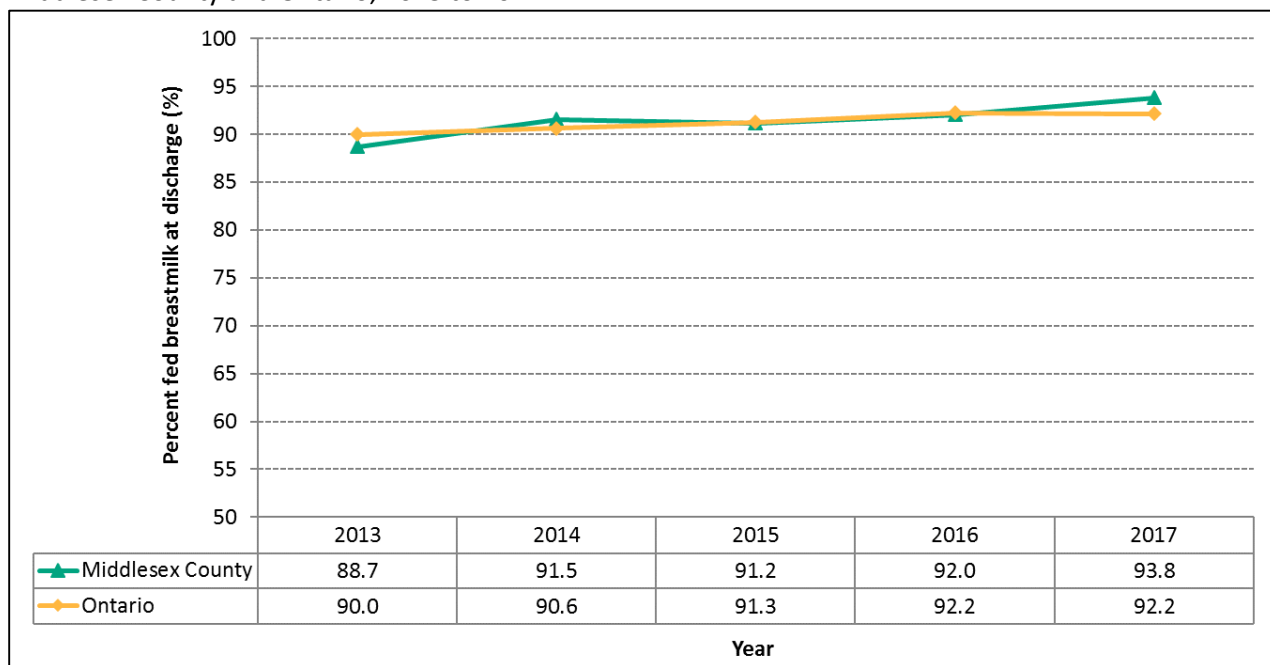
Understanding tooth decay in the school aged children population is important because of its implications for quality of life. In Middlesex County, where some drinking water is not fluoridated, tooth decay increases as children age from junior kindergarten until grade 2. The percentage of children with no cavities or decay goes down and the number of teeth affected in those with decay increases as grade level goes up. In comparison to a sample of health units making up approximately half on the Ontario population, Middlesex County rates of decay were lower in the 2015/2016 and 2016/2017 school years.

The *Immunization of School Pupils Act* identifies a number of diseases against which students need to be vaccinated. Each year, the Middlesex-London Health Unit reviews the immunization records of students attending schools in the region to ensure that their immunizations are up to date (Ontario Ministry of Health and Long-Term Care, 2016). In the 2017–2018 school year, greater than 95% of immunization records of 7-year old students in Middlesex County schools were up-to-date for seven key diseases.

## 7.2. Breastfeeding rate

- In 2017, 93.8% of infants in Middlesex County were fed breastmilk at discharge from hospital or Midwifery Practice Group, compared to 92.2% in Ontario (Figure 26).
- Between 2013 and 2017, the proportion of infants in Middlesex County fed breastmilk at discharge has gradually increased over time.
- The proportion of infants in Middlesex County fed breastmilk at discharge has followed a similar trend to Ontario from 2013 to 2017.

Figure 26. Proportion of infants fed breastmilk (exclusively or in combination) at discharge from hospital or Midwifery Practice Group (MPG) per the number of live births discharged home and home births, Middlesex County and Ontario, 2013 to 2017.

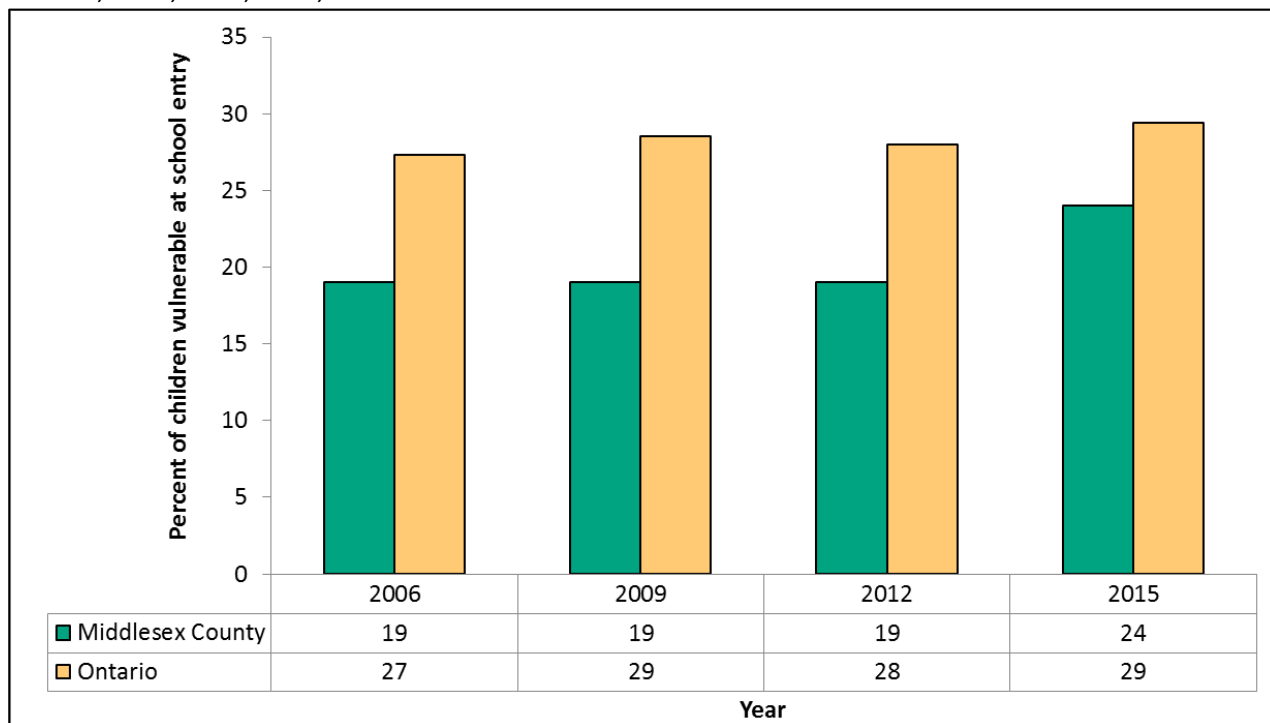


Data sources: (1) PHU – Newborn Clinical Report. BORN Information System, BORN Ontario. Information accessed on July 7, 2018. (2) Public Health Unit Analytic Reporting Tool (Cube), BORN Information System, BORN Ontario. Date Extracted: July 31, 2018.

## 7.3. Early development

- The percent of children entering school that were vulnerable on at least one domain of the Early Development Instrument has been lower than province since the inception of the measurement of the tool in 2006 (Figure 27). Recently, the Middlesex County rate has increased but continues to be lower than the province.
- The physical health and well-being domain has the highest proportion of vulnerable children in Middlesex County (15.9%), followed by the emotional maturity domain (Table 10). These are also the top two areas for Ontario.
- In all municipalities in Middlesex County results showed the percentage of children vulnerable from nearly all domains across all years tested to be lower than Ontario rates (data not shown).

Figure 27. Percentage of children vulnerable in one or more EDI domains, Middlesex County and Ontario, 2006, 2009, 2012, 2015.



Data source: Middlesex County Municipalities Child & Family Community Profile: Appendix 2: Early Development Instrument (EDI), 2012. (2013). Middlesex Children’s Services Network. Available at <https://www.middlesex.ca/sites/default/files/Appendix%20Middlesex%20EDI%202012.pdf> & Middlesex County community profile. (ca. 2016). [Unpublished report for the Middlesex Children’s Service Network]. Middlesex Children’s Service Network.

Table 10. Percentage of children at school entry vulnerable by EDI domain, 2015.

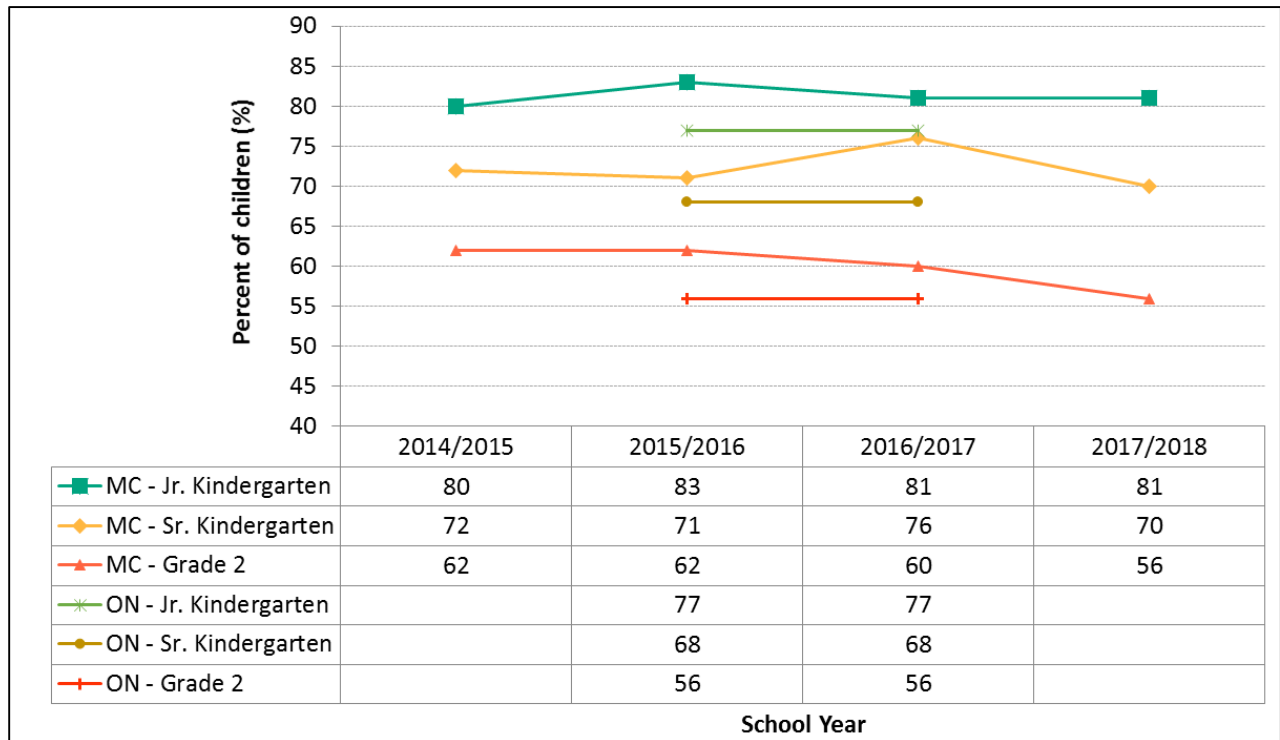
Early Development Instrument Domain	% of children vulnerable at school entry	
	Middlesex County	Ontario
Physical health and well-being	15.9	16.1
Emotional maturity	10.5	12.3
Social competence	7.3	10.7
Communication skills and general knowledge	7.2	10.2
Language and cognitive development	4.1	6.7
<b>One or more EDI domains</b>	<b>24.0</b>	<b>29.4</b>

Data source: Middlesex County Municipalities Child & Family Community Profile: Appendix 2: Early Development Instrument (EDI), 2012. (2013). Middlesex Children’s Services Network. Available at <https://www.middlesex.ca/sites/default/files/Appendix%20Middlesex%20EDI%202012.pdf> & Middlesex County community profile. (ca. 2016). [Unpublished report for the Middlesex Children’s Service Network]. Middlesex Children’s Service Network.

## 7.4. Oral health

- The proportion of children in Middlesex County with no visible tooth decay (caries free) has remained consistent over time for those in junior (81% in 2017/2018) and senior kindergarten (70% in 2017/2018) (Figure 28). The rate of those in Grade 2 with caries has increased since the 2014/2015 school year.
- In comparison to an Ontario sample in the 2015/2016 and 2016/2017 school years, there was a smaller proportion of Middlesex County children with visible tooth decay, across all grades (Figure 28).
- In all children between junior kindergarten and Grade 2 there were between three and four teeth affected by decay, in those with some decay (Figure 29). While those in Middlesex County had fewer teeth affected than a sample of Ontario children, this still represents preventable tooth decay in children.

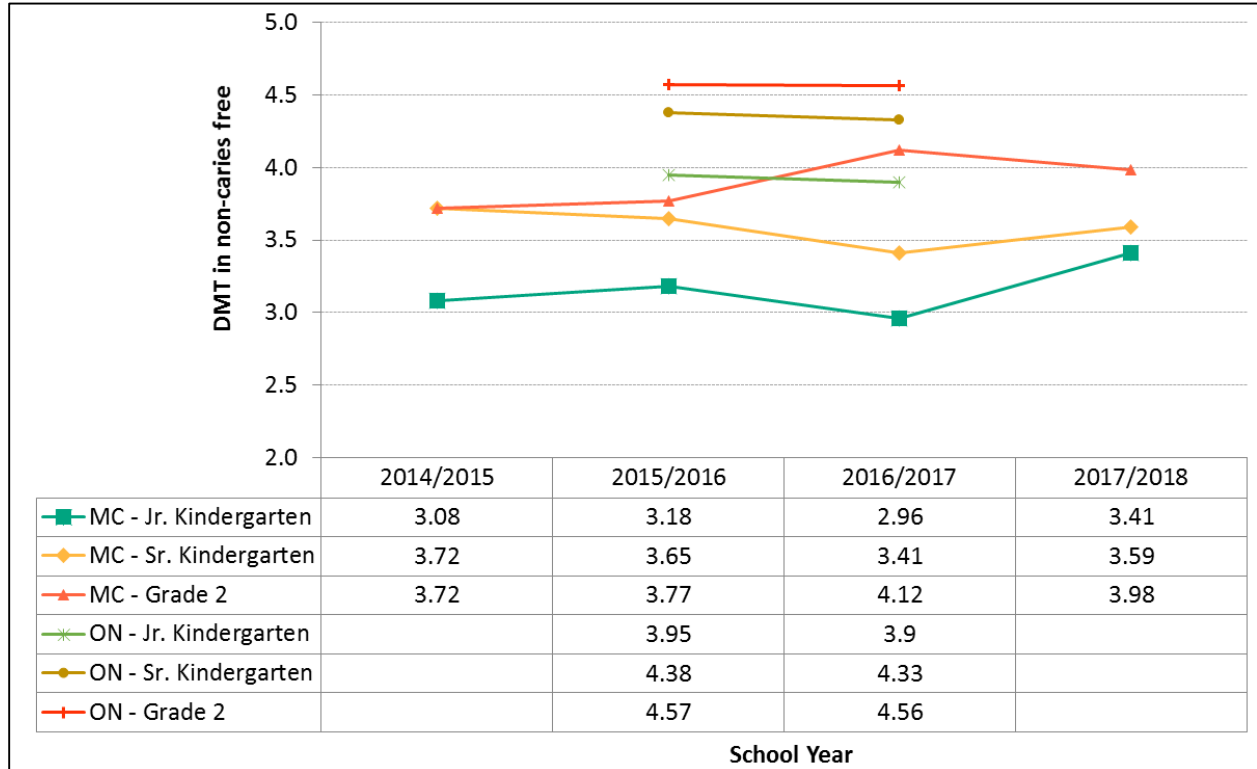
Figure 28. Percent of children who had no visible tooth decay (caries free) in Middlesex County and Ontario.



Data source: Oral Health Information Surveillance System (OHISS), Ministry of Health and Long-Term Care.  
 Extracted date: July 17, 2018 & Oakley, D. 2018. Summary of 2015-2017 Oral Health Screening: Results from Participating Ontario Health Units: For the Ontario Association of Public Health Dentistry.



Figure 29. Average Decay Missing Teeth (DMT) scores for children in Middlesex County and Ontario schools, by school year and grade.



Data source: Oral Health Information Surveillance System (OHISS), Ministry of Health and Long-Term Care. Extracted date: July 17, 2018 & Oakley, D. 2018. Summary of 2015-2017 Oral Health Screening: Results from Participating Ontario Health Units: For the Ontario Association of Public Health Dentistry.

### 7.5. Immunization rates

- The Immunization of School Pupils Act identifies a number of diseases against which students need to be vaccinated. Each year, the Middlesex-London Health Unit reviews the immunization records of students attending schools in the region to ensure that their immunizations are up to date.
- In the 2017–2018 school year, greater than 95% of immunization records of 7-year old students in Middlesex County schools were up-to-date for seven key diseases (Table 11). Proportions ranged from 96.9% to 98.8% depending on the vaccine component.

Table 11. Proportion of immunization records forecast up-to-date\* for childhood vaccines among 7-year old<sup>†</sup>, Middlesex County<sup>§</sup>, 2017–2018 school year.

Vaccine component	Up-to-date status	
	Middlesex County schools estimate (%)	Middlesex County schools range (%)
Diphtheria	96.9	80.0–100
Measles	97.4	80.0–100
Mumps	97.5	80.0–100
Pertussis	96.9	80.0–100
Polio	97.1	80.0–100
Rubella	98.8	80.0–100
Tetanus	96.9	80.0–100

Data source: Middlesex-London Health Unit Panorama Enhanced Analytics and Reporting (PEAR): Forecaster Compliance for Disease by Age or School – Aggregate – STD – PR2001. Toronto ON: Ontario Ministry of Health and Long-Term Care; 2018 August 14 [cited 2018 August 14].

\* Records were considered to be up to date when the immunization forecast was classified as up to date, and not eligible, due or overdue for the identified immunization based on the Publicly Funded Immunization Schedule for Ontario (Ministry of Health and Long-Term Care, 2016).

† Birth year is 2010 for the 2017-18 school year.

§ Middlesex County estimate based on enrollment of children born in 2010 in elementary schools (public and private) located in Middlesex County for which the Middlesex-London Health Unit screened immunization records in the 2017-18 school year.

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# Appendix B

## *Literature Scan*

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# Review of Public Health Services in Middlesex County – Literature Scan

## Executive Summary

As part of the Review of Public Health Services in Middlesex County a literature scan was undertaken to determine effective service delivery models for public health services in rural settings. The scan was limited to service delivery frameworks, models, or plans by provincial, state, or federal public health agencies, both in Canada and abroad, as well as the websites of the health agencies in the same Statistics Canada health peer group (Group A) as Middlesex-London Health Unit.

In many jurisdictions, unlike Ontario, public health is integrated within larger health authorities alongside primary care. As this literature scan was interested in public health services, in such cases effort was made to extract only information about delivering services which, in Ontario, are considered public health.

From these results, there was much consensus, the most prevalent one being that each rural community is unique, with different needs, assets, and challenges, and that there is no one-size-fits-all service delivery model that will work. The following were the most common findings:

- The need for engagement with community members, organizations, non-profits, and other health care providers in order to determine the needs of the community and how best to address them
- The importance of collecting, monitoring, and using local data for service planning and delivery
- The potential value of integration or co-location. Many jurisdictions advocate for a “health hub” type model where various primary care providers as well as social services are integrated to some extent and ideally co-located
- Leveraging community assets through collaboration and co-ordination. This could be delivering public health services out of another organization’s location, using local facilities and physical environment in public health interventions, supporting other community health care providers to provide public health services themselves, or referring clients to already existing programs and services in the community
- The importance of providing services as close to home as possible, usually necessitating expanding access to services. The particular service delivery model used will depend upon the needs of the particular community, but possibilities include mobile outreach, home visits, multiple locations, extended hours, telehealth, and online services
- The potential value of appropriate staffing mixes involving multi-disciplinary teams and professionals working to their fullest scope. Role clarity is important to reduce duplication. Generalists were also perceived as being more appropriate to rural settings

## Introduction

As part of the Review of Public Health Services in Middlesex County a literature scan was undertaken to determine effective service delivery models for public health services in rural settings. A difficulty encountered in this scan was the lack of universal definitions or classifications of what constitutes “rural,” the lack of such impacting the potential applicability and transferability of findings to Middlesex County. In an attempt to address this, the scan was limited to service delivery frameworks, models, or plans by provincial, state, or federal public health agencies, both in Canada and abroad, the rationale being that higher-level government plans for rural settings would provide synthesized evidence, the nature of which is more likely to be generalizable. Additionally, the websites of the health agencies in the same Statistics Canada health peer group (Group A) as Middlesex-London Health Unit were also searched for service delivery frameworks, models, or plans, as their plans for service delivery would most likely be applicable and transferable to the Middlesex County setting, regardless of their definition of “rural” (Statistics Canada, 2017)

## Methodology

The searches were conducted throughout the month of July using private browsing in Google to reduce aspects like previous searches, pages visited, and location from filtering the search results. Custom Google searches developed by the Ontario Public Health Libraries Association were used to search the websites of all Canadian and American health authorities (specifically public health when available) at the federal and provincial/state level as well as all Ontario public health units. Additional searches were conducted of the websites of all health authorities within the same Statistics Canada health peer group as Middlesex-London Health Unit, Australian and United Kingdom governments, and various rural health associations.

Due to Google’s search word limit, multiple search strings were used to capture all combinations of the selected search terms. In essence, the search strategy combined terms for the concepts of: “rural” including rural, non-urban, peri-urban, non-metropolitan, peri-metropolitan, town, township, and county; “public health” including public health, community health, population health, health protection, health promotion, health authority, health department, outreach, chronic disease, maternal health, infectious disease, environmental health, child health, and sexual health; “service delivery” including delivery, delivering, delivery, system, structure, access, staffing mix, staffing complement, location, and infrastructure; and “framework” including framework, model, strategy, and plan. The search terms for “rural” were not included for websites which were already focussed on rural settings or for health authorities in Statistics Canada health peer group A. The searches were limited to 2008 to 2018. Results were screened by one individual, the same who conducted the data extraction, and were included if they dealt with a rural setting, were focussed on a public health issue, discussed service delivery, and were a framework, model, strategy, or plan rather than specific interventions. Results were excluded if they were not English, focussed on remote or northern settings, or were exclusively primary care without considerable public health components.

From the search results, 1 164 links were selected. Of those, 129 had their full text reviewed, with 7 additional results being added from reference lists, and 54 were eventually included for data extraction. No formal critical appraisal process was followed given the nature of the reports.

Information was extracted into a table with the following fields: the included definition of rural, whether a formal definition or the attributes of rural described such as population density or proximity to metropolitan centres (in many cases these were not provided, but rather just described as “rural”); the public health issues, areas, or services addressed; and the service delivery model or approach described. Some included papers discussed service delivery for entire health systems, including, but not exclusive to, public health components. In many of these papers, each branch of the health care system was discussed separately in terms of the issues they addressed, but then service delivery approaches were described more generally for the entire system. In these cases, the service delivery approaches were extracted unless specific to a non-public health related service (for example surgeries or EMS), but then identified as not being exclusive to public health. Outside of scope, and therefore not extracted, was information about specific interventions or programs, approaches to improve recruitment, or models or organizational structure at a government level beyond the control of an individual health unit or health authority, for example having a separate department or ministry of public health. The extracted information was then assessed for common themes or service delivery approaches to arrive at generalizable findings.

## Findings

Providing public health, or any health services, in rural settings presents challenges unique from more metropolitan settings. On average, rural areas have aging populations and higher rates of unemployment and poverty as compared to more urban areas, all social determinants of health which can negatively impact health and wellbeing (White, 2011). As well, they have higher death rates due to injuries, circulatory and respiratory diseases, diabetes, and suicide which can stress the health care system (White, 2011). In addition to generally poorer health statuses, rural populations tend to have challenges accessing health services. Low population densities can make it difficult to have health care offices and providers available in every community due to a lack of critical mass and economies of scale (British Columbia Ministry of Health, 2015; Ontario Hospital Association, 2015; White, 2011). This results in rural populations often needing to travel greater distances to access services or have trouble navigating the health system as some services are available locally while others are not (Government of Newfoundland and Labrador Ministry of Health and Community Services, 2015; Iowa Department of Public Health, 2011; Island Health, 2013; Nova Scotia Health Authority Central Zone, 2017; White, 2011). The service delivery models described in the included results aim to address these challenges.

Consistent across the included papers was the idea that each rural community is unique with its own specific combination of challenges and assets. As such, there is no one-size-fits-all service delivery model that will work for rural communities. As a result, the importance of engaging with community members, community organizations, municipal government agencies, and other local health care providers to assess local needs and assets and to develop local strategies was prominent among the results (British Columbia Ministry of Health, 2015; Capital Health Primary Health Care & District Department of Family Practice, 2011; City of Hamilton Public Health Services, 2011; Drug Strategy Coordination Committee, 2017; Government of Australia Department of Health, 2011; Government of



Newfoundland and Labrador Ministry of Health and Community Services, 2015; Interior Health Authority, 2014, 2015, 2016, 2017; Iowa Department of Public Health, 2011; Nova Scotia Health Authority Central Zone, 2017; NSW Government Department of Health, 2014; Ontario Hospital Association, 2015; Queensland Government Department of Health, 2013; State of Indiana, 2012; Vancouver Island Health Authority, 2016, 2018; Virginia Department of Health, 2013; Windsor-Essex County Health Unit, 2017; Winnipeg Regional Health Authority, 2010, 2013, 2014, 2016; Winnipeg Regional Health Authority Population & Public Health, 2013b, 2015a, 2015b). To further understand local community needs and the ability to monitor progress on desired health outcomes, another prevalent theme was having systems in place to collect, monitor, analyze, and share local data. Strategies included conducting regular community health assessments, having data sharing agreements with other community organizations, and having standard Electronic Medical Records in order to aggregate local data from multiple providers (Government of Australia Department of Health, 2011; Government of Colorado, 2013; Government of Newfoundland and Labrador Ministry of Health and Community Services, 2015; Interior Health Authority, 2017; Iowa Department of Public Health, 2011; Ontario Hospital Association, 2012, 2015; Vancouver Island Health Authority, 2009; Windsor-Essex County Health Unit, 2017, 2018; Winnipeg Regional Health Authority Population & Public Health, 2012b, 2015a, 2015b).

One of the most prevalent findings, which greatly impacted the extraction and interpretation of the available information, is that Ontario is relatively unique in having a separate agency for public health. In many jurisdictions, within Canada and abroad, population and public health are departments or branches of a larger health authority also directing primary health care and emergency health services. As such, many of the included documents are plans for the service delivery of primary health care through which public health issues like chronic disease prevention, healthy lifestyles, maternal and child health, and immunizations are addressed (British Columbia Ministry of Health, 2015; Capital Health Primary Health Care & District Department of Family Practice, 2011; Government of Australia Department of Health, 2011; Government of Colorado, 2013; Government of Newfoundland and Labrador Ministry of Health and Community Services, 2015; Horizon Health Network, 2010; Interior Health Authority, 2012, 2014, 2015, 2016; Iowa Department of Public Health, 2011; Island Health, 2013; Michigan Center for Rural Health, 2008; Nevada Department of Health and Human Services, 2016; NSW Government Department of Health, 2014; Prince Edward Island Department of Health, 2008; Queensland Government Department of Health, 2013, 2014; State of Indiana, 2012; State of Victoria Department of Health, 2011; Vancouver Island Health Authority, 2009; Victoria State Government, 2017; Virginia Department of Health, 2013). In many organizations with this structure there is a focus within primary health care on population health and the social determinants of health (British Columbia Ministry of Health, 2015; Horizon Health Network, 2010; Interior Health Authority, 2014, 2015, 2016; Island Health, 2013; Ontario Hospital Association, 2012, 2015; State of Indiana, 2012). As a result, many service delivery models for primary health care are used to address issues which are, in Ontario, traditionally the territory of public health.

In settings where primary health has responsibility for population and public health outcomes, the most prevalent model proposed is that of a “health hub”, although the model goes by many different names. In essence, a health hub is a model whereby many different health care providers and services are integrated, usually with multi-disciplinary teams, and co-located or networked with other social services such as housing, education, child services, and social assistance (Capital Health Primary Health Care &

District Department of Family Practice, 2011; City of Hamilton, 2014; Horizon Health Network, 2010; Interior Health Authority, 2016; Nevada Department of Health and Human Services, 2016; NSW Government Department of Health, 2014; Prince Edward Island Department of Health, 2008; Queensland Government Department of Health, 2014; State of Indiana, 2012; Vancouver Island Health Authority, 2009, 2018; Victoria State Government, 2017). Even in settings where separate public health entities exist, such as Ontario, the health hub model is promoted for rural settings with the vision that public health will collaborate with the health hubs (Ontario Hospital Association, 2012, 2015). The health hub model helps to address several of the challenges rural communities face. Having multiple health and social services co-located or networked together can decrease operating costs such as physical and technological infrastructure (Interior Health Authority, 2012; Ontario Hospital Association, 2015). It can also decrease the amount of travelling rural residents are required to do to access various services (Ontario Hospital Association, 2015). Having health and social services integrated to various degrees can also help to address the social determinants of health by improving access to, and collaboration among, the various services and supports such as housing, education, and social assistance and streamline referrals (Vancouver Island Health Authority, 2009, 2018; Winnipeg Regional Health Authority, 2013). Increased collaboration and integration of multiple services can also improve role clarity among providers, thereby reducing duplication of services which can free up capacity and resources (Island Health, 2013; Victoria State Government, 2017).

Other strategies to improve access to services in rural communities revolve around leveraging already-existing community assets. One approach is to collaborate with community organizations and other health service providers to deliver public health services. This can consist of public health employees delivering the services, but using other organizations' facilities, which reduces operational costs, increases the number of locations through which services can be delivered, and further encourages community development (City of Hamilton, 2017; City of Hamilton Public Health Services, 2011; Drug Strategy Coordination Committee, 2017; Nova Scotia Health Authority Central Zone, 2017; Queensland Government Department of Health, 2014; Winnipeg Regional Health Authority, 2013; Winnipeg Regional Health Authority Population & Public Health, 2016a). It can also consist of already existing community organizations and health care providers addressing public health issues and providing public health services themselves, which expands potential hours and locations through which individuals can receive public health information and services, as well as reduces costs by requiring less public health-specific infrastructure and reducing duplication of efforts. In some settings, this is a component of the health care system as there are no specific public health agencies or organizations addressing specific issues (see above). In other settings, it is public health professionals educating and supporting others to deliver the services. Some examples are family doctors or pharmacists providing immunizations, health screening, and health promotion messaging and schools implementing healthy policy and delivering public-health related curricula (Drug Strategy Coordination Committee, 2017; Government of Australia Department of Health, 2011; Government of Newfoundland and Labrador Ministry of Health and Community Services, 2015; Horizon Health Network, 2010; Interior Health Authority, 2012; Island Health, 2017; National Collaborating Centre for Healthy Public Policy, 2016; Nevada Department of Health and Human Services, 2016; NSW Government Department of Health, 2014; Ontario Hospital Association, 2012, 2015; Public Health England, 2017; Queensland Government Department of Health, 2013; State of Victoria Department of Health, 2011; Virginia Department of Health, 2013; Windsor-Essex County Health Unit, 2017, 2018; Winnipeg Regional Health Authority, 2017; Winnipeg Regional Health Authority Population & Public Health, 2012a, 2012b, 2013a, 2015a, 2015b, 2016b). Similarly, public

health professionals can incorporate already existing facilities and infrastructure within the community into their public health services, such as referring clients to physical activity facilities or encouraging the use of walking trails; this reduces the amount of travel and potential costs to individuals while also not incurring operational costs for the public health system (Nova Scotia Health Authority Central Zone, 2017; Virginia Department of Health, 2013; White, 2011; Winnipeg Regional Health Authority, 2014). Several results advocate for conducting community resource inventories or gap analyses to determine what services are being delivered and by whom to reduce redundancies in service provision (Capital Health Primary Health Care & District Department of Family Practice, 2011; Government of Newfoundland and Labrador Ministry of Health and Community Services, 2015; Island Health, 2013; Vancouver Island Health Authority, 2009; Winnipeg Regional Health Authority Population & Public Health, 2012a).

While having public health issues addressed by others within the community has many benefits to improving access to services and reducing costs to the public health system, it can make it potentially challenging for community members to become aware of, and navigate to, all the different services. This emphasizes the importance of co-ordinating services. Developing formal partnerships with community stakeholders can improve co-ordination of effort, reduce duplication, incorporate non-health sector contributors to health and wellbeing, and provide consistent messaging; however, they also require planned communication to the community to raise awareness and inform how to access services (Capital Health Primary Health Care & District Department of Family Practice, 2011; Drug Strategy Coordination Committee, 2017; Government of Australia Department of Health, 2011; Government of Newfoundland and Labrador Ministry of Health and Community Services, 2015; Nova Scotia Health Authority Central Zone, 2017; NSW Government Department of Health, 2014; State of Indiana, 2012; Vancouver Island Health Authority, 2009, 2016, 2018; Virginia Department of Health, 2013; Windsor-Essex County Health Unit, 2017, 2018; Winnipeg Regional Health Authority, 2016; Winnipeg Regional Health Authority Population & Public Health, 2015b). Some jurisdictions also incorporate the role of a wellness or system navigator who connects clients to the various services in their community depending upon their health needs (Capital Health Primary Health Care & District Department of Family Practice, 2011; City of Hamilton, 2014; Government of Colorado, 2013; Iowa Department of Public Health, 2011; Winnipeg Regional Health Authority Population & Public Health, 2013b).

Another theme which emerged was the need for expanding access to services in order to meet the diverse population needs within a community. In rural communities, populations are more dispersed, most services require driving to access, and unemployment and seasonal work are more prevalent, which can make accessing services from fixed sites during regular business hours more difficult. As such, different service delivery models are usually required; however, determining the appropriate service delivery model to implement depends upon the unique needs of each community and its residents, meeting people where they are and providing services in manners that are acceptable for them (Interior Health Authority, 2012, 2017; NSW Government Department of Health, 2014; Vancouver Island Health Authority, 2018; Virginia Department of Health, 2013; Winnipeg Regional Health Authority, 2013; Winnipeg Regional Health Authority Population & Public Health, 2012a, 2016a). Suggested methods for expanding access to services include, as mentioned above, providing services through other community organizations, facilities, or service providers, thereby increasing the number of locations and potential hours. Outreach, mobile, and home visiting services are also mentioned frequently, especially in the

delivery of substance misuse, sexual health, and harm reduction services, but also to deliver maternal and child health services such as breastfeeding support (Capital Health Primary Health Care & District Department of Family Practice, 2011; City of Hamilton, 2017; City of Hamilton Public Health Services, 2011; Drug Strategy Coordination Committee, 2017; National Collaborating Centre for Healthy Public Policy, 2016; White, 2011; Windsor-Essex County Health Unit, 2018; Winnipeg Regional Health Authority, 2013, 2016; Winnipeg Regional Health Authority Population & Public Health, 2012a, 2013b). Developing formal service agreements between health authorities is another approach proposed from New South Wales in Australia to enable residents who live close to the border to access services from a neighbouring health authority should those services be closer (NSW Government Department of Health, 2014). Finally, technology is advocated as being a manner through which to deliver both direct services through telehealth, as well as health education and information through web-based resources. Live telemedicine alleviates the challenge of having a full range of professionals located in the community, while pre-recorded telemedicine or web content and web-based tools address the challenge of accessing set locations during set hours. Examples of using technology to improve service delivery include using web-based tools to support self-care for chronic disease prevention and management, migrating vaccination reporting online, supplying information about community services online, telehealth for direct patient-provider consultations using either rooms equipped with required equipment or mobile smartphone applications, and telehealth to better connect community stakeholders and health care providers for collaboration, support, and professional development (City of Hamilton, 2017; Interior Health Authority, 2014, 2017; NSW Government Department of Health, 2014; Prince Edward Island Department of Health, 2008; Victoria State Government, 2017).

A final theme which emerged through the included results was that of staffing mix and its impact on maximizing service delivery and available resources. While mainly discussed within the context of primary health care teams whose services addressed public health issues, a prevalent model is multidisciplinary teams working together to provide services. The composition of these teams is dependent upon the needs of the specific community but can include not just physicians and nurses, but also allied health professionals, community health workers, and social service providers (Capital Health Primary Health Care & District Department of Family Practice, 2011; Government of Newfoundland and Labrador Ministry of Health and Community Services, 2015; Nevada Department of Health and Human Services, 2016; Ontario Hospital Association, 2012, 2015; Winnipeg Regional Health Authority, 2013; Winnipeg Regional Health Authority Population & Public Health, 2013b). Having multiple disciplines on the same team can improve the quality of care and reduce the need to travel as different disciplines are available together to provide their expertise. It can also improve the timeliness and cost-effectiveness of care as clients can receive service from the most appropriate professional, not necessarily the most expensive, for example receiving an immunization from a nurse practitioner or pharmacist rather than waiting to see the physician, who is then available to provide services outside of other professions' scopes. Success of this model necessitates that professionals practice at the full scope of their profession and with clear role delineation, thereby increasing the variety of services that are available in the community, often at reduced costs (First Nation's Health Authority, 2015; Government of Australia Department of Health, 2011; Government of Newfoundland and Labrador Ministry of Health and Community Services, 2015; Interior Health Authority, 2012; Iowa Department of Public Health, 2011; NSW Government Department of Health, 2013, 2014; State of Victoria Department of Health, 2011; Victoria State Government, 2017; Virginia Department of Health, 2013; White, 2011). Along those lines, several results also advocated for the increased use of generalist, as opposed to specialist professionals

as they can provide a greater breadth of services, important in rural areas which may have difficulty recruiting or affording health care professionals or not have the volume of requests to support a specialist (British Columbia Ministry of Health, 2015; Iowa Department of Public Health, 2011; NSW Government Department of Health, 2014). Increasing the use of lay health educators or community health workers was also promoted as a more cost effective means of providing education and outreach, connecting clients to community resources, and possibly performing direct services such as screening and rapid tests (Capital Health Primary Health Care & District Department of Family Practice, 2011; Government of Colorado, 2013; Nevada Department of Health and Human Services, 2016; Virginia Department of Health, 2013).

## Discussion

Isolating service delivery models for rural public health has some challenges. For one, issues which public health traditionally addresses are not solely the realm of public health professionals and systems anymore, but rather are becoming a priority and service component of other fields such as primary health care. As such, some components of service delivery used by primary health care to address public health may make sense for a public health-specific organization whereas others may not. Another challenge is the lack of a consistent definition of “rural,” which makes it difficult to assess the applicability and transferability of findings to the Middlesex County setting. Many of the included papers which focussed on rural settings do not even define “rural.” In an attempt to address this issue, papers were sought that either focussed on rural settings, by any definition, or were from health authorities which are in the same Statistics Canada health region peer group as Middlesex-London Health Unit, regardless if they considered themselves rural or not. A possibility was that service delivery models articulated in the self-identified rural papers would not agree with those articulated by Middlesex-London Health Unit’s peer group members. Generally speaking, this was not the case, with the themes and strategies outlined above appearing in both sets of results.

It should also be noted that some components of public health are to a large degree lacking from the results, namely services which typically are associated with environmental health and infectious disease control. While terms for these public health components were included in the search strategy, ultimately the results which were included did not address these areas.

An additional limitation to this literature scan is that it was conducted by a single individual and therefore is at increased risk of bias. These findings should be incorporated into other forms of evidence for decision-making purposes.

## Conclusion

Each rural community is unique, facing its own challenges and containing its own assets. As such, there is no one-size-fits-all service delivery model that will work across all rural settings; however, there are several consistent considerations for planning how to deliver services: determining the needs, assets, and challenges of the local community through collecting local data and engaging with community members and stakeholders, the better to tailor approaches to that community; collaborating and co-ordinating services, using assets and providers already existing in the community or technology, to enable more services to be delivered locally and with greater accessibility and to better address the social determinants of health; and incorporating many different disciplines and professions within the

staffing mix, working to their fullest scope, to maximize the variety of services and expertise available with available staff.

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# Appendix C

## *Municipal Council Survey*

For information, please contact:

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## Introduction

As part of the process to understand the community needs and identify strategies to enhance access to public health services, the Middlesex-London Health Unit commissioned an online survey of municipal councillors to assess their areas of public health priority, how the Health Unit can increase accessibility, and gather feedback on way to improve services.

Specifically, in order to ensure that the Health Unit is meeting the needs of its Middlesex County residents, this consultation was conducted to keep key decision makers informed, and to understand and acknowledge the interests and concerns that can be integrated into decision-making.

Results from this survey will be used to inform future strategies to improve service delivery.

The survey was conducted by Middlesex-London Health Unit staff during the period of June 4<sup>th</sup>, 2018 to August 31<sup>st</sup>, 2018.

# Study Implementation

## Survey Instrument

A survey instrument was developed by the Middlesex-London Health Unit in order to collect information about municipal council needs and priorities for Health Unit service. The final instrument consisted of 13 items.

## Survey Sample

The survey was distributed to all municipal councillors at lower-tier council meetings attended during June and August 2018. It was distributed in pre-addressed postage paid envelopes with an option to complete the survey online using CheckMarket Survey software. An additional reminder email was sent to all councillors in August 2018. At the time of survey distribution, there were 52 councillors.

## Survey Fielding

The overall completion rate was 26.9%, with a total of 14 surveys completed. Average completion time of the survey was 11 minutes and 20 seconds. Only completed surveys were included for analysis.

## Survey Limitations

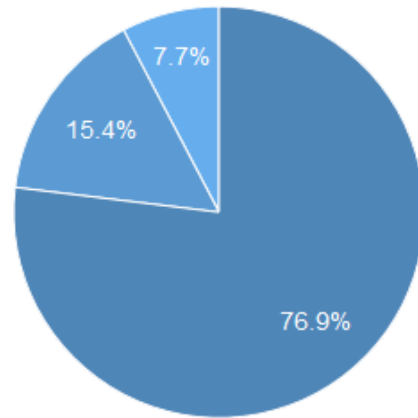
There are a number of study limitations given the sampling strategy used for conducting this online self-administered survey.

Due to the nature of the self-administered survey, respondents were not able to clarify questions that they may have at the time of survey completion. However, there was contact information for the Project Manager available to participants at the outset of the survey in order to provide the opportunity to seek clarification if questions did arise.

The main limitation of a sampling strategy is that municipal councillors, while elected, may not be representative of the views of all Middlesex County residents.

Furthermore, participants could have completed the online survey more than once as there was no method established to control for this issue.

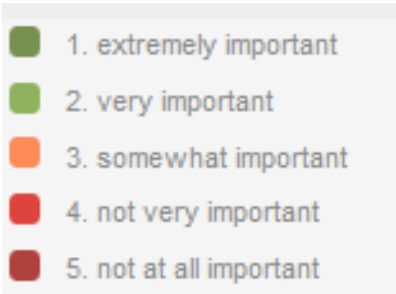
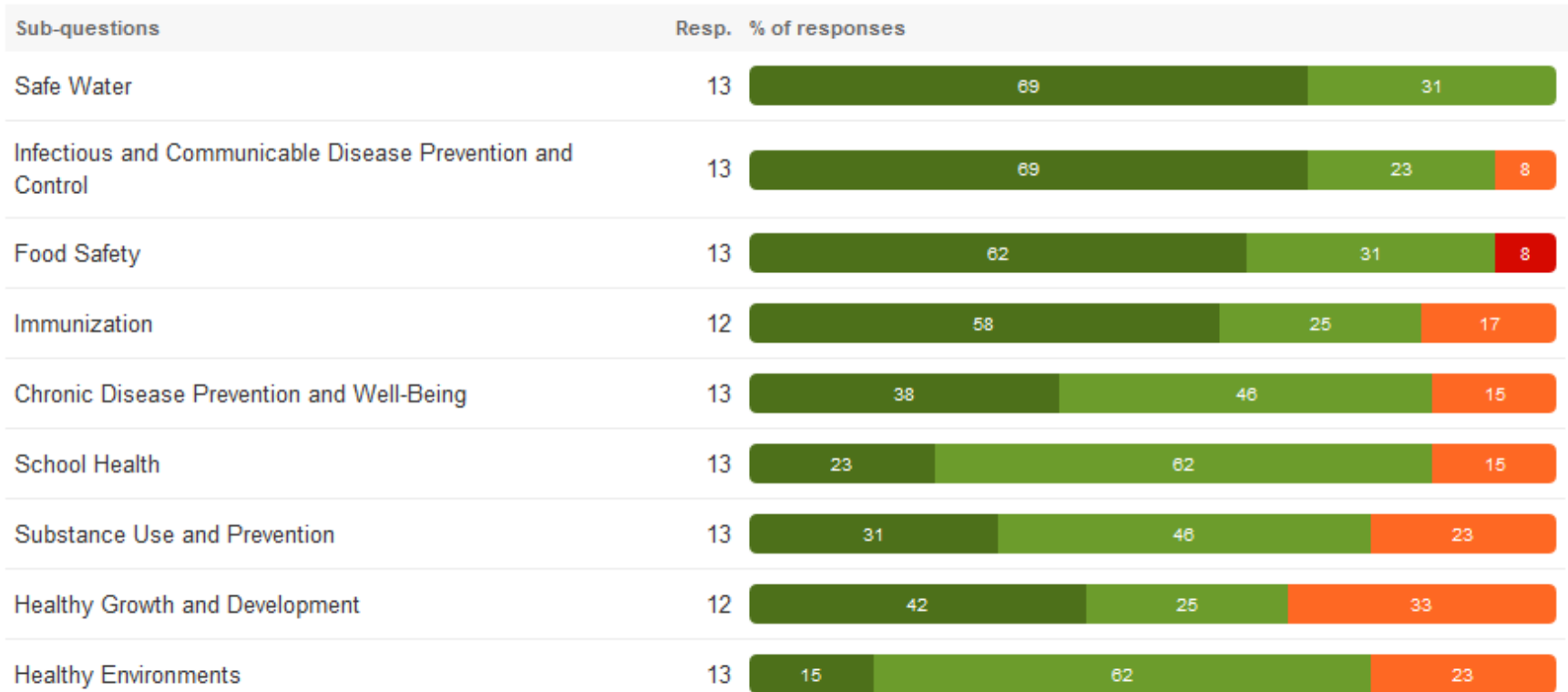
1. How familiar are you with MLHU's programs and services?



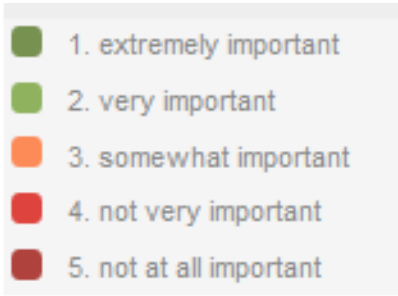
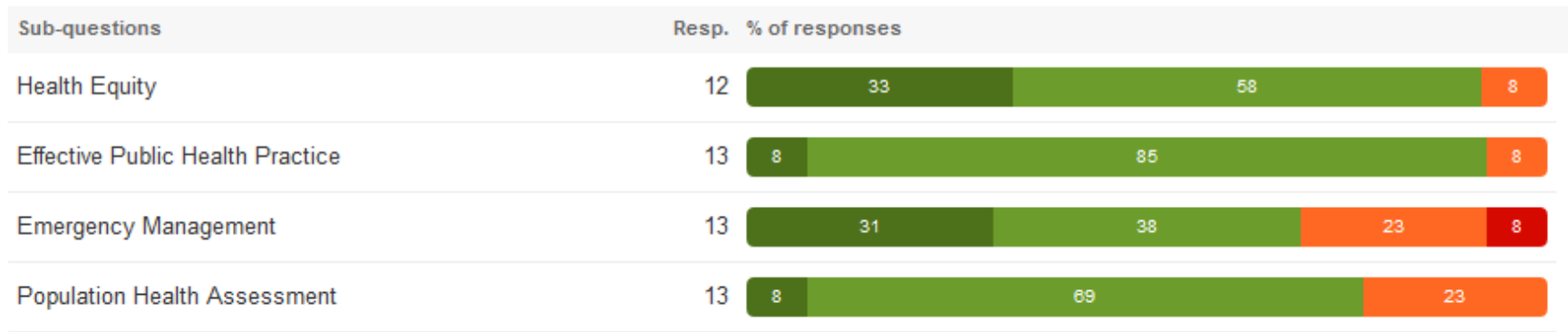
N=13

- 77% - somewhat familiar
- 15% - not very familiar
- 8% - very familiar

2. How important is it for MLHU to focus on the following areas of public health program and service delivery in Middlesex County?



3. How important is it for MLHU to focus on the following foundational standards for public health practice?



4. Please describe the public health issues that are of primary concern to Middlesex County residents.

Respondents were asked to give their own opinions and comments about the primary concern to Middlesex County residents.

A wide range of concerns were mentioned across the commentary. The most frequent responses were related to opioids and drug addiction, immunization and vector-borne disease.

Issues outside the authority of public health (access to primary care providers and specialists, home care, etc.) were not included in the counts below.

Concern	Count
Opioids & Drug Addiction	4
Immunization	3
Vector Borne Disease	3
Mental Health	2
Prenatal Health	2
Safe Water	2
Sexual Health	2
Accessibility of Physical Locations	2
Early Growth and Development	1
Food Safety	1
Health Equity	1
Infectious Disease Control	1
Marijuana Legalization	1
Parenting	1



5. How accessible (physically, with outreach programs, and virtually) are MLHU's programs and services to residents of Middlesex County?



N = 13

6. How could MLHU increase accessibility for Middlesex County residents?

Theme	Count
Provide programming in each community	3
Offer more programming in Strathroy	3
Participate in the regional transportation initiative	2
Utilize municipal/county spaces	2
Offer rotating / mobile clinics around the county	2
Improve the efficiency of responding to questions online or over the phone	1
Offer programming through other health care providers / private sector	1

7. What are the best ways for MLHU to share information to assist partners with their understanding of public health issues and/or opportunities?

Theme	Count
Social media	3
Share information at other locations (libraries, schools, town hall, doctors offices, etc.)	3
Online newsletters	2
Regular visits to municipal councils	2
Information sessions	2
Information in tax notices	2
Digital media	2
Print media	2
Service clubs	1

8. What are the best ways for MLHU to obtain feedback from community partners on public health issues and/or opportunities?

Theme	Count
Social media	3
Share information at other locations (libraries, schools, town hall, doctors offices, etc.)	3
Online newsletters	2
Regular visits to municipal councils	2
Information sessions / community meetings	2
Information in tax notices	2
Digital media	2
Print media	2
Service clubs	1

9. What are the best ways for MLHU to consider the concerns and needs of community partners for public health issues and/or opportunities?

Theme	Count
Formal feedback mechanisms	2
Work with community partners	2
Consultation sessions	2
Delegations to municipal councils	1
Social media	1

10. What are the best ways for MLHU to with engage community partners in decision-making for public health issues and/or opportunities?

Theme	Count
Delegations to municipal councils	3
Listen to community about issues	3
Hold public meetings regarding budget priorities and other priorities	2
Work with community partners	1
Develop good relationships with municipal officials	1
Social media	1

11. What are the best ways for MLHU to place final decision-making in the hands of the community partners for public health issues and/or opportunities?

Theme	Count
Ensure that mandates for decision-making are clear	2
Work with committees that have broad community representation	2
Gather information from public meetings and present finding to decision-making bodies like municipalities	2
Define what success looks like when empowering decision-makers	1

12. What are the community assets (individuals, associations, institutions, physical assets, and connections, etc.) in Middlesex County that you feel MLHU should be aware to enhance public health program and service delivery?

Theme	Count
Local service clubs	4
Existing health providers	3
Education system	3
Public transit providers	3
Work closely with municipal councils	2
Social service agencies and not-for-profits	4
Faith-based organizations	2
Community centres	2
Private businesses	2
Libraries	2
Work closely with municipal administrators	1
Local media outlets	1
Municipal offices	1
Parks	1
Arenas	1
Sports clubs	1

13. Please share any additional thoughts about how the Middlesex-London Health Unit can enhance services that have not previously been addressed.

Theme	Count
Enhanced communication and visibility	2
Increase physical presence in county if financially viable	1
Continuous dialogue with public and community partners	1
Enhance outreach in-person and electronic	1
Ensure low cost travel to programs and facilities	1
Partner and coordinate with existing service providers	1
Offer mobile services	1

# Appendix D

## *Key Informant Interviews*

AUGUST 2018

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## Introduction

As part of the process to understand the community needs and identify strategies to enhance access to public health services, the Middlesex-London Health Unit reached out to Mayors and Deputy Mayors of municipalities in Middlesex County to understand their perspectives on public health services being provided to their residents and opportunities for improvement.

The key informant interviews were conducted by Middlesex-London Health Unit staff during the period of July 19<sup>th</sup>, 2018 to September 6<sup>th</sup>, 2018.

## Study Implementation

### Survey Instrument

A survey instrument was developed by the Middlesex-London Health Unit in order to collect information from key informants regarding the services provided to rural populations. The final instrument consisted of 9 items.

### Survey Sample

All mayors, deputy mayors or designates were invited to participate.

### Survey Fielding

A total of three telephone interviews were completed. Average completion time of the survey was 30 minutes.

### Survey Limitations

There are a number of study limitations given the sampling strategy used for conducting the interviews.

The main limitation of a sampling strategy is that there were few respondents and it was not possible to reach data saturation. Additionally, municipal councillors, while elected, may not be representative of the views of all Middlesex County residents.

1. Please describe the public health issues that are of primary concern to Middlesex County residents.

*Opioids and Drug Addictions*

- Opioids and drug addiction was raised as a public health issue of concern by two of the three key informants interviewed
- One key informant noted that there is a stigma associated with drug and drug addiction and many try to turn a blind eye
- This issue is intertwined with other issues such as housing and mental health

*Mental Health*

- Mental health was a concern of two of the three key informants
- It was felt that is an issue that requires the involvement of many different community organizations to solve and not just the Health Unit
- With limited resources, the response will depend on communication and awareness – about where people can access services, and partnerships between those who have resources in the county

*Vector-borne disease (West Nile Virus)*

- Vector-borne disease (West Nile Virus) was commented on by two of the three key informants
- West Nile Virus is present in North Middlesex and the larviciding program is important to county residents

*Other public health issues of concern*

- Prenatal and postnatal health and support for mothers and families who have to balance jobs and other priorities
- Vaccination (no details provided)
- Bullying

*Other comments not specific to public health issues*

- The relationship with municipalities is important
- Continue to be present physically in the community
- The public has a difficult time knowing who we are and what we do. There could be improvement in the ways we communicate (using newsletters, visits to councils, working with community partners, etc.)

## 2. How accessible (physically, with outreach programs, and virtually) are MLHU's programs and services to residents of Middlesex County?

### *Transportation Challenges*

- All respondents noted that transportation is a significant challenge for their residents, particularly the most vulnerable residents. There is a lack of public transportation options for county residents. Many residents are not familiar with our locations and how accessible we are and it can be difficult for residents to get to downtown London for services

### *Libraries as Community Hubs*

- All respondents noted that libraries are becoming the hub of many communities and provides a space for information to be shared and services to be delivered in a way that people would not be stigmatized for accessing health unit services

### *Community Partnerships*

- All respondents touched upon the need to collaborate with community partners to share information and to use spaces that are already existing in the community.
- Some of the places to share information include schools, hospitals, primary care providers, town halls, municipality-specific web pages, local media, etc.
- Some of the physical spaces to use include schools, community rooms, grocery stores, libraries, town hall, social housing, etc.



3. What are some of the items of public health importance that municipalities and community partners should be informed of?

- The Health Unit could inform residents of items of public health importance through:
  - o Newsletters to municipal councils (could be sent as correspondence)
  - o Speaking at service organizations
  - o Tax bill inserts
  - o Specific websites (i.e. Strathroy Buy and Sell)
  - o Billboards and portable signs
  - o Social media
  - o Communication with schools

4. What are some of the items of public health importance that municipalities and community partners should be consulted on?

- The Health Unit should consult municipalities regarding the opioid crisis and where consumption sites might be located
- The Health Unit should also consult with municipalities regarding where clinics could best be located
- Suggested methods to effectively consult include:
  - o Delegations to municipal councils
  - o Speaking at service organizations

5. What are some of the items of public health importance that municipalities and community partners should be involved in the planning and decision-making?

- Issues regarding wind turbines and municipal land use were mentioned by key informants
- One key informant noted that the Health Unit board is the body responsible for decision-making and that municipalities and community partners should be comfortable in having the Health Unit make decisions
- Suggested methods to effectively involve municipalities and community partners in decision-making included:
  - o Surveys (although they can be unreliable)
  - o Open houses
  - o Conversations with municipalities and decision-makers
  - o Regularly scheduled engagement opportunities

6. What are some of the items of public health importance that municipalities and community partners should be collaborating with MLHU on?

- Key informants noted that the Health Unit could collaborate with municipalities on safe consumptions facilities, movies in the park, dental for low-income adults, mental health, bullying and infectious disease outbreaks
- One informant felt that any issues that is controversial or could have significant impact on people should involve collaboration

7. What are some of the items of public health importance that municipalities and community partners should be making the final decisions on?

- One key informant noted that zoning is an issue that municipalities have the final decision on but that the Health Unit should have input if there is a public health impact

8. What are the community assets (individuals, associations, institutions, physical assets, and connections, etc.) in Middlesex County that you feel MLHU should be aware to enhance public health program and service delivery?

- All of the key informants noted the importance of schools, service groups in their community,
- Two of the key informants noted libraries as physical infrastructure
- Other community assets included:
  - o Faith-based organizations
  - o Community centres and halls
  - o Not-for-profits
  - o For-profit businesses
  - o Primary care providers
  - o Retirement and nursing homes

9. Do you have any additional thoughts about how the Middlesex-London Health Unit can enhance services that have not previously been addressed?

- Communicating to the public is paramount to ensuring people know who we are, where to find our programs and services and how to contact us
- Utilize community events to reach municipal residents and be physically present

# Appendix E

## *Environmental Scan of Ontario Public Health Units*

AUGUST 2018

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## Introduction

As part of the process to understand the community needs and identify strategies to enhance access to public health services, the Middlesex-London Health Unit reached out to Ontario Public Health Units with similar demographics to understand their strategies for servicing rural populations.

Specifically, in order to ensure that the Health Unit is considering all possible strategies and best practices, this environmental scan sought to identify potential service improvements for Middlesex County residents.

The environmental scan was conducted by Middlesex-London Health Unit staff during the period of July 19<sup>th</sup>, 2018 to August 31<sup>st</sup>, 2018.

## Study Implementation

### Survey Instrument

A survey instrument was developed by the Middlesex-London Health Unit in order to collect information from Ontario Public Health Units regarding the services they provide to rural populations. The final instrument consisted of 9 items.

### Survey Sample

The survey was distributed to 14 health units during July and August 2018. It was distributed to the business administrators via email to complete using an online survey.

### Survey Fielding

The overall completion rate was 35.7%, with a total of 5 surveys completed. Average completion time of the survey was 7 minutes and 28 seconds. Only completed surveys were included for analysis.

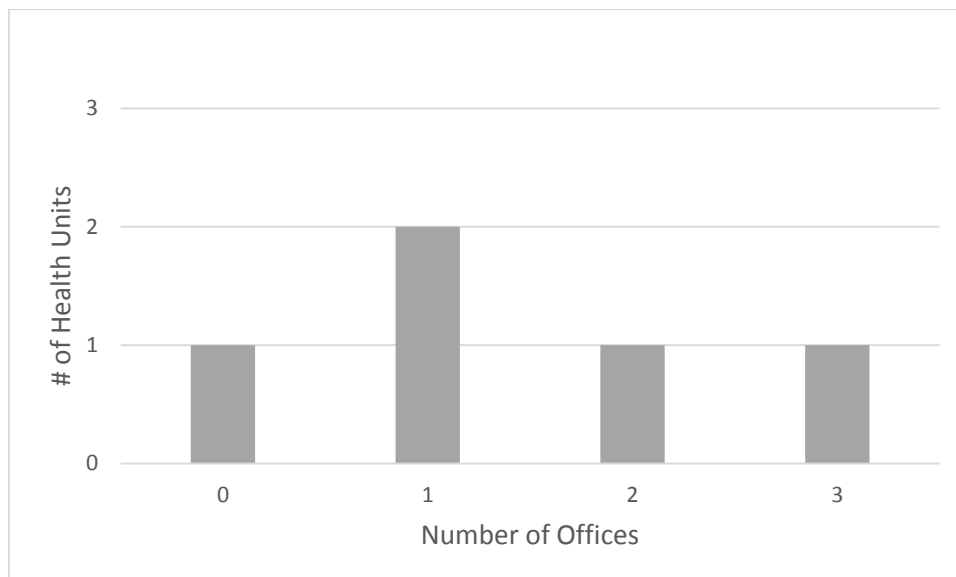
### Survey Limitations

There are a number of study limitations given the sampling strategy used for conducting this online self-administered survey.

Due to the nature of the self-administered survey, respondents were not able to clarify questions that they may have at the time of survey completion. However, there was contact information for the Project Manager available to participants at the outset of the survey in order to provide the opportunity to seek clarification if questions did arise.

The main limitation of a sampling strategy is that each health unit has different community needs, strategies and characteristics that must be considered.

1. Do you have satellite offices in the rural communities the health unit serves? If yes, how many satellite sites does the Health Unit have?



- Three of the health units also noted the use of other shared office spaces and “service centres”

2. If yes, what public health programs and services are available at the satellite sites?

- Two health units noted almost all services are provided at satellite sites
- Other health units noted:
  - o Sexual health services
  - o Infant feeding supports
  - o Tobacco cessation
  - o Oral health
  - o Environmental health programs
  - o Mother and young child clinics

3. Does the Health Unit use community spaces (e.g. library, community centres) to deliver public health programs and services?

- One health unit indicated they do but not on a regular basis
- Other health units indicated they utilize:
  - o Libraries
  - o Community centres
  - o Social housing common areas
  - o Recreation centres
  - o Municipal offices
  - o Schools spaces
  - o Community health centres
  - o Community hubs
  - o Early years centres
  - o Hospitals
  - o Faith-based organization spaces

4. Besides physical locations, what does your Health Unit do to increase the accessibility of its public health programs and services to rural residents?

- Website, social media and other internet applications
- Phone service
- Information at municipal offices
- Drop off sites for water testing in rural communities
- Mobilize and build capacity with community groups and partners to deliver services (health care providers, other social services, volunteers, etc.)
- Board meetings are rotated between municipal and First Nation sites
- Partnerships with neighbouring health units when residents may have closer options
- Have staff working in schools across rural areas
- Staff attendance at community events
- Rotate the location of classes and courses
- Offer taxi vouchers

5. How do you provide rural residents / municipalities with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions?

- Website
- Town hall meetings and presentations
- Board of Health reports and meeting minutes are accessible
- Communication team ensure that strategies are in place to reach all residents
- Maintain listing of people and organizations to disseminate information to

6. How do you obtain rural residents/municipalities feedback on analysis, alternatives and/or decisions?

- Surveys
- Community meetings
- Feedback is build into program delivery and evaluation (each program ensures they are obtaining feedback)

7. How do you work directly with rural residents / municipalities throughout the process to ensure that public concerns and aspirations are consistently understood and considered?

- Ensure that residents and municipalities are involved in the planning process
- A community engagement strategy has been developed to guide this work

8. How do you partner with the rural residents / municipalities in aspects of decision-making including the development of alternatives and the identification of the preferred solution?

- Ensure that residents and municipalities are involved in all aspects of planning, implementation and evaluation
- Have staff that act as liaisons between stakeholder groups
- Use a community development approach
- Ensure board representation of the community
- Build and use coalitions

9. When do you place final decision-making in the hands of the rural residents / municipalities?

- Public health units can provide advice to municipalities when they make decisions regarding public health matters

10. Please provide any additional comments you would like to share about engaging with rural residents/municipalities

- It is difficult to obtain data specific to rural municipalities
- Engage with candidates for municipal offer by having a conversation café to help them understand key public health issues