MIDDLESEX-LONDON HEALTH UNIT

Assessment of Vulnerability to the Health Impacts of Climate Change in Middlesex London Region

Advisory Committee on Environment (ACE)
February 4, 2015
By Iqbal Kalsi

ML MIDDLESEX-LONDON
HEALTH UNIT

Environmental Health Chronic Disease's Mission

We are public health professionals who embrace opportunities that promote the prevention of chronic disease and injuries through evidence-based practice, innovative leadership, dynamic partnerships, and effective communications.

choose **health**

ML MIDDLESEX-LONDON
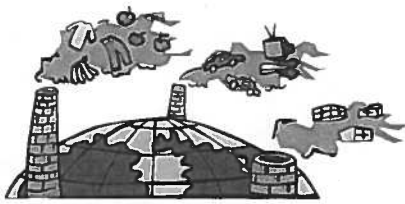HEALTH UNIT

Goal of EHCD

To protect and promote the health of people within our community through the implementation of public health programs that focus on environmental health, chronic diseases and injury prevention.

choose **health**

ML MIDDLESEX-LONDON
HEALTH UNIT

Health Hazard Management and Prevention

- Environmental Health Hazards
- Toxicology & Risk Assessments
- Non-communicable disease investigations
- Climate Change &Health
- Air Quality & Health & Anti-idling
- School health and environment issues
- Land Use Planning
- Emergency Response
- Special Risks Program
- Contaminated Site & PCB Waste Cleanup and Blood Study
- *Etc...*

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

"Climate change is the biggest global health threat of the 21st century"

Lancet and UCL, 2009

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

In Canada, average national
temperatures have increased 1.2°C over
the past 50 years and an even greater
rate of warming is projected over this
century.
(Government of Canada, 2006)

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

**According to Natural Resources
Canada(2007)**

*…Southwestern Ontario region, where
Middlesex-London is located is expected to
experience increases in temperature,
precipitation and more extreme weather (e.g.
storms and resulting flooding)…..*

choose
health

∕∕L MIDDLESEX-LONDON
HEALTH UNIT

By 2050 SW Ontario temperatures are
anticipated to increase by 2° to 4° C,
largest in winter months
(Bruce 2011)

choose
health

∕∕L MIDDLESEX-LONDON
HEALTH UNIT

**Pathways by which climate change impacts health, and the concurrent
influences of environmental, social and health system factors**
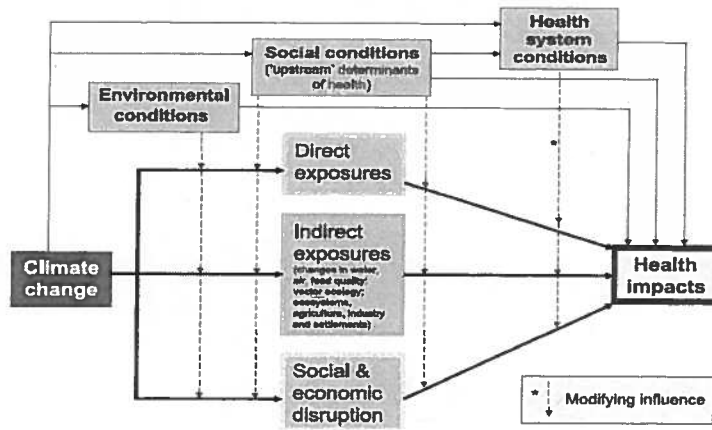
Source: Confalonieri et al 2007 Climate Change 2007

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

Role of Public Health in Changing Climate

- Increase knowledge & awareness and prevent diseases and deaths related to Changing Climate
- Direct health affects include increased morbidity and mortality issues from extreme weather events e.g. extreme heat, floods, hurricanes, ice storms, droughts…
- Indirect health affects include increases in acute respiratory and cardiovascular diseases related to poor air quality, food & waterborne and vector-borne & zoonotic diseases….

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

Under these circumstances

- health risks from climate change are growing for people living in Middlesex-London.

- economic costs are also expected to be significant due to increased pressures on health and social services.

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

Therefore, ...

To ascertain our vulnerability to climate change, we partnered with Health Canada (Climate Change Health Office) to conduct a baseline vulnerability assessment

This assessment will be used to guide future climate change adaptation strategies in Middlesex-London

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

Objective

To report results of an assessment of vulnerability of people living in Middlesex-London to the health impacts of climate change.

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

Middlesex-London Area

ML MIDDLESEX-LONDON
**HEALTH UNIT**
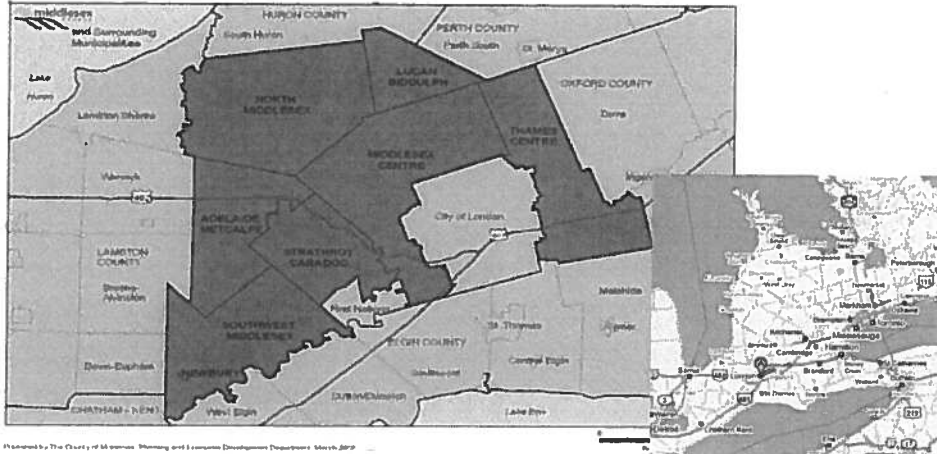
Middlesex-London Area

- Consist of City of London & Middlesex Counties (eight rural municipalities)
- Covering 3317 square kilometers
- MLHU population is 439,151(2011) around 25.2 people/ sq.km
- City of London is 11th largest municipality in Canada with 366,151population around 132.4 people/sq.km

ML MIDDLESEX-LONDON
HEALTH UNIT

Methodology

- **For assessment methods we used World Health Organization and Pan American Health Organization (2012) approach**
- **A scientific literature review and analysis of community health and meteorological data;**
- **Projections of future climate conditions;**
- **A community workshop to examine vulnerable populations and capacity to adapt.**

Source: WHO/PAHO,2012

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT
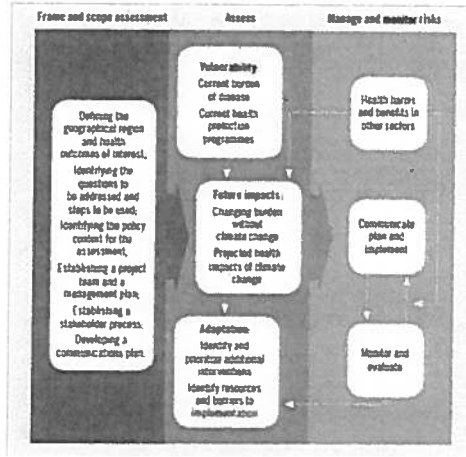
Vulnerability ....

... "the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes"
(IPCC 2007, p.21).

Vulnerability is a function of ...
- **EXPOSURE**
- **SENSITIVITY**
- **ADAPTIVE CAPACITY**

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

Function of Vulnerability Risk Assessment

- Exposure of our population living in Middlesex-London to Climate Change Hazards …

- Determine threats to human health,

- Establish plans for climate change adaptation

- Promote the health of community through wide array of program & policy initiatives that would prevent morbidity and mortality

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

Exposure Indicators…

- **Extreme Heat and Cold Events**
- **Air Pollution**
- **Vector-Borne Disease**
- **Water-Borne Illness**
- **Food-Borne Illness**
- **Ultra Violet Radiation**
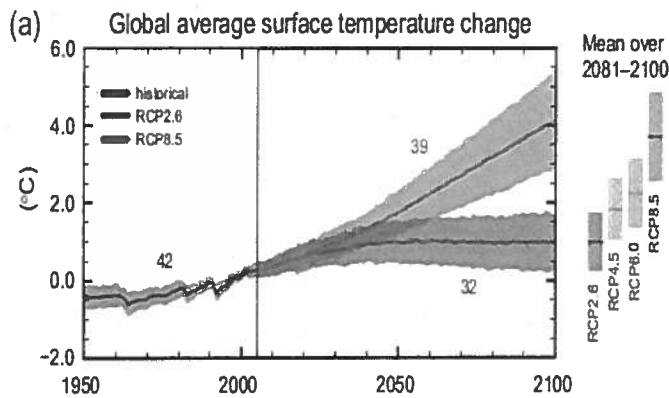- **Food Security**
- **Floods**

choose
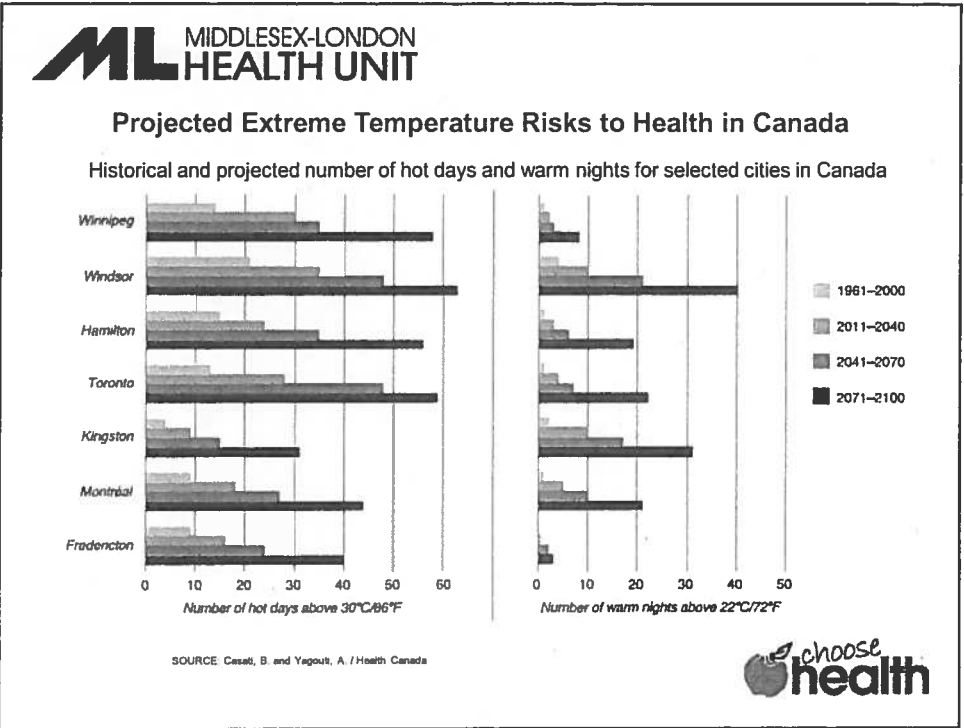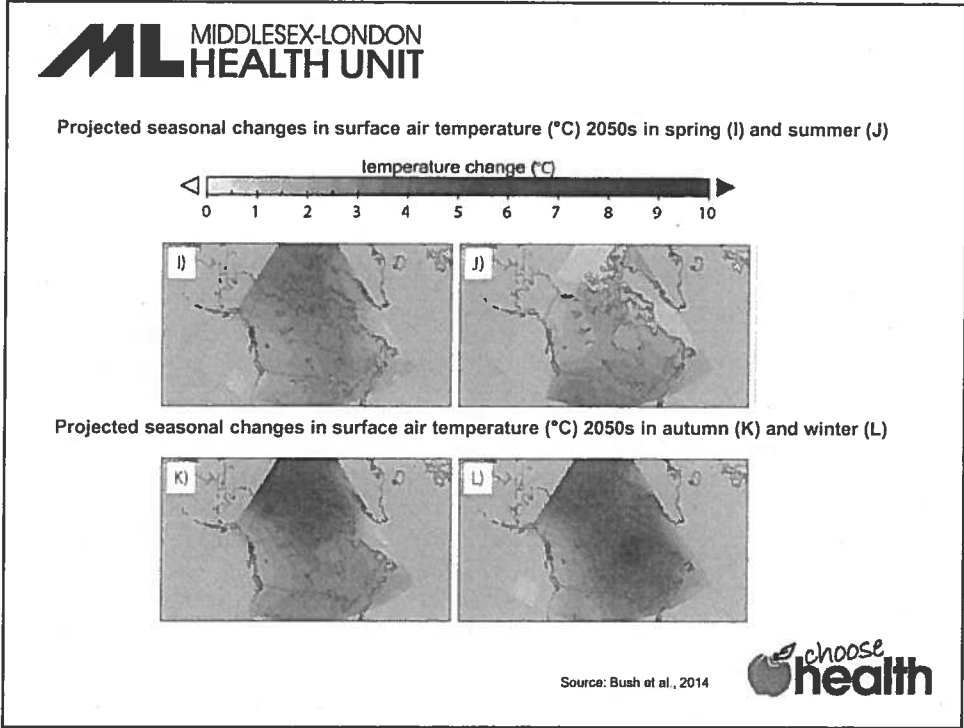**health**

ML MIDDLESEX-LONDON HEALTH UNIT

Local Impacts ...

- In Southwestern Ontario temperatures are anticipated to increase between 2 to 4°C by 2050 with largest increase in the winter
- Warming temperatures will likely impact wind & river flows
- Intense winter storms with high winds to increase by 8-15%
- Spring ice break-up on rivers is expected to occur earlier
- Flooding
- Increase poor air quality events
- Tornados increase in frequency
- Intensity of precipitation increasing
(Bruce 2011)

choose **health**

ML MIDDLESEX-LONDON HEALTH UNIT

Future Climate Projections
(AR5 - IPCC 2013)

(a) Global average surface temperature change

choose **health**

MIDDLESEX-LONDON
HEALTH UNIT

Projected seasonal changes in surface air temperature (°C) 2050s in spring (I) and summer (J)

temperature change (°C)

0 1 2 3 4 5 6 7 8 9 10

Projected seasonal changes in surface air temperature (°C) 2050s in autumn (K) and winter (L)

Source: Bush et al., 2014

choose health

MIDDLESEX-LONDON
HEALTH UNIT

Projected Extreme Temperature Risks to Health in Canada

Historical and projected number of hot days and warm nights for selected cities in Canada

Winnipeg
Windsor
Hamilton
Toronto
Kingston
Montreal
Fredericton

1961–2000
2011–2040
2041–2070
2071–2100

0 10 20 30 40 50 60
Number of hot days above 30°C/86°F

0 10 20 30 40 50
Number of warm nights above 22°C/72°F

SOURCE: Casati, B. and Yagoub, A. / Health Canada

choose health

12

MIDDLESEX-LONDON HEALTH UNIT

NUMBER OF HOT DAYS* PER YEAR

Canadian Centre for Climate Modelling and Analysis
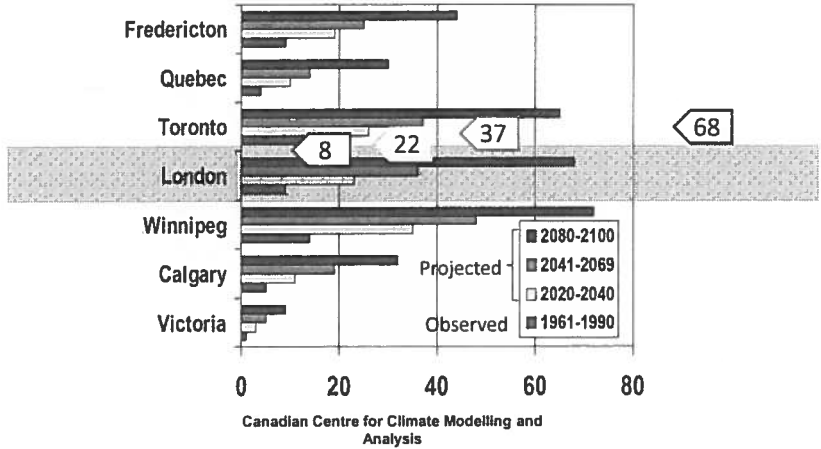
*A hot day is defined as a day with a maximum temperature above 30C

MIDDLESEX-LONDON HEALTH UNIT
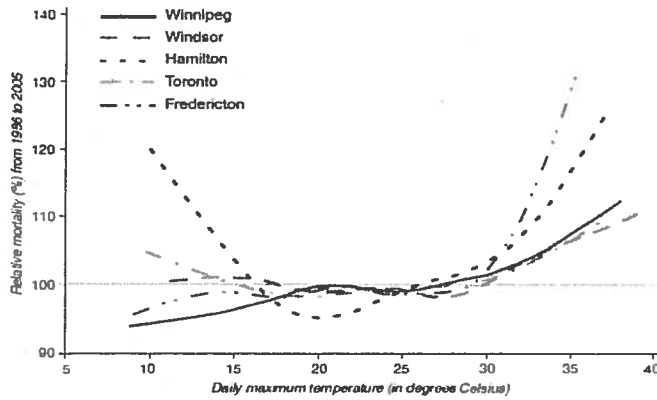
Projected Risks to Health in Canada
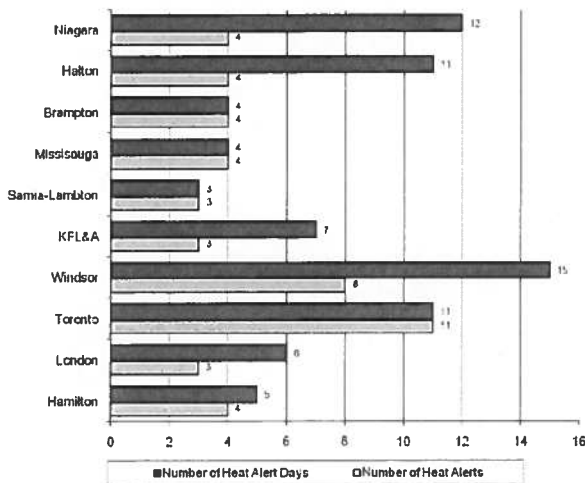
SOURCE: Casati, B. and Yagouti, A. / Health Canada

ML MIDDLESEX-LONDON
HEALTH UNIT

Evidence of Health Impacts from Extreme Heat Temperatures

Relationship between daily maximum temperatures in June, July and August, and all non-traumatic deaths from selected Canadian cities. (1986 – 2005)
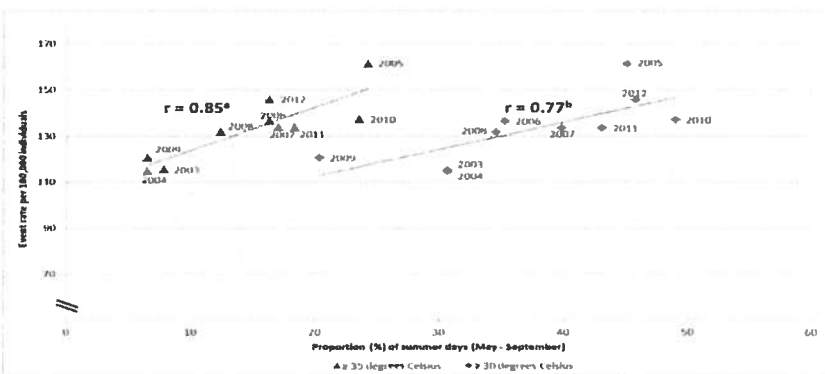

SOURCE: Casati, B. and Yagouti, A. / Health Canada

ML MIDDLESEX-LONDON
HEALTH UNIT

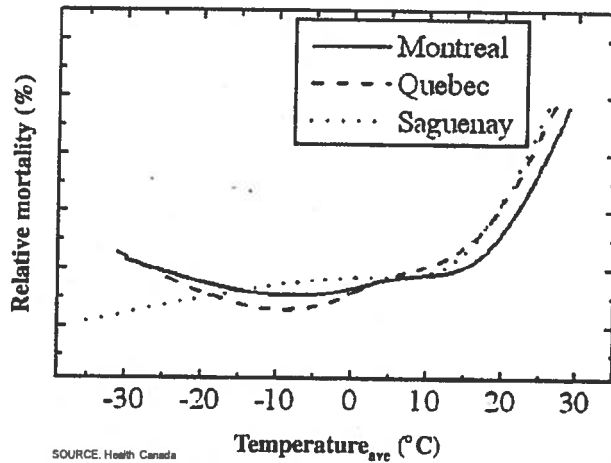Association between heat-stress morbidity and summer humidex values in the Middlesex-London Region, 2003-2012

Source: Shariff et al., 2014

MIDDLESEX-LONDON
HEALTH UNIT

Temperature-mortality Relationships for Montreal, Quebec City and the Saguenay Region

SOURCE. Health Canada

choose health

MIDDLESEX-LONDON
HEALTH UNIT

Historical temperature comparison for Middlesex-London, 1971-2000 vs. 2001-2012

	Mean Daily Tmax (°C)		Mean Daily Temperature (°C)		Mean Daily Tmin (°C)	
	1971-2000	2001-2012	1971-2000	2001-2012	1971-2000	2001-2012
January	-2.4	-1.6	-6.3	-5.2	-10.1	-8.8
February	-1.4	-0.8	-5.5	-4.8	-9.7	-8.7
March	4.2	5.2	-0.3	0.6	-4.7	-4.1
April	11.6	13.2	6.3	7.6	1	1.9
May	19	19	13	13.3	7	7.6
June	23.8	24.5	18	18.9	12.1	16.9
July	26.3	27.1	20.5	20.4	14.6	16.4
August	25.2	26.2	19.5	19.9	13.7	15.2
September	20.9	22.3	15.3	16.1	9.6	11.2
October	14	14.6	9	9.8	4	5
November	6.9	8.5	3.1	4.2	-0.7	0.8
December	0.6	1.3	-3	-2.2	-6.5	-4.9

Historical extreme heat and cold for Middlesex-London, 1971-2000 vs. 2001-2012

|	Days with Humidex >= 30°C		Record Daily Tmax in °C (Year/Day)		Days with Wind Chill =< -20°C		Record Daily Tmin in °C (Year/Day)	
	1971-2000	2001-2012	1900-2000	2001-2012	1971-2000	2001-2011	1900-2000	2001-2011
January	0	0.0	16.7 (1950/25)	14.8 (Twice) (2008/13; 2008/7)	10.2	7.8	-31.7 (1970/24)	-27.1 (2005/25)
February	0	0.0	17.8 (2000/26)	13.2 (2002/25)	7.7	5.6	-29.5 (1978/04)	-25.6 (2009/5)
March	0	0.1	24.8 (1998/30)	27.2 (2012/22)	2.1	1.4	-24.8 (1978/02)	-25.6 (2003/3)
April	0.3	0.3	29.4 (1990/25)	28.2 (2002/16)	0.1	0.0	-12.2 (1965/03)	-12.4 (2003/6)
May	3.1	3.3	32.4 (1987/30)	33.1 (2006/29)	0	0.0	-5 (1947/10)	-2.8 (2002/19)
June	9.7	12.3	38.2 (1988/25)	33.4 (2005/27)	0	0.0	-0.6 (1972/11)	3.8 (2003/1)
July	16.9	20.5	36.7 (1941/27)	36.7 (2011/21)	0	0.0	5 (1963/09)	5.9 (2001/2)
August	15	15.5	37 (2001/08)	37 (2001/8)	0	0.0	1.5 (1982/29)	6.1 (2004/22)
September	5.6	6.3	34.4 (1953/01)	34.2 (2002/9)	0	0.0	-3.3 (1965/27)	2 (2001/26)
October	0.3	0.8	30.3 (1946/06)	30.3 (2007/8)	0	0.0	-11.1 (1969/23)	-5.2 (2002/31)
November	0	0.0	24.4 (1950/01)	19.6 (2008/6)	0.1	0.8	-18.3 (1951/06)	-13.5 (2008/23)
December	0	0.0	18.5 (1982/03)	16.4 (2001/5)	4.2	1.8	-26.9 (1977/11)	-22.7 (2004/20)

choose health

MIDDLESEX-LONDON HEALTH UNIT

### Historical precipitation for Middlesex-London, 1971-2000 vs. 2001-2012

Month	Average Monthly Rainfall (mm)*			Average Monthly Snowfall (cm)*			Record Daily Rainfall in mm (date)	Record Daily Snowfall in cm (date)
	1971-2000	2001-2012	Difference	1971-2000	2001-2012	Difference		
January	31.1	31.8	0.7	52.6	49.3	-3.3	45 (1993/04)	32.5 (1943/03)
February	29.1	39.8	10.7	38.1	39.7	1.6	58.8 (1990-22)	30 (1965/25)
March	53.8	50.2	-3.6	28.6	23.0	-5.7	43.2 (1942/27)	27.4 (1947/25)
April	73.8	74.9	1.1	9.2	2.7	-6.5	66.4 (2008/20)	21.8 (1975/03)
May	82.6	95.3	12.7	0.3	0.0	-0.3	58.2 (1996/20)	5.8 (1961/02)
June	86.8	73.5	-13.3	0.0	0.0	0.0	82.8 (2000/11)	0.0
July	82.2	68.0	-14.2	0.0	0.0	0.0	63 (1942/05)	0.0
August	85.3	64.1	-21.2	0.0	0.0	0.0	69.9 (1940/29)	0.0
September	97.7	88.5	-9.2	0.0	0.0	0.0	89.1 (1986/29)	0.0
October	74.9	81.5	6.6	2.7	0.7	-2.1	56.9 (1954/15)	15.7 (1948/17)
November	73.7	78.0	4.3	19.7	15.1	-4.6	56.5 (1987/25)	40.6 (1970/24)
December	47.0	55.4	8.3	51.1	47.0	-4.1	45.6 (1990/29)	57 (1977/07)

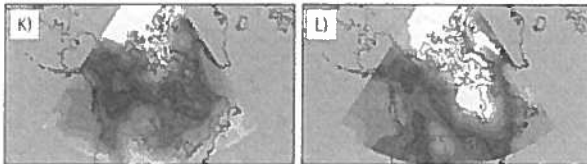### Difference in monthly average precipitation for Middlesex-London: 1971-2000 vs. 2001-2012

Average Monthly Rainfall

Average Monthly Snowfall

choose health
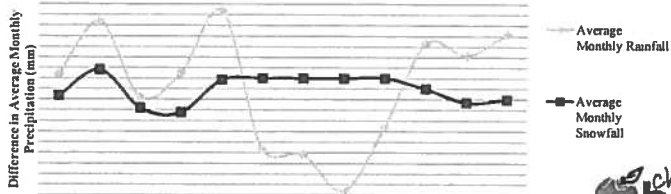
MIDDLESEX-LONDON HEALTH UNIT

Projected seasonal changes in precipitation (%) 2050s in spring (I) and summer (J)

precipitation change (%)

-25 -20 -15 -10 -5 0 5 10 15 20 25
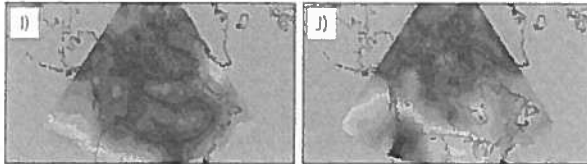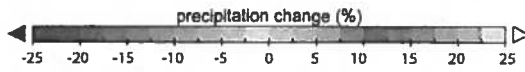
Projected seasonal changes in precipitation (%) 2050s in autumn (K) and winter (L)

Source: Bush et al., 2014

choose health

MIDDLESEX-LONDON HEALTH UNIT

Population and dwelling counts in the City of London affected by flooding under different climate scenarios

Flood Line	Climate Scenario	No. of Homes Flooded	No. of Buildings Flooded	Proportion Affected (2006 census data) Population	Dwellings
100-year	Historic	1141	34	7701	3969
	Dry	68	18	4881	2521
	Wet	1249	42	7949	4109
250-year	Historic	1376	58	8474	4381
	Dry	1059	33	7351	3802
	Wet	1486	59	8745	4543
500-year	Historic	1560	71	9119	4740
	Dry	1155	36	7717	3988
	Wet	1690	83	9388	4886

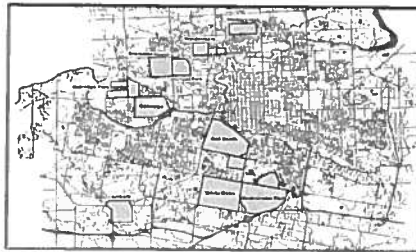Table 1: Neighbourhoods in London, ON with a history of basement flooding

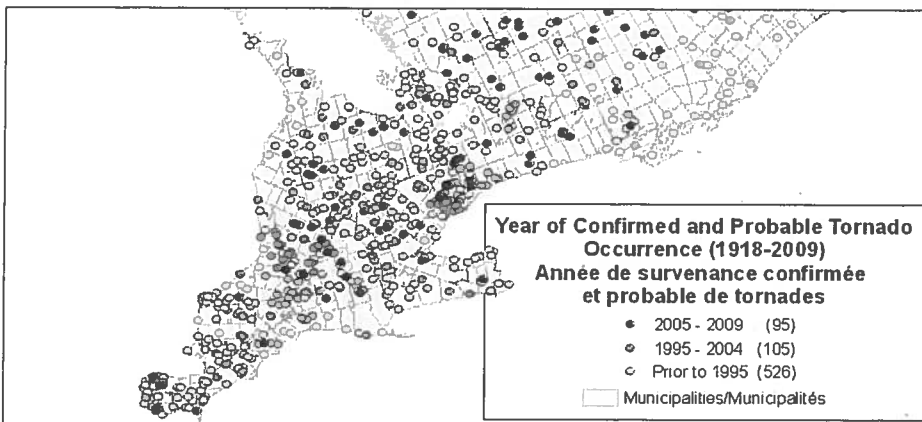Table 2: City of London 100-, 250- and 500-year floodplains under various climate change scenarios

Source: MLHU (2013) & Source: Adapted from Hebb and Mortsch, 2007.

choose **health**

MIDDLESEX-LONDON HEALTH UNIT

Historical overview of tornado occurrence in Southwestern Ontario, 1918-2009

Year of Confirmed and Probable Tornado Occurrence (1918-2009)
Année de survenance confirmée et probable de tornades

- 2005 - 2009 (95)
- 1995 - 2004 (105)
- Prior to 1995 (526)
- Municipalities/Municipalités

Environment Canada Environnement Canada

Canada

Source: Environment Canada (2011).

choose **health**

MIDDLESEX-LONDON HEALTH UNIT

Air Quality in Middlesex London

- Ground level Ozone (O_3) is significant health issue for residents in Middlesex-London.
- Nitrogen Oxides (NOx) and volatile organic compounds (VOCs) are two main constituents of ground level O_3 in Ontario.
- Significant rise smog advisories until 2007 and then a decrease which may be due to 2008 economic recession and associated decline in industrial activity within Canada and United States.
- Industrial and wild fire transboundary pollution is the highest concern from Ohio, Illinois, Michigan and other states.
- M-L 400 hi-way series, commercial, industrial have an associations with all cause mortality & morbidity issues.

Reported poor air quality days and smog advisories for Middlesex-London, 2003 – 2011

Year	# of Poor Air Quality Days in M-L	# of Smog Advisories (# of days) in M-L	Average # of Smog Advisories (# of days) for Ontario Municipalities
2011	No data	1 (1)	5 (9)
2010	0	2 (9)	3 (12)
2009	2	2 (4)	3 (5)
2008	5	5 (11)	8 (17)
2007	6	12 (27)	13 (39)
2006	4	4 (12)	6 (17)
2005	18	12 (45)	15 (53)
2004	13	6 (16)	8 (20)
2003	No data	5 (14)	7 (19)

Source: Ministry of the Environment, 2012a

choose health

MIDDLESEX-LONDON HEALTH UNIT

Primary Health Impacts

Impact	Cause
Mortality	Drowning or acute trauma (e.g. debris or building collapse) usually attributable to motor vehicle accidents or inappropriate behavior in flooded areas (e.g. swimming, surfing)
Shock, hypothermia	Exposure to floodwater which is often below human core body temperature
High blood pressure, heart attacks and strokes	Exertion and stress related to the event
Physical injuries such as lacerations, skin irritations, bruises, wound infections	Direct contact with flood water
Infection, pulmonary swelling, lung irritation, fungal infection	Aspiration of water into lungs
Sprains, strains and orthopedic injuries	Contact with water-borne debris, attempts to escape from collapsed structures, falls from ladders, attempts to rescue people or possessions, etc.
Electrical injuries	Contact with downed power cables/lines, circuits and electrical equipment in contact with standing water
Burns (fire-related or chemical) and explosion-related injuries	Disturbed propane and natural gas lines, tanks, power lines and chemical storage tanks; toxic gas emissions; rescue boats coming in to contact with power lines

choose health

MIDDLESEX-LONDON HEALTH UNIT

Secondary Health Impacts

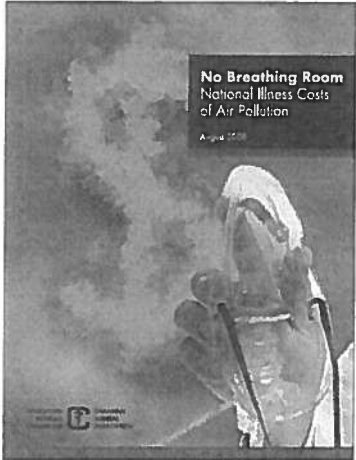| Impact	Causes
Exacerbation of existing illnesses, including chronic diseases	Disruption/decreased availability of emergency and ongoing health services, especially if health infrastructure is affected, including: decreased ability to provide/access care; displacement of patients and staff; impaired surveillance of illness, injury, toxic exposure; loss of medical records; loss/impairment of medication and medical devices
Carbon monoxide poisoning	Inappropriate use of unventilated cooking tanks (e.g. barbeques), pressure washers and gas powered generators
Burns/smoke inhalation	House fires started by candles
Dehydration, heat stroke, heart attack, stroke	Exposure of vulnerable populations to environmental stresses in days following event
Water- and food-borne diseases – upset stomach/gastrointestinal problems, infectious diseases with longer incubation periods including Hepatitis A, Legionella pneumophila, Norovirus, Rotavirus, Hepatitis A and C	Water and food contamination (e.g. from sewage overflows, flooding of agricultural areas and transport of sediment, fertilizers, pesticides, etc., leakage from tanks holding petroleum products, landfill materials), chemical contamination of water (e.g. from flooding of industrial sites)
Respiratory problems/symptoms	Mould and respiratory contaminants from mould, bacteria, fungal growth on damp structures Also, due to Legionella, Chlamydia, pneumonia, Burkholderia cepacia, and Mycobacterium avium

choose **health**

MIDDLESEX-LONDON HEALTH UNIT

Canadian Medical Association Air Pollution Costs Projections

- By **2031**, almost **90,000 people** will have died from the **acute effects** of air pollution. The number of deaths due to **long-term exposure** to air pollution will be **710,000**.
- The number of **premature deaths** associated with chronic exposure to air pollution is expected to **rise 83% between 2008 and 2031**.
- Over **92,000 emergency department** visits were associated with air pollution exposure in **2008** increasing to nearly **152,000 by 2031**.
- In 2008, it was estimated that there were over **620,000 doctor's office** visits because of air pollution. This total is expected to rise to over **940,000 visits in 2031 if air quality does not improve**.
- In 2008, economic costs of air pollution topped **$8 billion**, by 2031, these costs could accumulate to over **$250 billion**, if not controlled.
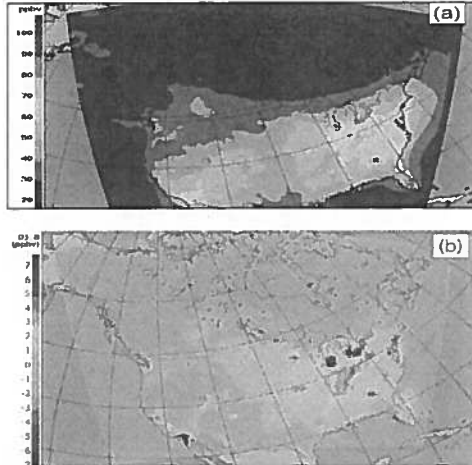
No Breathing Room
National Illness Costs
of Air Pollution

choose
ML BUREAU DE SANTÉ DE MIDDLESEX-LONDON HEALTH UNIT
www.healthunit.com

**MIDDLESEX-LONDON HEALTH UNIT**

Projected changes in the summer average daily maximum 8-hour O_3 between the "current" case and the "future" case in 2045 with climate change (Kelly et al., 2012)

MIDDLESEX-LONDON HEALTH UNIT Vector Borne Diseases

Risk maps for the establishment and spread of the Lyme disease vector *Ixodes scapularis* under current climate (2000) and projected future climate (2020 to 2080)
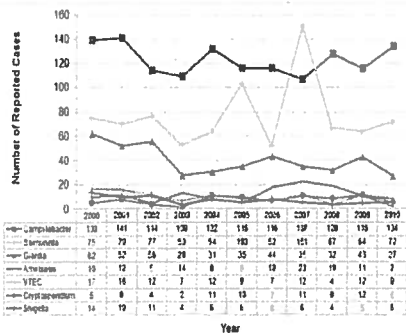
Source: Ogden, 2008

20

MIDDLESEX-LONDON HEALTH UNIT
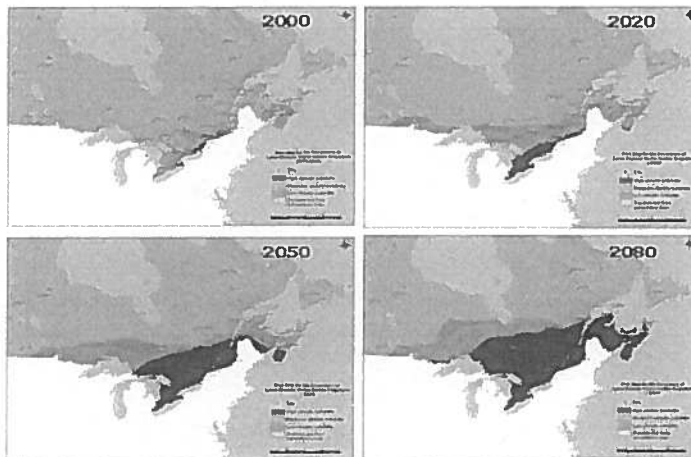
Water & Food-Borne Illnesses

The number of reported campylobacter, salmonella, giardia, VTEC and cryptosporidium infections reported in Middlesex-London by month, 2000 to 2010 annual average

Source: MLHU, 2014h

- Both Food &Water Borne Illnesses are under reported within Middlesex London area
- With gradual increase in temperatures and frequency of severe weather patterns e.g. precipitation, flooding due to climate change
- Also, aging infrastructure and increasing urban sprawl will further impact the food and water quality due to chemical and biological contaminations.
- Better reporting mechanisms need to be in place to protect the marginalized.

choose health

MIDDLESEX-LONDON HEALTH UNIT

Adaptive Capacity

…Refers to the ability of individuals, communities, and institutions to prepare for and cope with the consequences of climate variability and change.

- Greater the levels of adaptive capacity….which reduce impacts of higher climate related exposures which then contributes to climate resiliency

choose health

ML MIDDLESEX-LONDON
HEALTH UNIT

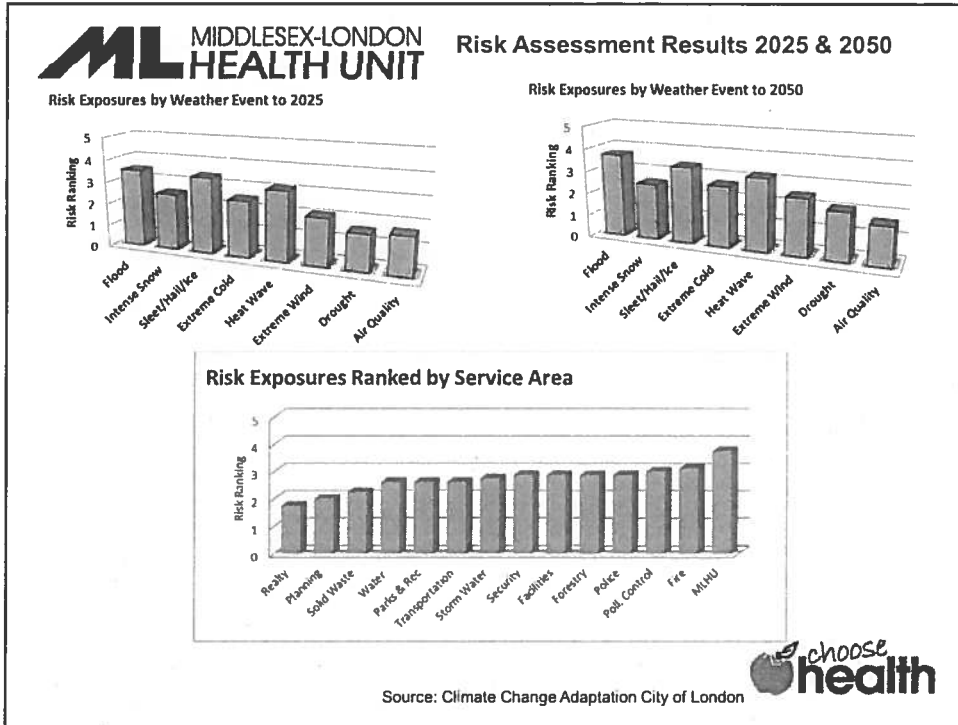## Stakeholder Workshop March 27, 2014

- **29** Organizations surveyed in Feb 2014 for direct and indirect resilience to climate change.
- **105** stakeholders attended and it was all day long workshop

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

3 Key Components Identified by Community Stakeholders

1. Socioeconomic Factors
   - High unemployment, limited housing and limited education

2. Adaptation Preparedness
   - Vulnerable population not adequately prepared, no new investment in community capacity & resilience & monitoring to address health risk to CC

3. Community Design and Preparedness
   - Active lifestyle promotion, more trees for shade porous materials for protection against Urban Heat Island Impacts

choose
health

Slide 1

MIDDLESEX-LONDON HEALTH UNIT

Risk Assessment Results 2025 & 2050

Risk Exposures by Weather Event to 2025

Risk Exposures by Weather Event to 2050

Risk Exposures Ranked by Service Area

Source: Climate Change Adaptation City of London

choose health

Slide 2

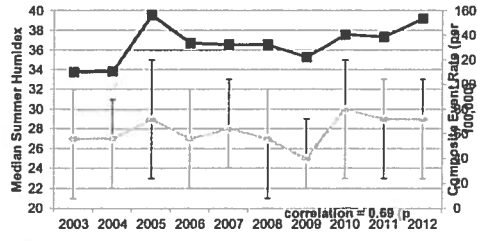**MIDDLESEX-LONDON HEALTH UNIT**

Vulnerable Groups

- Older adults
- Infants and young children
- Occupational groups
- The physically active
- People who are physically impaired
- People with chronic illness (e.g. heart or lu disease, diabetes, psychiatric illnesses, renal illnesses)
- People on certain medications (e.g. antihypertensive, antidepressants, antipsychotics, anti-Parkinsonian)
- Socially disadvantaged individuals and communities (e.g. low income, homeless, living alone)
- Newcomers to Canada and transient populations

SOURCE: Health Canada

choose health

Source: MLHU (2014)

Source: MLHU, 2014e

MIDDLESEX-LONDON
HEALTH UNIT

Socioeconomic distress within the City of London

Socio-Economic Distress

Level of socio-economic distress
- Very Low
- Low
- Moderate
- High
- Very High
- No Data

City of London Planning Districts
Major Roads
400 Highway Series
Water

Source: MLHU, 2014e

MIDDLESEX-LONDON
HEALTH UNIT

Barriers to implementing programs, activities or measures to reduce health risks from climate change

What are the barriers to implementing programs, activities or measures to reduce health risks from climate change?

Source: MLHU (2014)

ML MIDDLESEX-LONDON
HEALTH UNIT

RECOMMENDATIONS

Climate Change and Health Action Plan – Efforts to address climate change and health risks to residents of Middlesex-London would benefit from the development of an Action Plan to direct future adaptation measures.

Education and Outreach –The results of the report should be disseminated to public health and emergency management officials in the City of London, Middlesex County and the Middlesex-London Health Unit and those with a role in reducing health risks from extreme heat events.

Evaluating Adaptations – Efforts to prepare for climate change health impacts will benefit from evaluations of existing measures to protect people in Middlesex-London from climate-related hazards.

Surveillance and Monitoring – Continued surveillance and monitoring of climate sensitive diseases is needed to better understand and estimate increased health risks that climate change might pose in the region.

Urban and Rural Vulnerabilities – Greater understanding is needed about how climate change and health vulnerabilities may differ between urban and rural populations and communities in the Middlesex-London Region.

Dealing with Uncertainty - Policies and programs that address multiple risks (e.g. planting trees to reduce air pollution, enhancing flood prevention and drought mitigation and reducing the urban heat island) can mitigate the effects of uncertainty and are beneficial as are actions that target both adaptation and greenhouse gas mitigation goals concurrently (e.g., increasing active transportation

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

The Next Steps

We plan to use this baseline knowledge of vulnerability to climate change health impacts to address information gaps, raise awareness of risks among stakeholders, develop iterative evaluation processes to monitor changes in population health and inform development of future public health programs and policies.

We also plans to update information in this report with data from climate models and health outcome projections as they become available. A more formal evaluation of health services in the health region will also assist with better adaptation efforts to protect the most vulnerable and the socioeconomically marginalized populations.

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

According to Dr. Gordon McBean
Climate Change Nobel
Prize Recipient
Local Londoner & Western
Professor

......Canada must adapt to this new
reality of climate change....

choose
health

ML MIDDLESEX-LONDON
HEALTH UNIT

Presentations to International Climate Change
Forum in Ottawa at Chateau Laurier (April 23, 2014)

choose
health

∧∧L MIDDLESEX-LONDON
HEALTH UNIT

Acknowledgements

- **Health Canada Climate Change Office** *Jim Freh, Dr. Peter Berry, Jay Storfer, Jaclyn Paterson, Abderrahamane Yagouti, Gregory Richardson*
- **City of London** *Lois Burgess, Pat Donnely, Bruce Page, Billy Haklander, Jason Wills & Joy Jackson*
- **Western University(former UWO)** *Dr Jamie Vooght, Daniel Dyce*
- **Institute of Clinical Evaluative Services (ICES) London** *Dr. Salimah Shariff, Dr. Amit Garg, Sean Leonard, Jeniffer Winnick-Ng*
- ***Middlesex London Health Unit EH Staff*** *Wally Adams, Sarah Maaten, Randy Walker*

choose
health

∧∧L MIDDLESEX-LONDON
HEALTH UNIT

Climate Change Report

http://www.healthunit.com/climate-change

choose
health

MIDDLESEX-LONDON HEALTH UNIT

Questions?

choose
health