

A close-up photograph of a woman with dark, curly hair, smiling warmly. She is holding a fork with a piece of green leafy vegetable and a cherry tomato. The background is a soft, out-of-focus light blue.

# Diabetes

## Chapter 9

### **AUTHORS**

Gillian L. Booth

Lorraine L. Lipscombe

Onil Bhattacharyya

Denice S. Feig

Baiju R. Shah

Ashley Johns

Naushaba Degani

Beatrix Ko

Arlene S. Bierman



Project for an Ontario Women's Health Evidence-Based Report

# A Tool for Monitoring and Improvement

---

The **Project for an Ontario Women's Health Evidence-Based Report (POWER)** is designed to serve as a tool to help policymakers and providers to improve the health of and reduce inequities among the women of Ontario.

# Overarching Objectives

---

- Use of performance measurement and reporting
  - as a mechanism for knowledge translation
  - as a tool to drive equity in health care
- Provide evidence for use by a diverse group of stakeholders for use to improve women's (and men's) health in the province

# Ontario Women's Health Equity Report

---

## Volume 1

- Burden of Illness
- Cancer
- Depression
- Cardiovascular disease (CVD)
- Access to Health Care Services

## Volume 2

- Musculoskeletal Disorders (arthritis, osteoporosis)
- Diabetes
- Reproductive and Gynecological Health
- HIV Infection
- Special Populations (low income, immigrant and older women)
- Social Determinants of Health
- Conclusions and Policy Implications

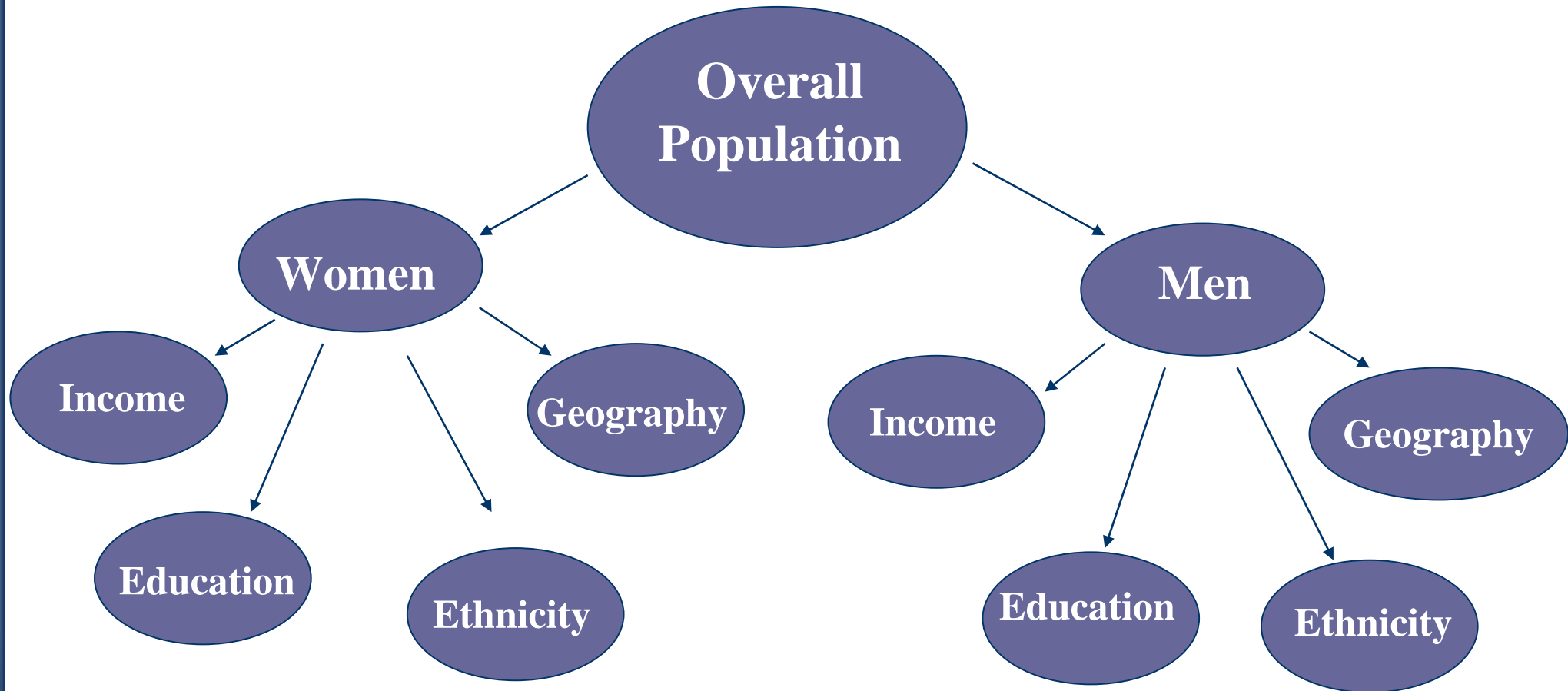
## Web-based reporting

# Community-Engaged Research

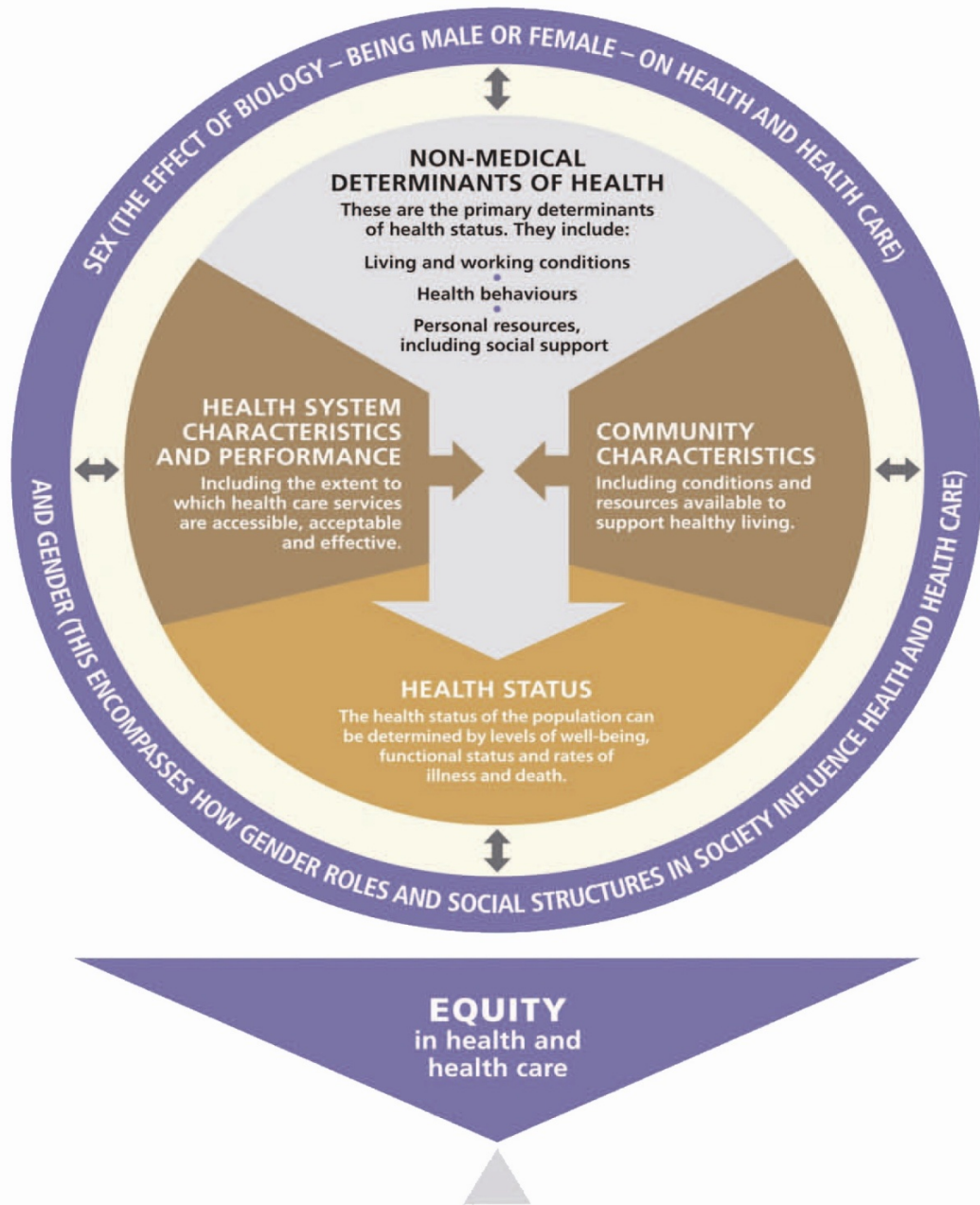
---

- POWER Study Roundtables
  - Inform indicator selection and Interpretation
  - Increase uptake of findings
- Consumers: representatives of community based organizations and associations
- Providers: clinicians, hospitals, community health centres (CHCs)
- Policymakers: government, regional health authorities, public health, health data agencies

# Assessing Equity



# POWER Study Gender and Equity Health Indicator Framework



# Diabetes



# Diabetes Indicators: data shared with LHINs

Section A: Health and Functional Status	LHIN	By Sex	By Income
<b>Diabetes prevalence and comorbidity</b>			
Prevalence of diabetes	√	√	√
Comorbidity (multiple chronic conditions)	√	√	
Probable depression			
Hypertension	√	√	
Self-rated health	√	√	
Limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL)			
<b>Health behaviours</b>			
Physical inactivity			
Inadequate fruit and vegetable intake			
Being overweight			
Being obese			
Current smoker			

# Diabetes Indicators: data shared with LHINs

<b>Section B: Access and Utilization of Care</b>	<b>LHIN</b>	<b>By Sex</b>	<b>By Income</b>
Continuity of primary care	√	√	
Mean number of visits to a general practitioner/family physician (GP/FP)	√	√	
Specialist care (endocrinologist, general internist or geriatrician) for adults with diabetes	√	√	
No visits to GP/FPs or specialists	√	√	
<b>Section C: Screening, Assessment and Monitoring</b>			
Self-monitoring of blood glucose for people on insulin	√		
Hemoglobin A1C monitoring			
Microalbumin measurement			
Eye examination	√	√	
Self foot examination	√	√	
Foot examination by a health care professional			
Dental care			

# Diabetes Indicators: data shared with LHINs

<b>Section D: Pharmacological Treatment</b>	<b>LHIN</b>	<b>By Sex</b>	<b>By Income</b>
Use of insulin or at least one glucose-lowering medication	√		
Use of anti-hypertensive medications for adults aged 65 and older	√	√	
Use of an angiotensin-converting enzyme (ACE) inhibitors and/or an angiotensin receptor blocker (ARB) for adults aged 65 and older	√	√	
Use of statins for adults aged 65 and older	√	√	
<b>Section E: Health Outcomes</b>			
Emergency room visits and hospital admissions for hyperglycemia or hypoglycemia	√	√	√
Hospitalizations for skin and soft tissue infections	√	√	
<b>Diabetes and cardiac care</b>			
Hospitalization for an acute myocardial infarction (AMI)	√	√	√
Hospitalization for congestive heart failure (CHF)	√	√	
Coronary artery bypass graft (CABG) surgery	√	√	
Percutaneous coronary intervention (PCI)	√	√	

# Diabetes Indicators: data shared with LHINs

Section E: Health Outcomes continued	LHIN	By Sex	By Income
<b>Diabetes and Stroke</b>			
Hospitalization for stroke	√	√	
Carotid endarterectomy			
<b>Diabetes and peripheral vascular disease</b>			
Major lower-extremity amputation (below the hip and above the ankle)	√	√	
Minor amputation (ankle or lower)	√	√	
Peripheral revascularization procedure (PVR)	√	√	
Chronic dialysis	√	√	
<b>Diabetic retinopathy</b>			
Laser photocoagulation	√	√	
Vitrectomy	√	√	

# Diabetes Indicators: data shared with LHINs

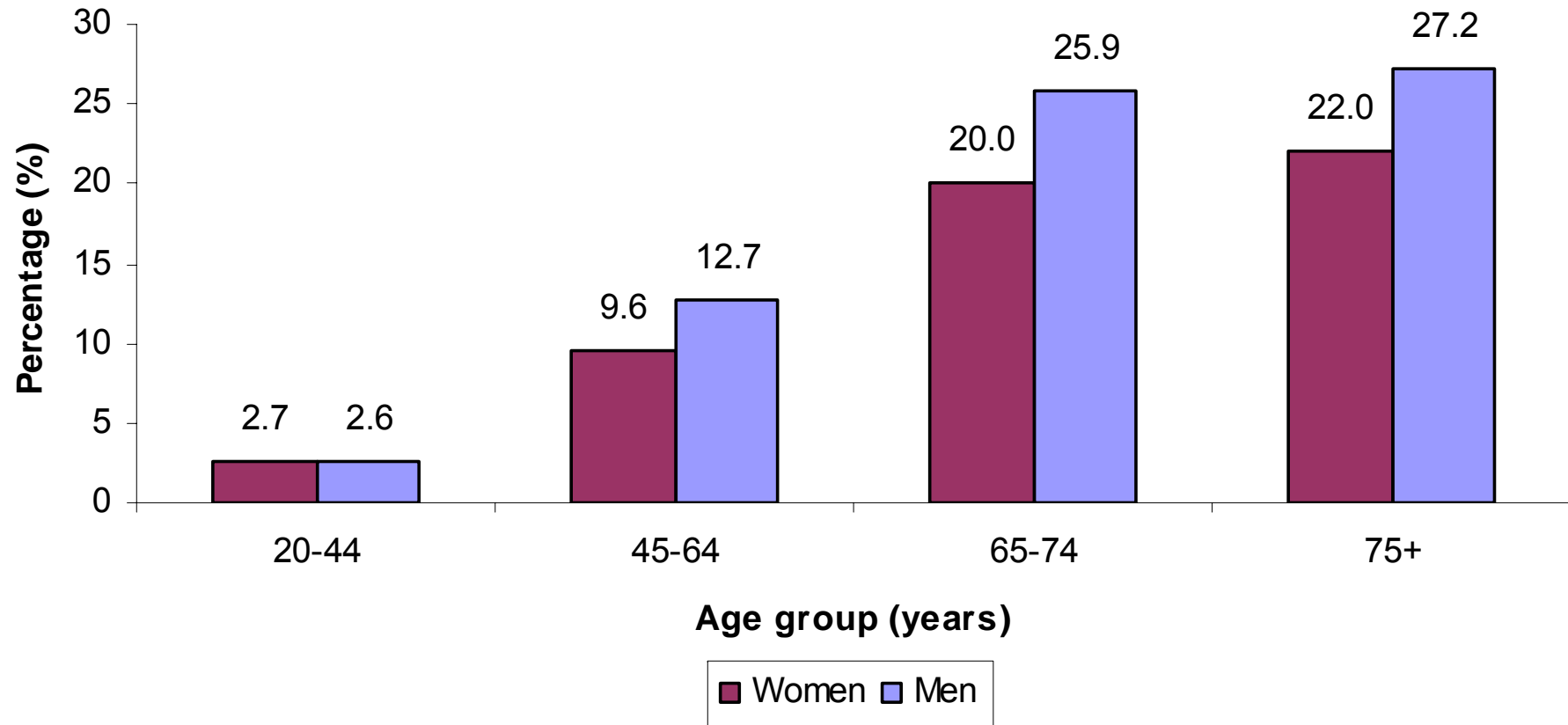
Section F: Diabetes and Pregnancy	Women with gestational diabetes	Women with pre-gestational diabetes	By Income
<b>Prenatal care</b>			
Obstetrician visit (for women with gestational or pregestational diabetes ) during pregnancy	√	√	
Specialist (endocrinologist or general internist) visit (for women with pregestational diabetes ) during pregnancy		√	
Eye examination within one year prior to delivery (for women with pregestational diabetes)		√	
<b>Obstetrical complications</b>			
Hypertension	√	√	
Preeclampsia/eclampsia	√	√	
Any obstructed labour (including shoulder dystocia)	√	√	
Shoulder dystocia at delivery	√	√	
Caesarean section	√	√	

# Diabetes Indicators: data shared with LHINs

Section F: Diabetes and Pregnancy continued	Women with gestational diabetes	Women with pre-gestational diabetes	By Income
<b>Fetal Complications</b>			
Stillbirth/in-hospital mortality	√	√	
Congenital anomalies (major and minor)	√	√	
Premature delivery (before 37 weeks gestation)	√	√	
Hyperbilirubinemia requiring phototherapy	√	√	
Neonatal intensive care unit (NICU) admissions			

# Health and Functional Status

# Prevalence of diabetes in adults aged 20 and older, by sex and age group, in Ontario, 2006/07

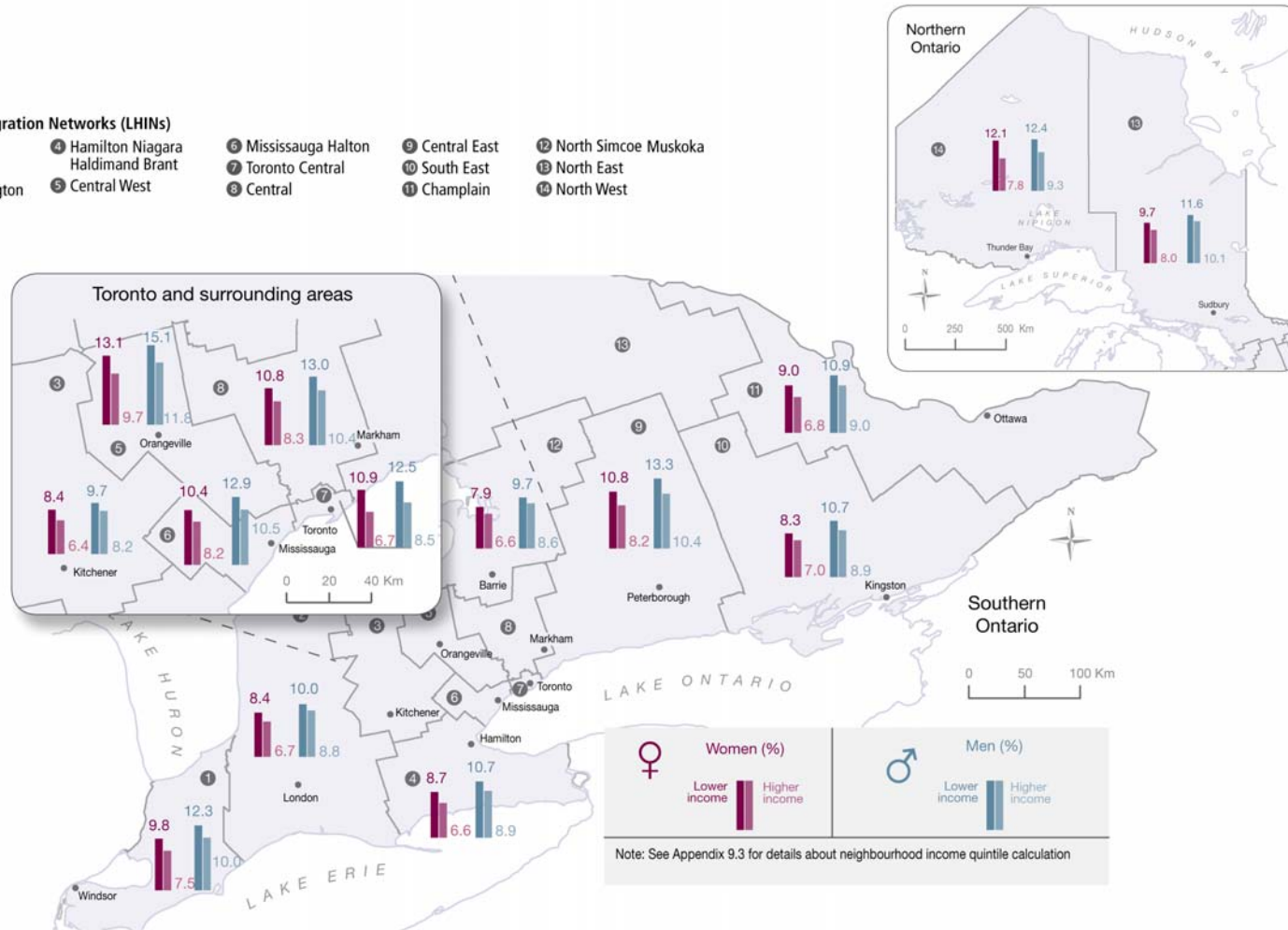




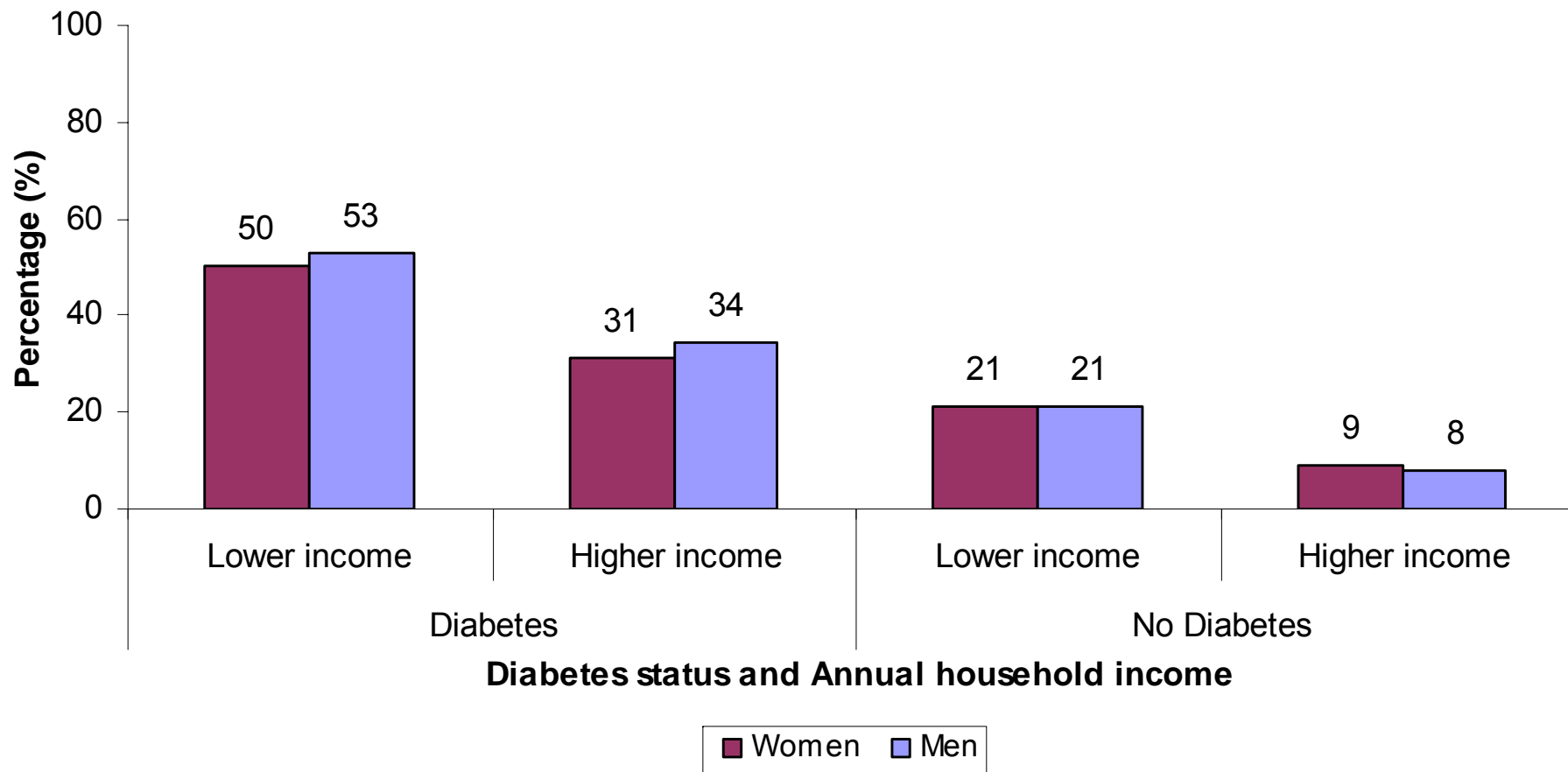
# Age-standardized prevalence of diabetes in adults aged 20 and older, by sex, neighbourhood income and Local Health Integration Network (LHIN), in Ontario, 2006/07

## Local Health Integration Networks (LHINs)

- ① Erie St. Clair
- ④ Hamilton Niagara Haldimand Brant
- ⑦ Mississauga Halton
- ⑩ Central East
- ⑬ North Simcoe Muskoka
- ② South West
- ⑧ Toronto Central
- ⑫ South East
- ⑭ North East
- ③ Waterloo Wellington
- ⑤ Central West
- ⑨ Central
- ⑪ Champlain
- ⑮ North West



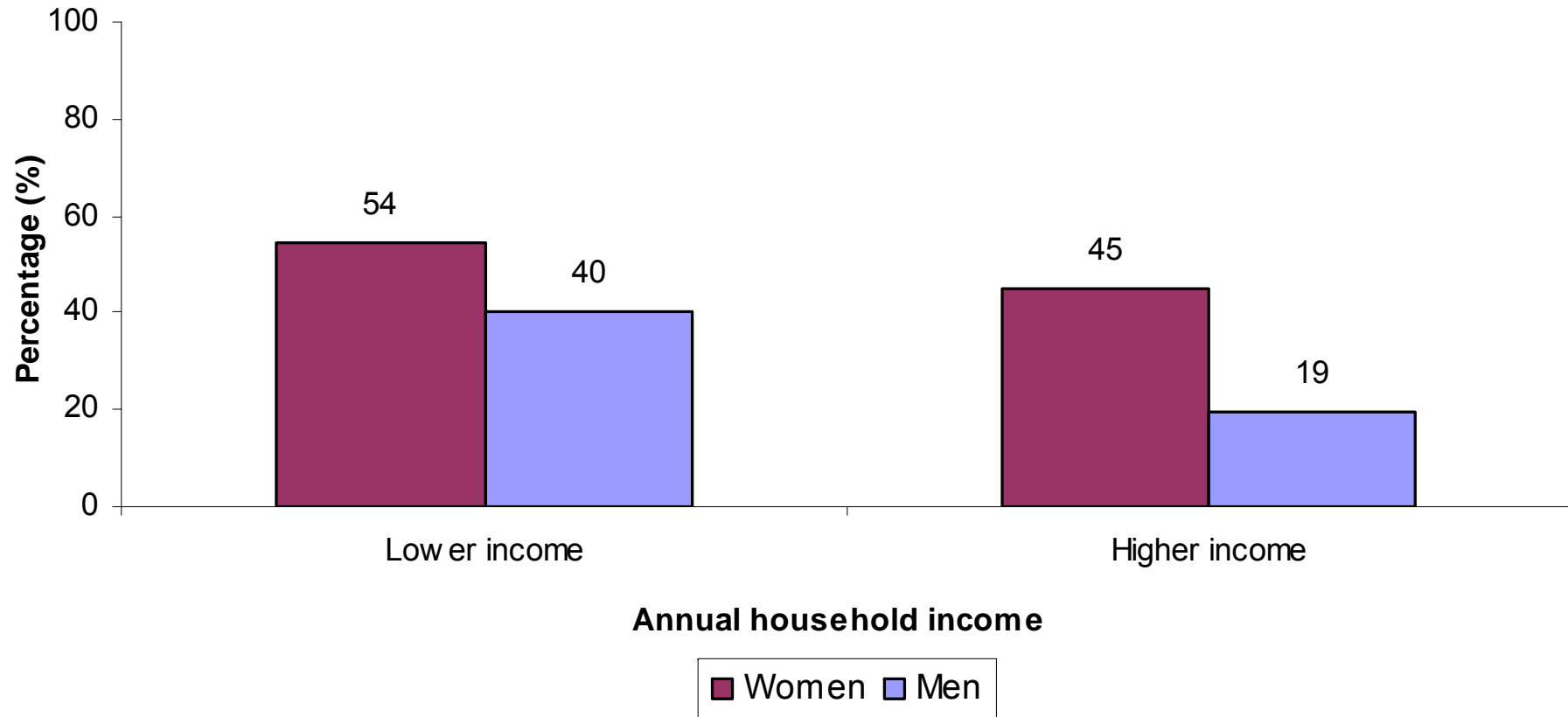
# Age-standardized percentage of adults aged 20 and older who reported having diabetes who rated their own health as fair or poor, by sex, annual household income, and diabetes status, in Ontario, 2005 and 2007



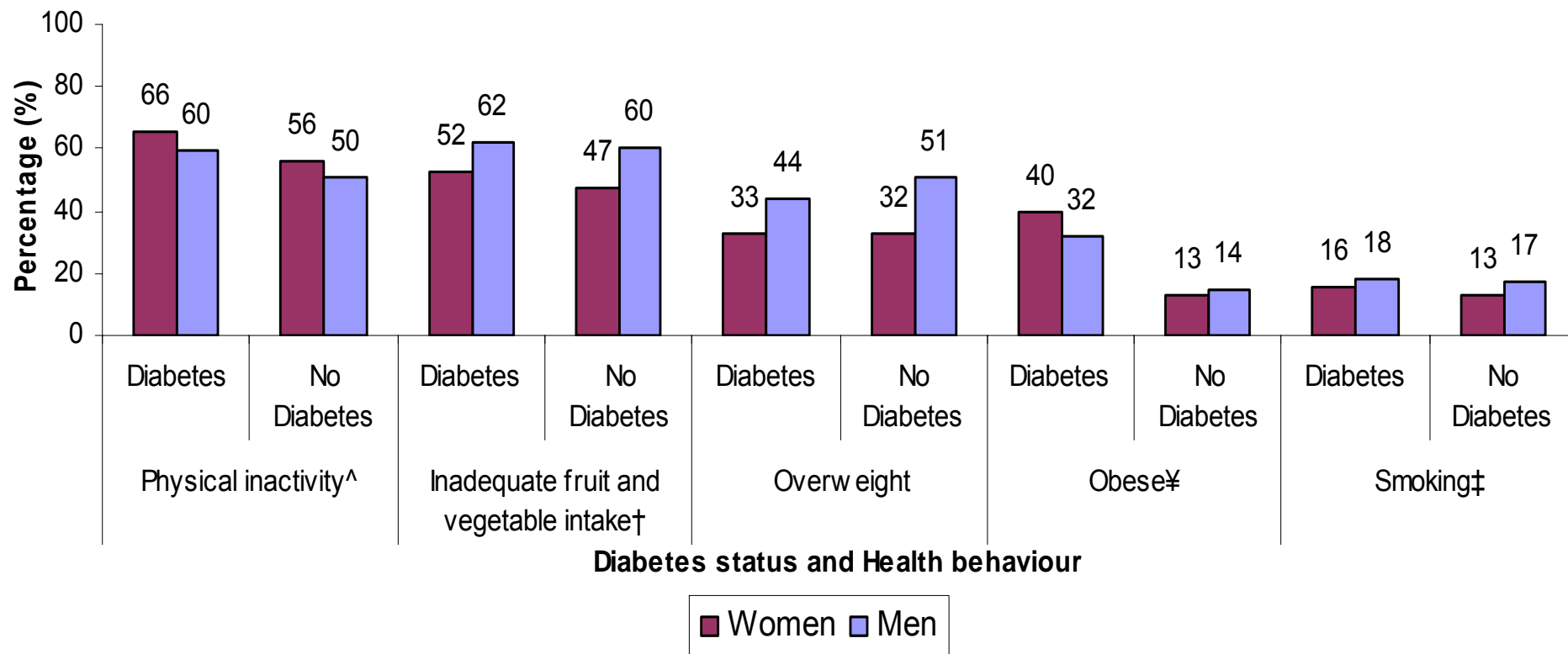
Data source: Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

Note: See Appendix 9.3 for definitions of annual household income categories

# Age-standardized percentage of adults aged 20 and older who reported having diabetes who reported limitations in activities of daily living (ADLs) and/or instrumental activities of daily living (IADLs), by sex and annual household income, in Ontario, 2005



# Age-standardized percentage of adults aged 20 and older who reported physical inactivity,<sup>^</sup> inadequate fruit and vegetable intake,<sup>†</sup> being overweight<sup>¥</sup>, being obese,<sup>¥</sup> or being current smokers,<sup>‡</sup> by sex and diabetes status, in Ontario, 2005 and 2007



**Data source:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> Physical Activity Index of < 1.5 kcal/kg/day

<sup>†</sup> Daily consumption of less than five servings of fruits and vegetables

<sup>¥</sup> Overweight refers to a Body Mass Index (BMI)  $\geq 25$  but < 30;

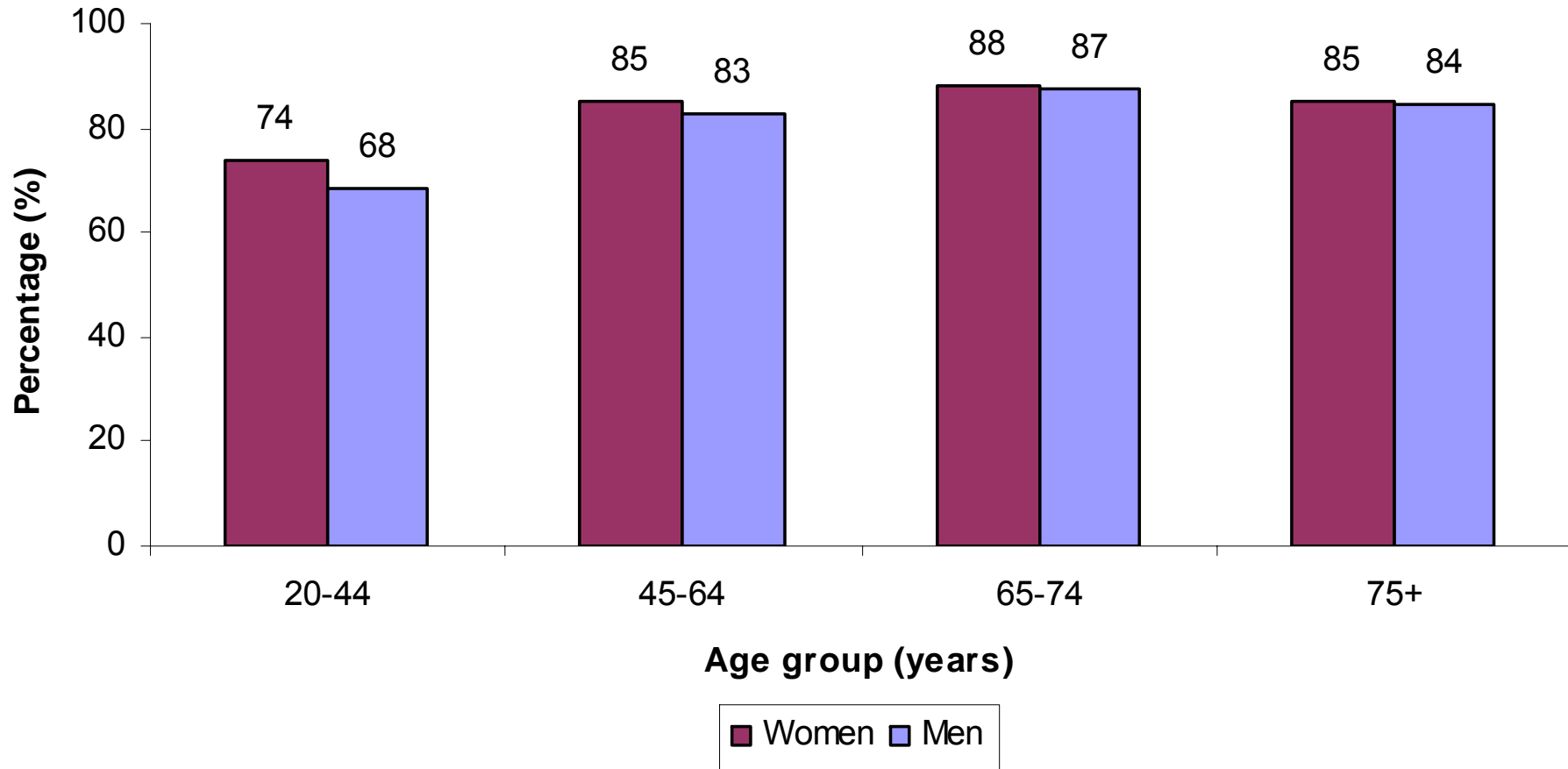
<sup>¥</sup> Obese refers to a BMI  $\geq 30$ ; BMI calculated from self-reported height and weight

<sup>‡</sup> Current smokers (daily or occasional)

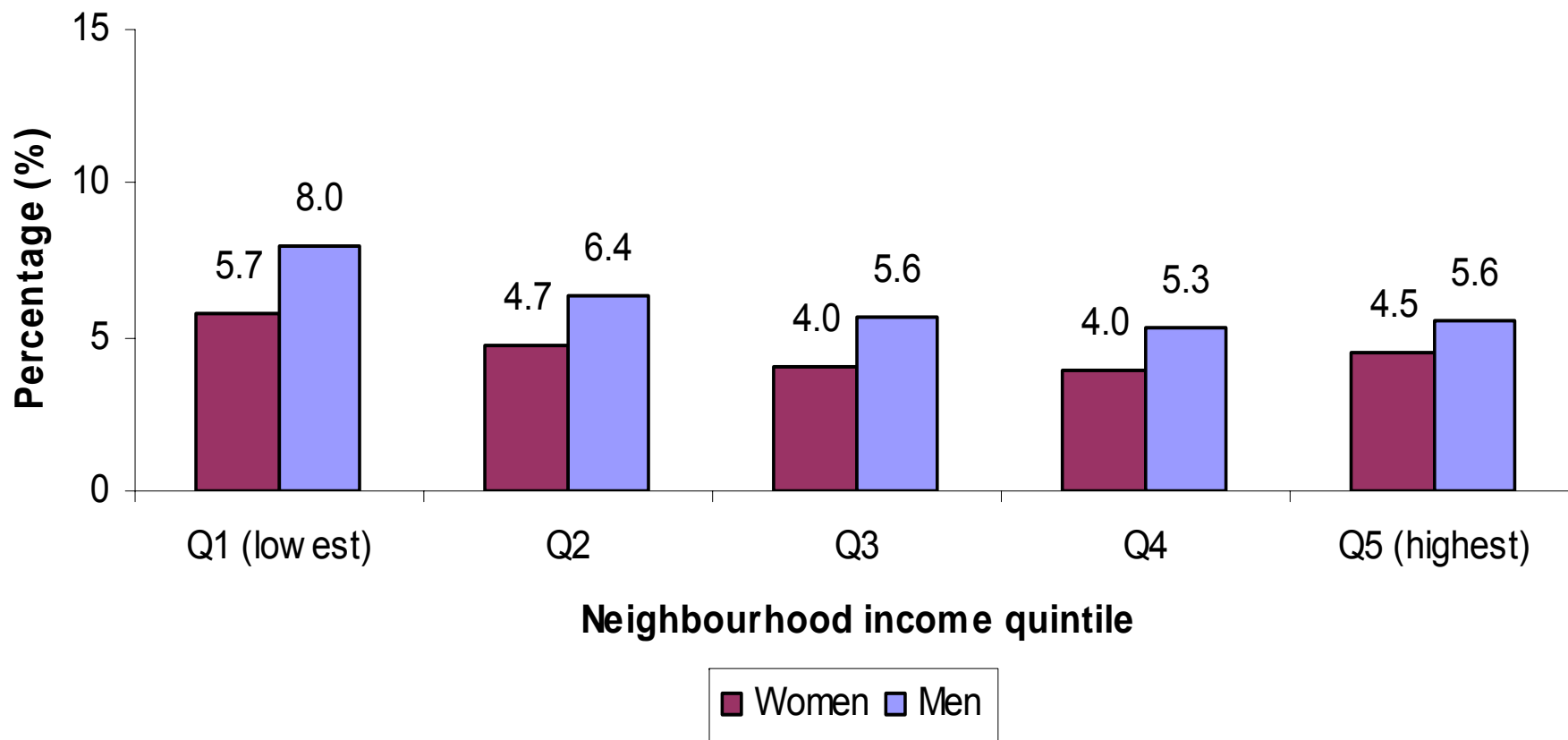
---

# Access and Utilization of Care

# Percentage of adults aged 20 and older with diabetes who had continuity of primary care, by sex and age group, in Ontario, 2005/06- 2006/07



# Age-standardized percentage of adults aged 20 and older with diabetes who had no visits to a GP/FP or a specialist† over a two-year period, by sex and neighbourhood income quintile, in Ontario, 2005/06-2006/07



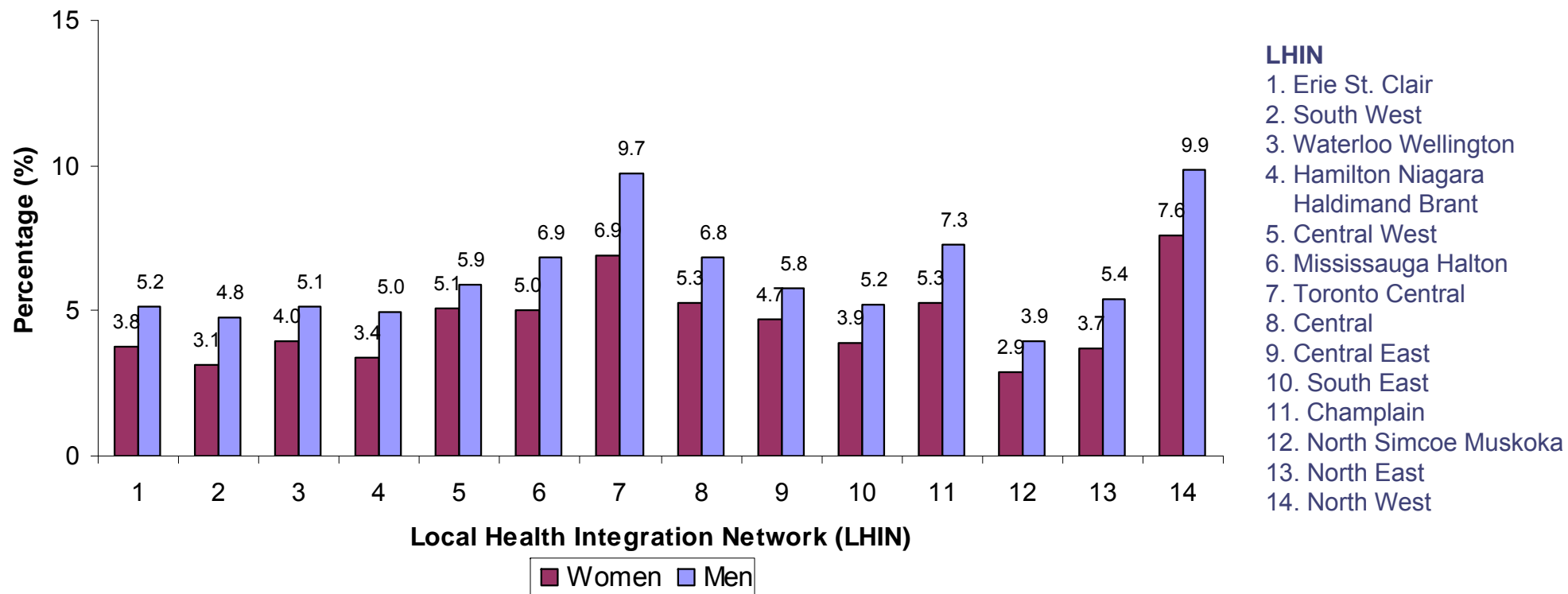
**Data Sources:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES physician Database (IPDB); Statistics Canada 2006 Census

**Note:** See Appendix 9.3 for details about neighbourhood income quintile calculation

**GP/FP:** General Physician/Family Physician

† Includes visits to endocrinologists, general internists or geriatricians

# Age-standardized percentage of adults aged 20 and older with diabetes who had no visits to a GP/FP or a specialist† over a two-year period, by sex and LHIN, in Ontario, 2005/06-2006/07



**Data Sources:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES physician Database (IPDB)

† Includes visits to endocrinologists, general internists or geriatricians

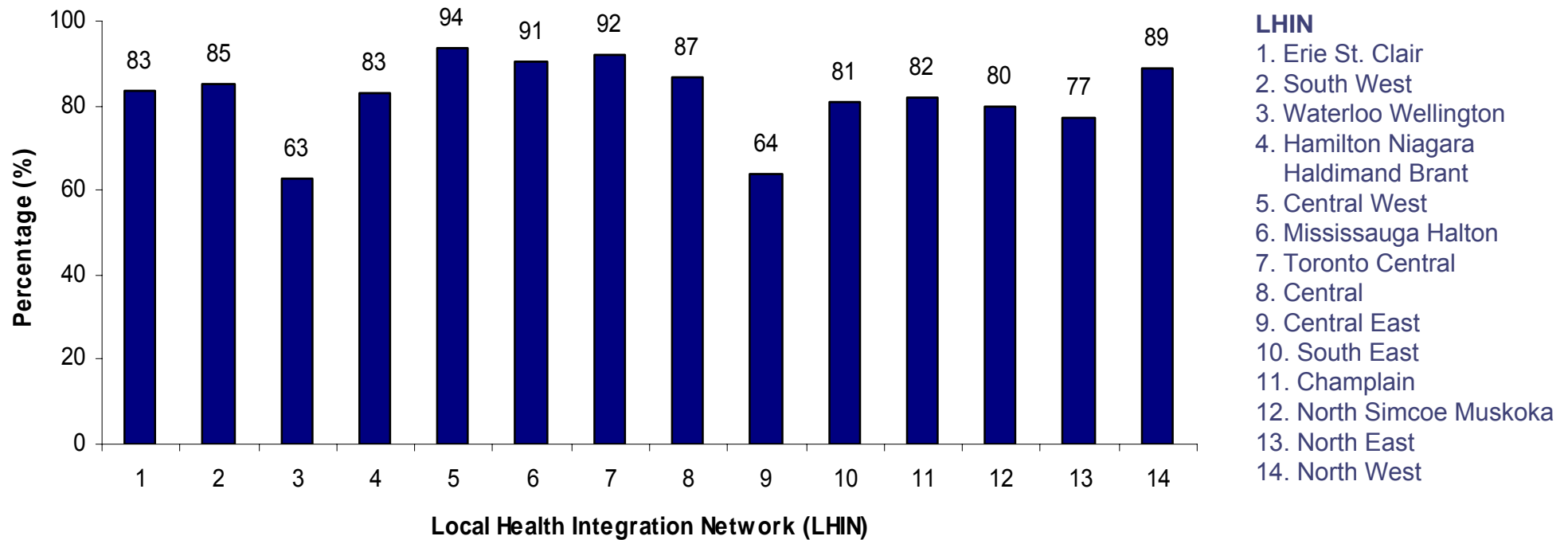
**GP/FP:** General Physician/Family Physician



---

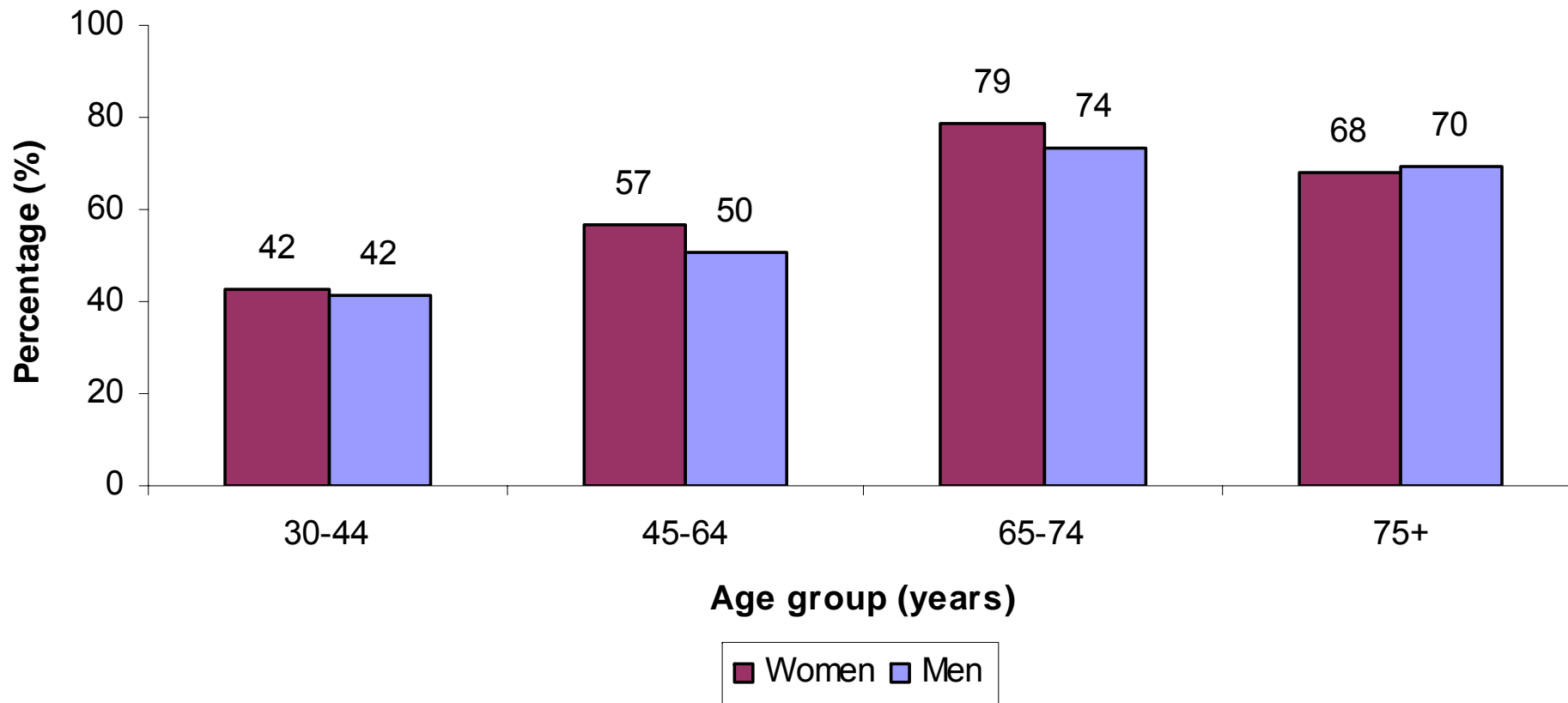
# Screening, Assessment and Monitoring

# Age-standardized percentage of adults aged 20 and older who reported having diabetes and who were on insulin who reported self-monitoring their blood-glucose levels<sup>^</sup> at least daily, by LHIN, in Ontario, 2005 and 2007

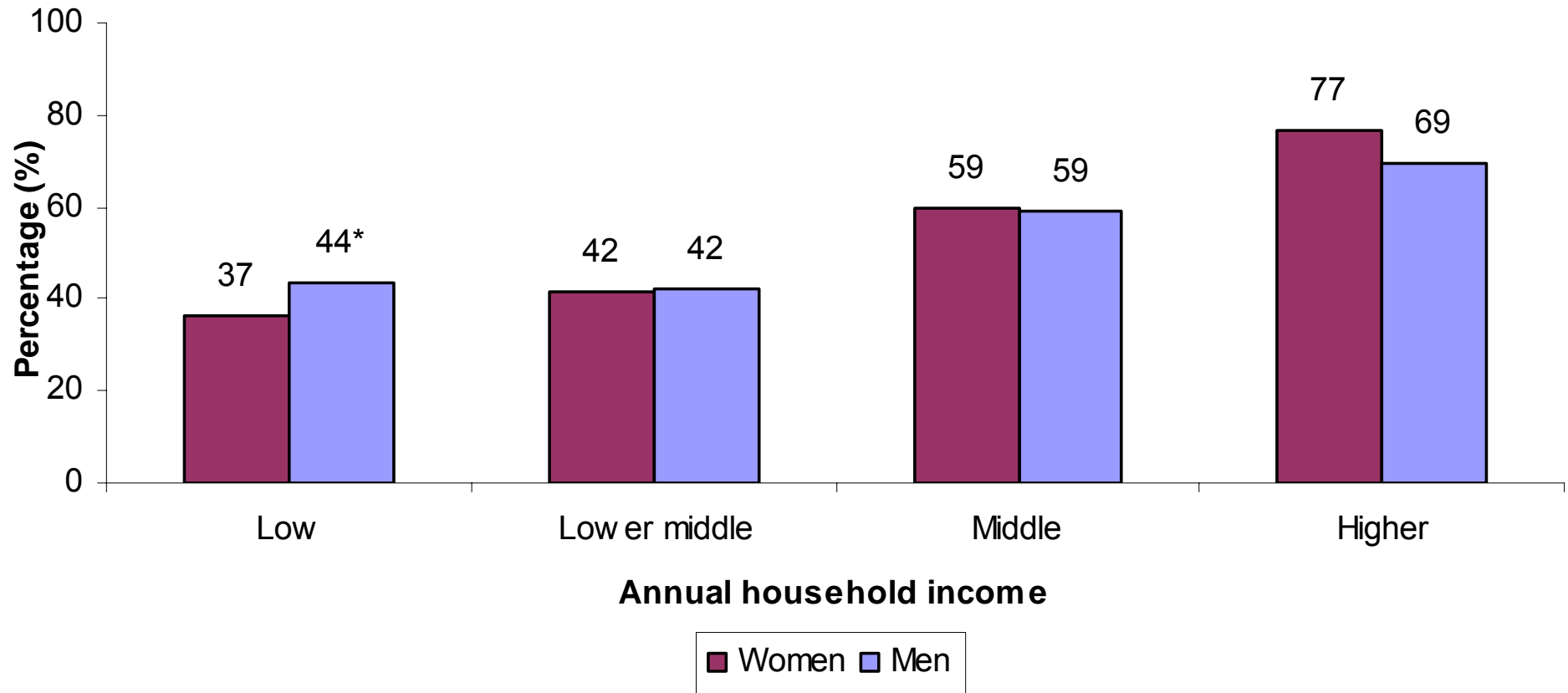


**Data Source:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007  
<sup>^</sup> refers to having their blood glucose levels checked by themselves, a family member or friend

# Percentage of people aged 30 and older who had an eye examination within two years of being diagnosed with diabetes, by sex and age-group, in Ontario, 2003/04-2005/06



# Age-standardized percentage of adults aged 20 and older who reported having diabetes who reported having had a dentist visit in the past year, by sex and annual household income, in Ontario, 2005



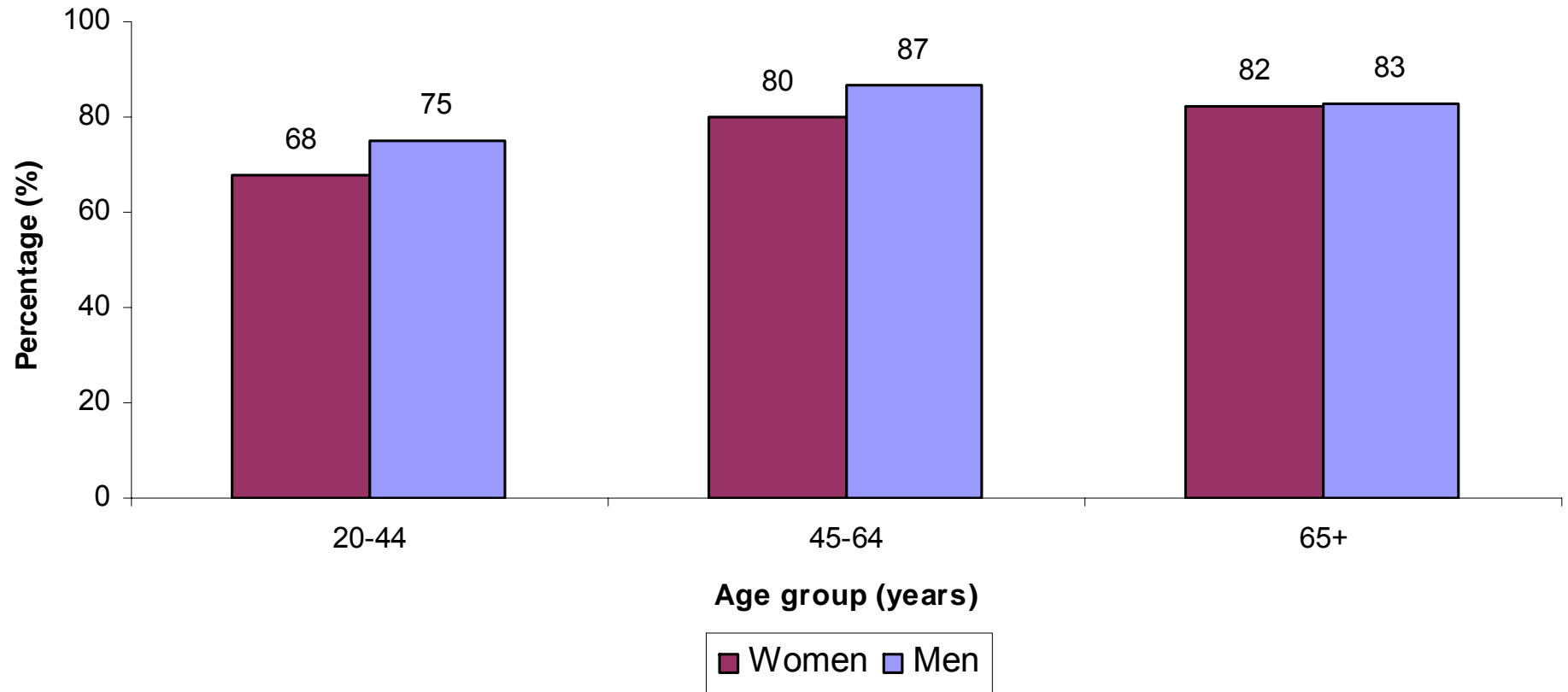
Data Source: Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

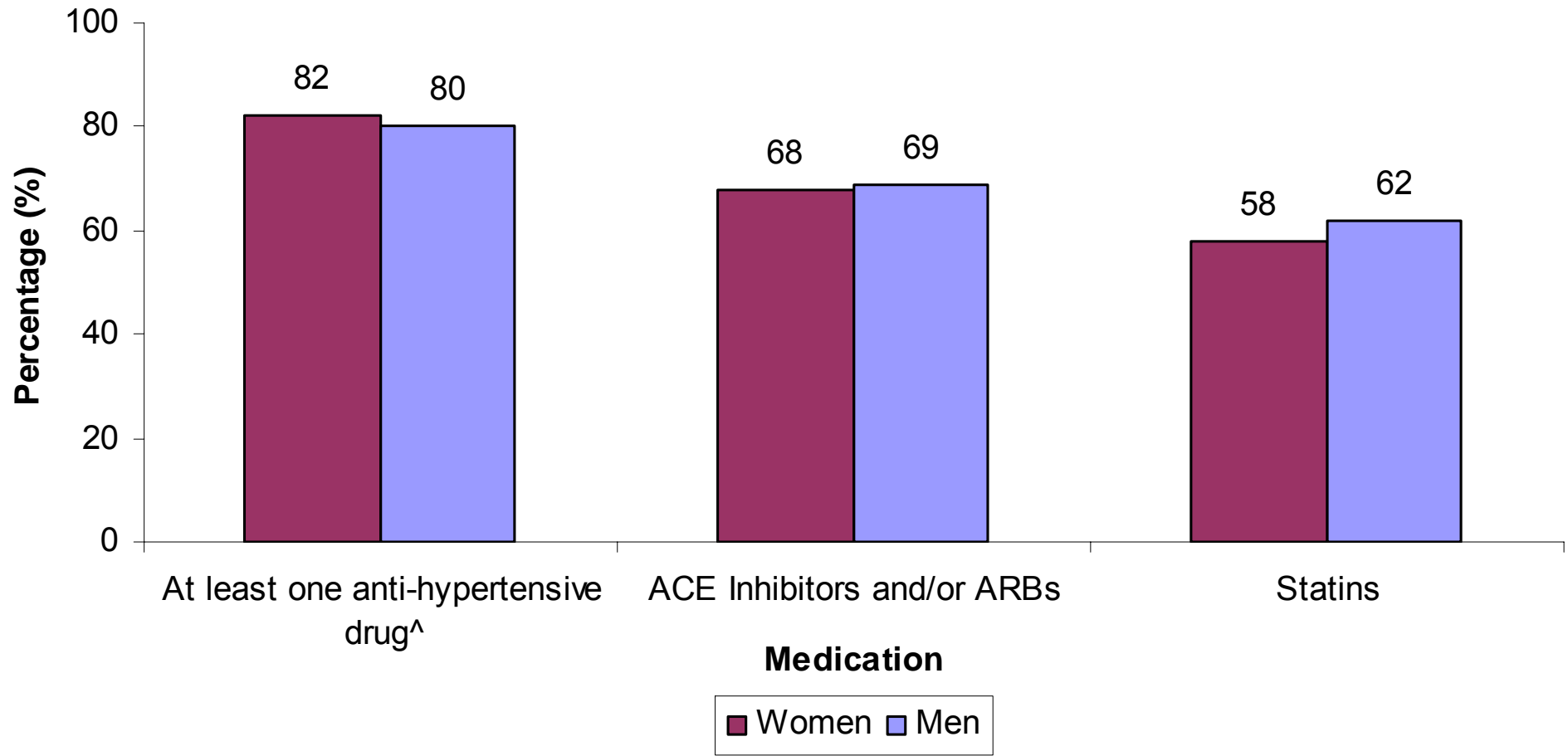
---

# Pharmacological Treatment

# Percentage of adults aged 20 and older who reported having diabetes who were on insulin and/or at least one oral glucose-lowering medication, by sex and age group, 2005 and 2007



# Age-standardized percentage of adults aged 65 and older with diabetes who were on anti-hypertensive drugs or statins, by sex, 2006/07



Data sources: Ontario Diabetes Database (ODD); Ontario Drug Benefits (ODB) database

<sup>^</sup> Includes ACE Inhibitors and ARBs

ACE inhibitors = Angiotensin converting enzyme inhibitors

ARBs = Angiotensin II receptor blockers

---

# Health Outcomes



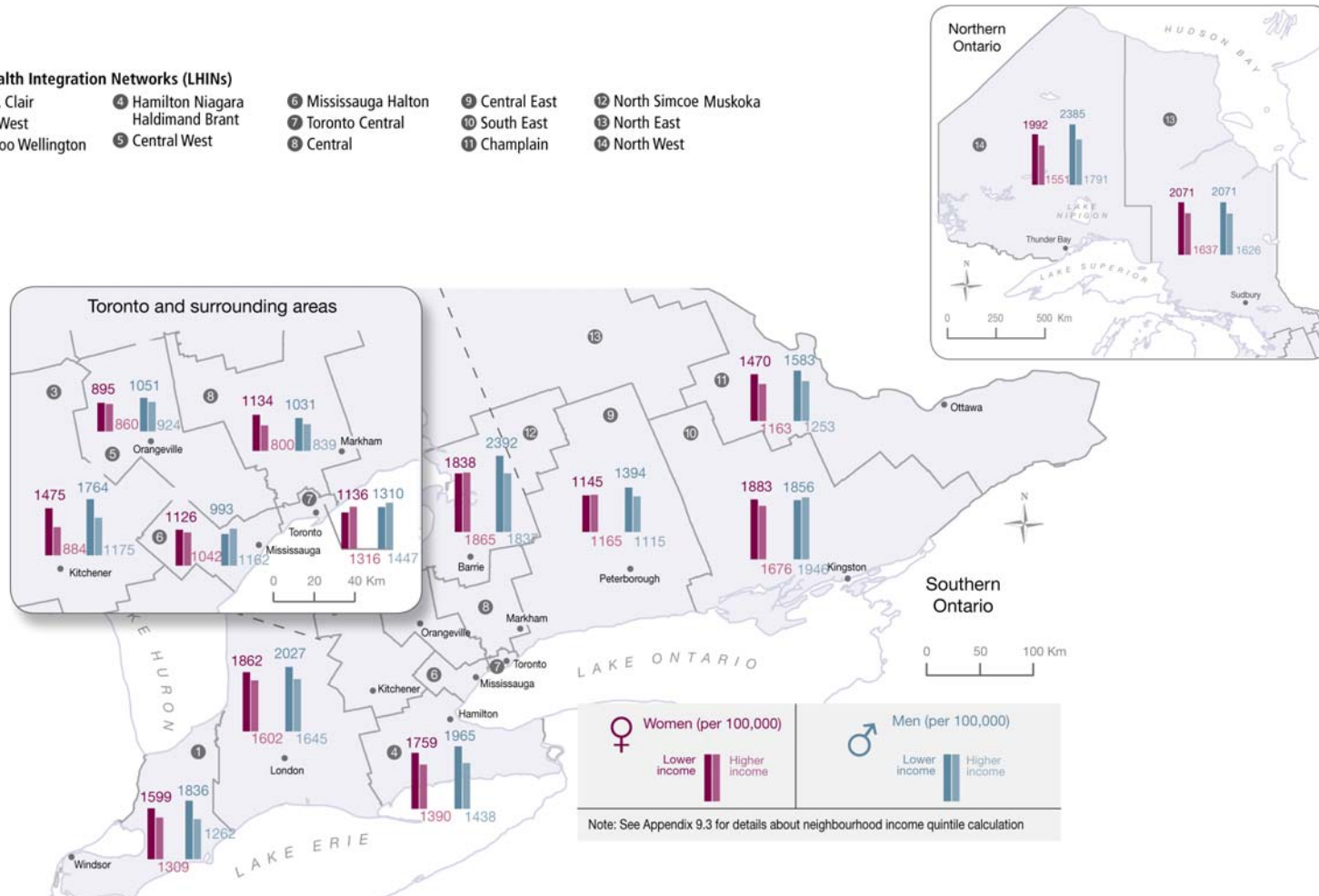
# Age-standardized rate (per 100,000) of adults aged 20 and older with diabetes who had at least one hospital visit for hyperglycemia or hypoglycemia, by sex and neighbourhood income quintile, in Ontario, 2006/07



# Age-standardized rate (per 100,000) of adults aged 20 and older with diabetes who had at least one hospital visit for hyperglycemia or hypoglycemia, by sex, neighbourhood income and LHIN, in Ontario, 2006/07

## Local Health Integration Networks (LHINs)

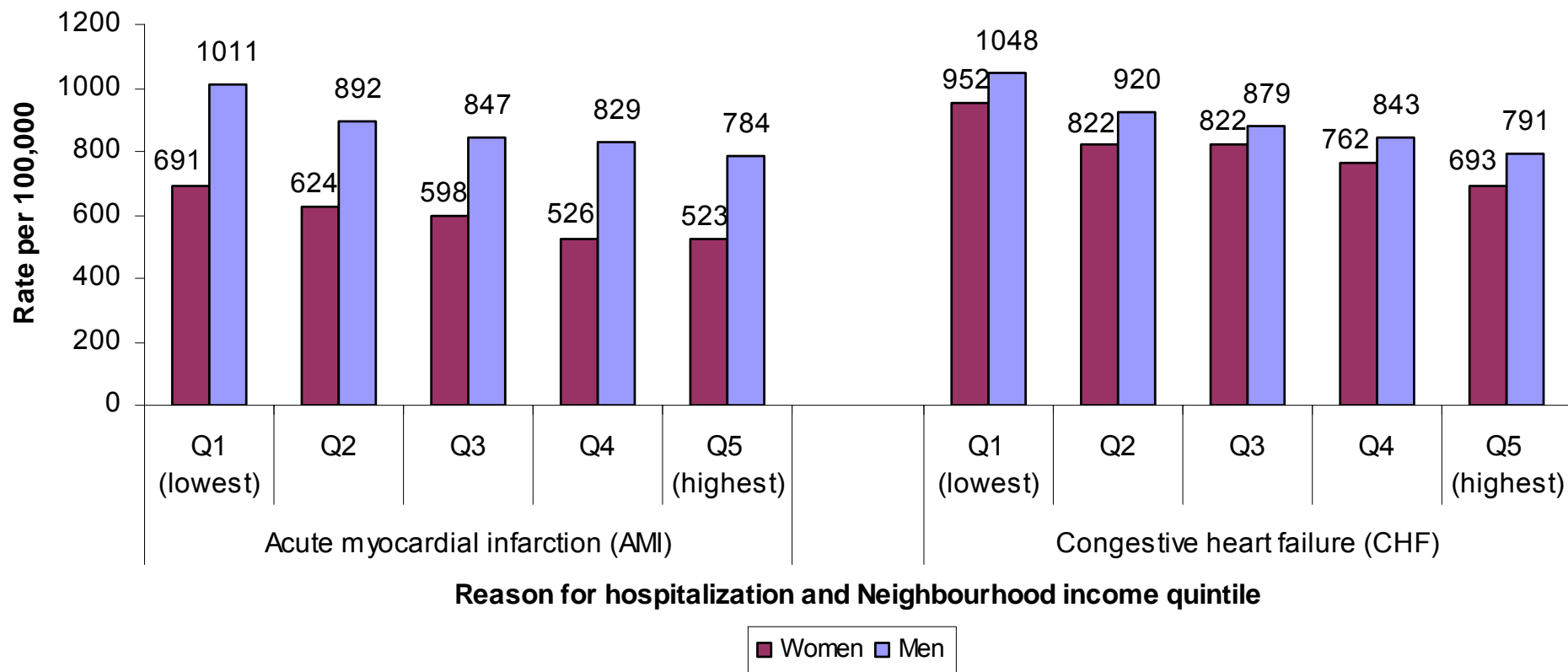
- ① Erie St. Clair
- ② South West
- ③ Waterloo Wellington
- ④ Hamilton Niagara Haldimand Brant
- ⑤ Central West
- ⑥ Mississauga Halton
- ⑦ Toronto Central
- ⑧ Central
- ⑨ Central East
- ⑩ South East
- ⑪ Champlain
- ⑫ North Simcoe Muskoka
- ⑬ North East
- ⑭ North West



**Data sources:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Statistics Canada 2006 Census

^ Emergency department visit or hospital admission

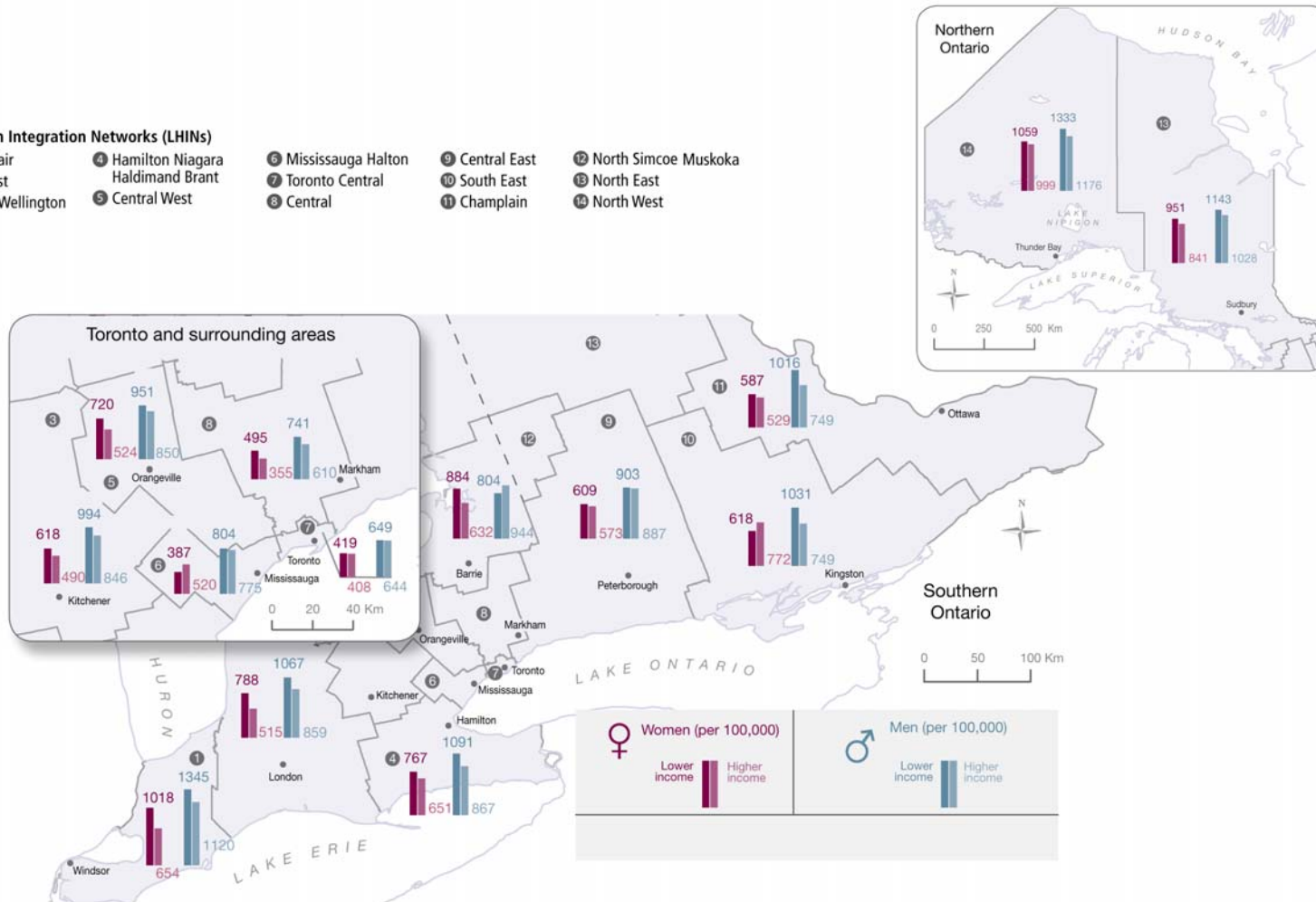
# Age-standardized rate of hospitalizations for cardiac disease per 100,000 adults aged 20 and older with diabetes, by sex and neighbourhood income quintile, in Ontario, 2006/07



# Age-standardized rate of hospitalization for AMI per 100,000 adults aged 20 and older with diabetes, by neighbourhood income and LHIN, in Ontario, 2006/07

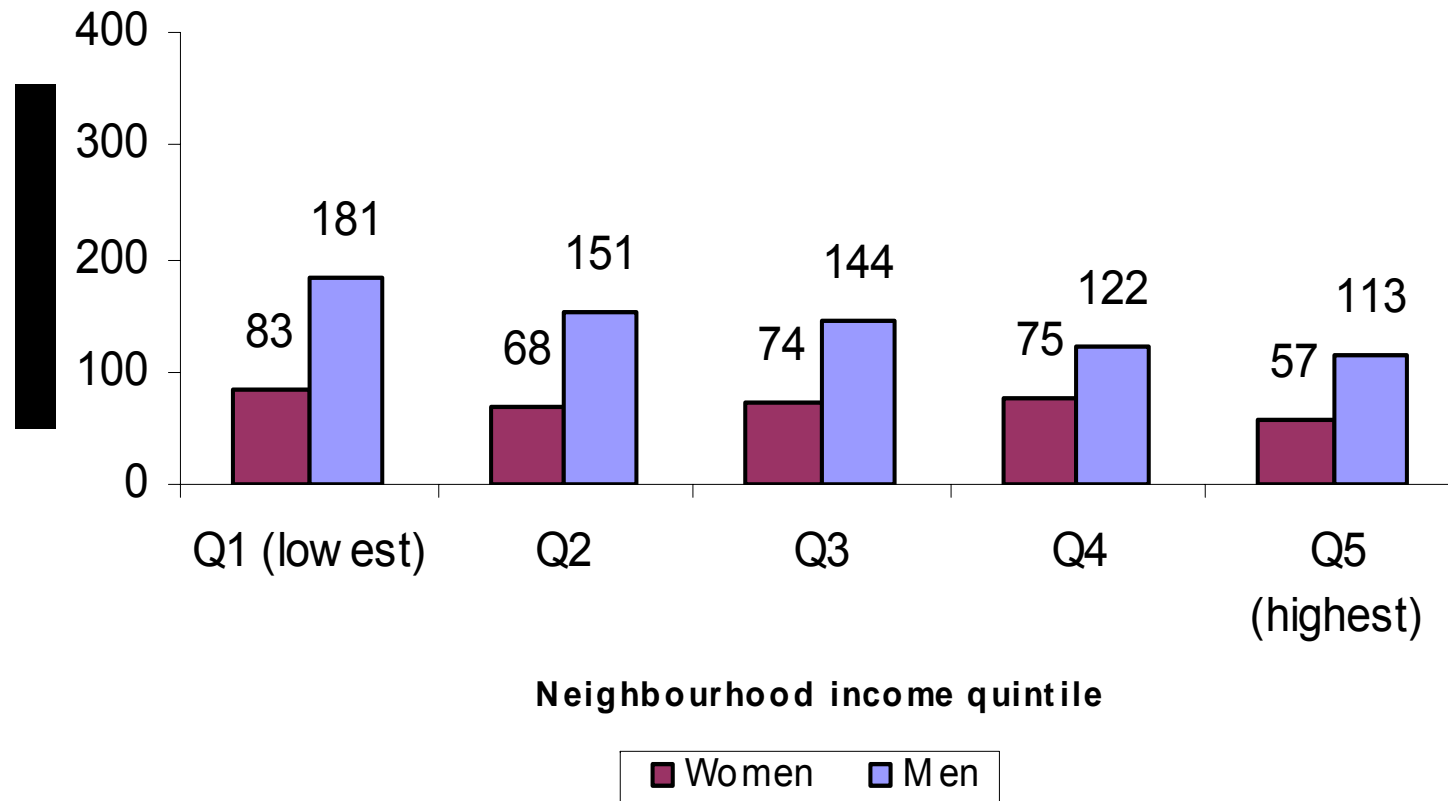
## Local Health Integration Networks (LHINs)

- ① Erie St. Clair
- ② South West
- ③ Waterloo Wellington
- ④ Hamilton Niagara Haldimand Brant
- ⑤ Central West
- ⑥ Mississauga Halton
- ⑦ Toronto Central
- ⑧ Central
- ⑨ Central East
- ⑩ South East
- ⑪ Champlain
- ⑫ North Simcoe Muskoka
- ⑬ North East
- ⑭ North West



Data source: Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2006 Census

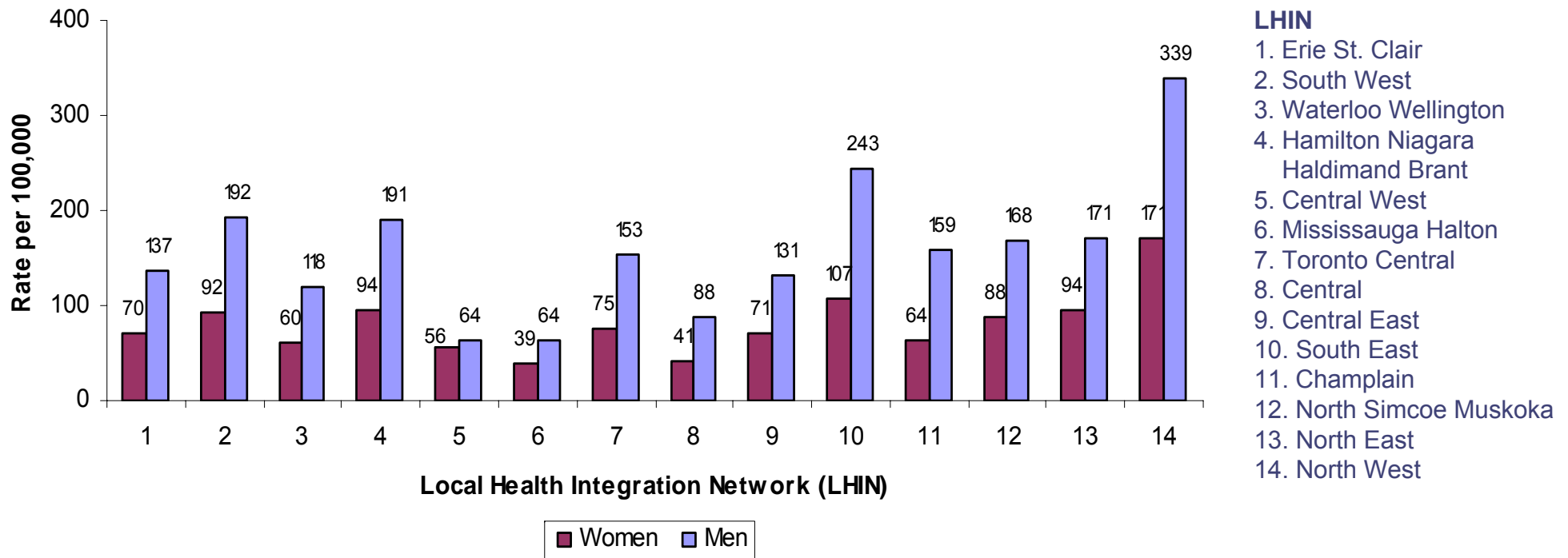
# Age-standardized rate of major amputations per 100,000 adults aged 20 and older with diabetes, by sex and neighbourhood income quintile, in Ontario, 2006/07



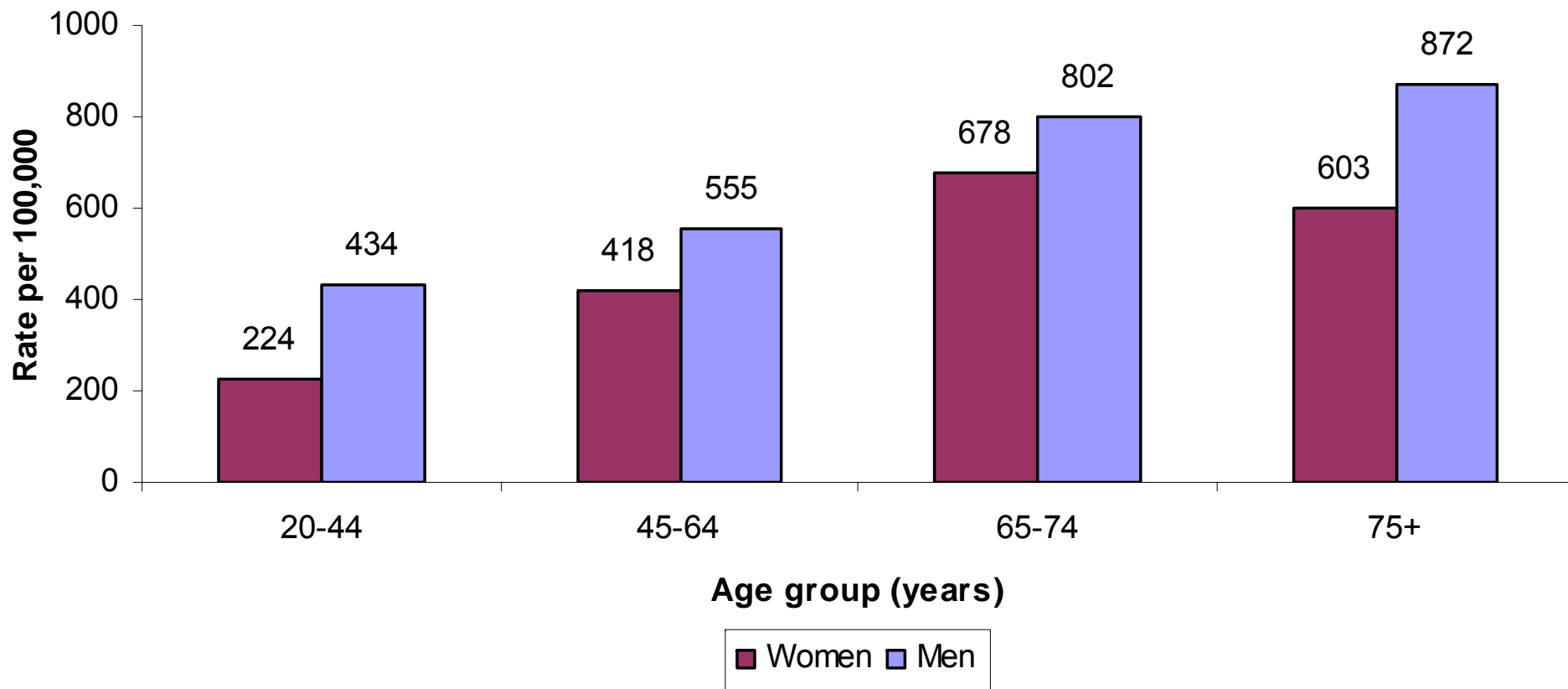
**Data Sources:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB); Statistics Canada 2006 Census

**Note:** See Appendix 9.3 for details about neighbourhood income quintile calculation

# Age-standardized rate of major amputations per 100,000 adults aged 20 and older with diabetes, by sex and LHIN, in Ontario, 2006/07



# Chronic dialysis rate per 100,000 adults aged 20 and older with diabetes, by sex and age group, in Ontario, 2006/07

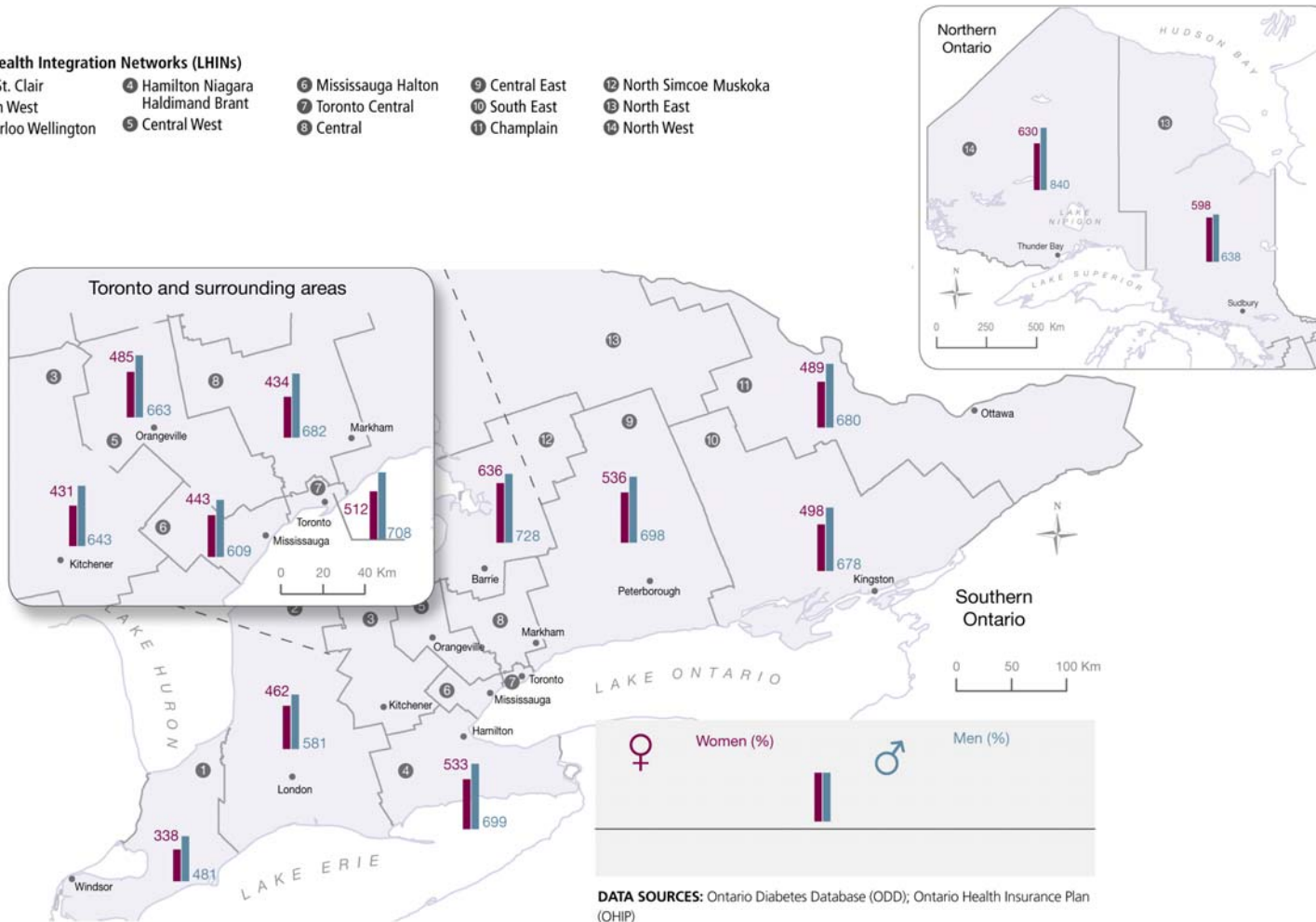




# Age-standardized chronic dialysis rate per 100,000 adults aged 20 and older with diabetes, by sex and LHIN, in Ontario, 2006/07

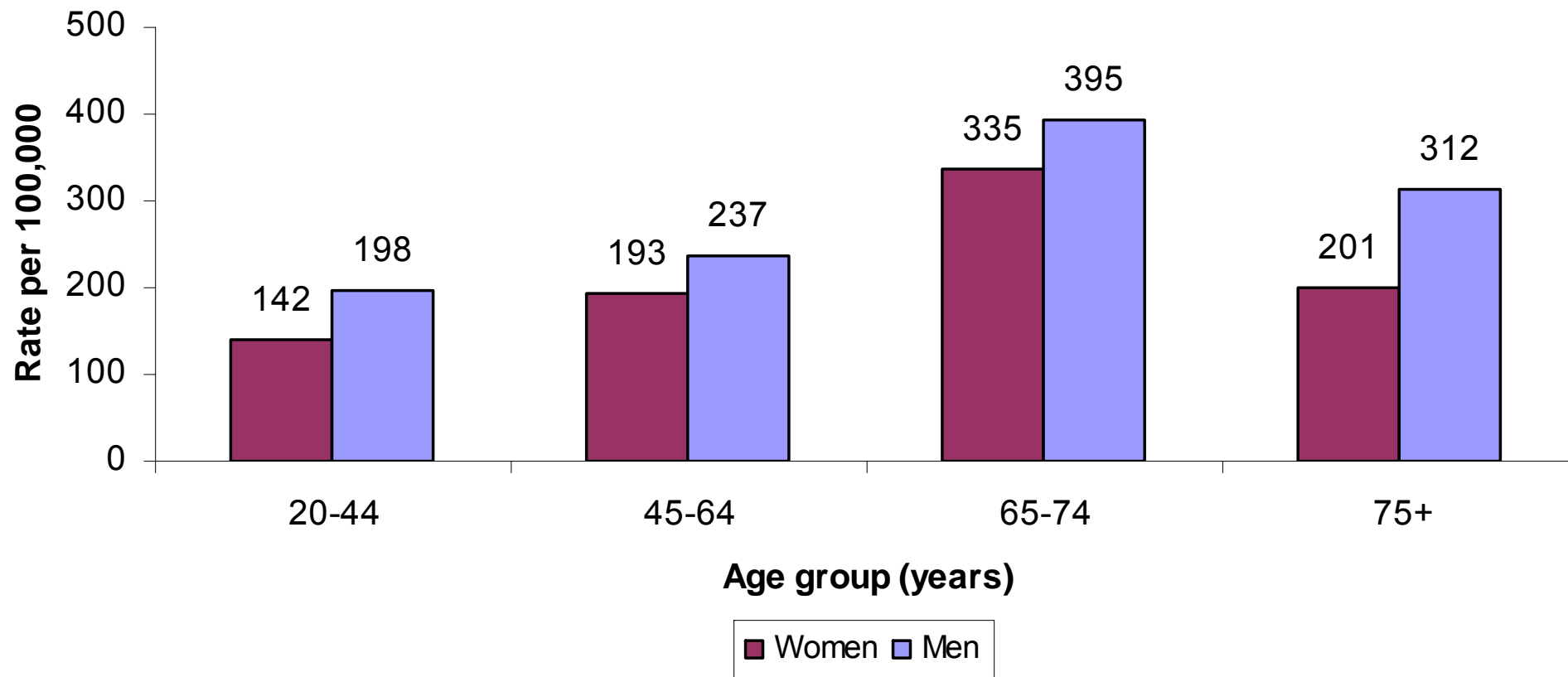
## Local Health Integration Networks (LHINs)

- |                       |                                       |                      |                |                         |
|-----------------------|---------------------------------------|----------------------|----------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara<br>Haldimand Brant | 6 Mississauga Halton | 9 Central East | 12 North Simcoe Muskoka |
| 2 South West          | 7 Toronto Central                     | 10 South East        | 11 Champlain   | 13 North East           |
| 3 Waterloo Wellington | 5 Central West                        | 8 Central            | 14 North West  |                         |

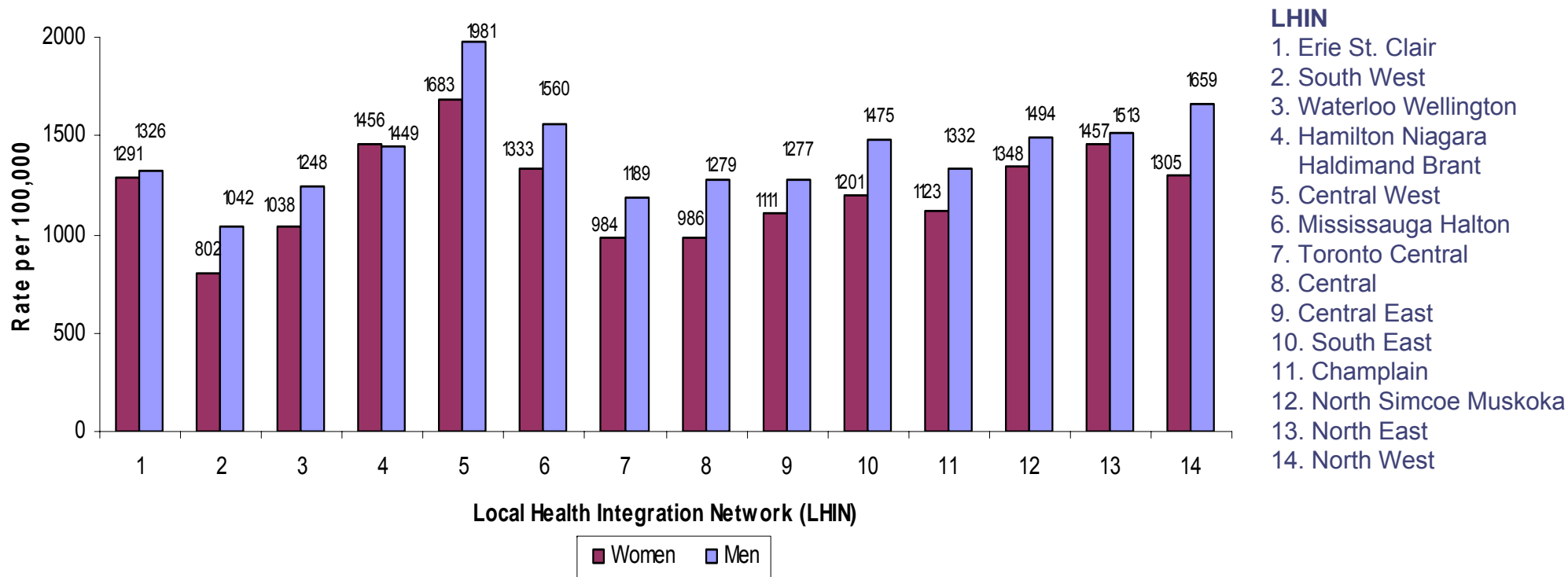




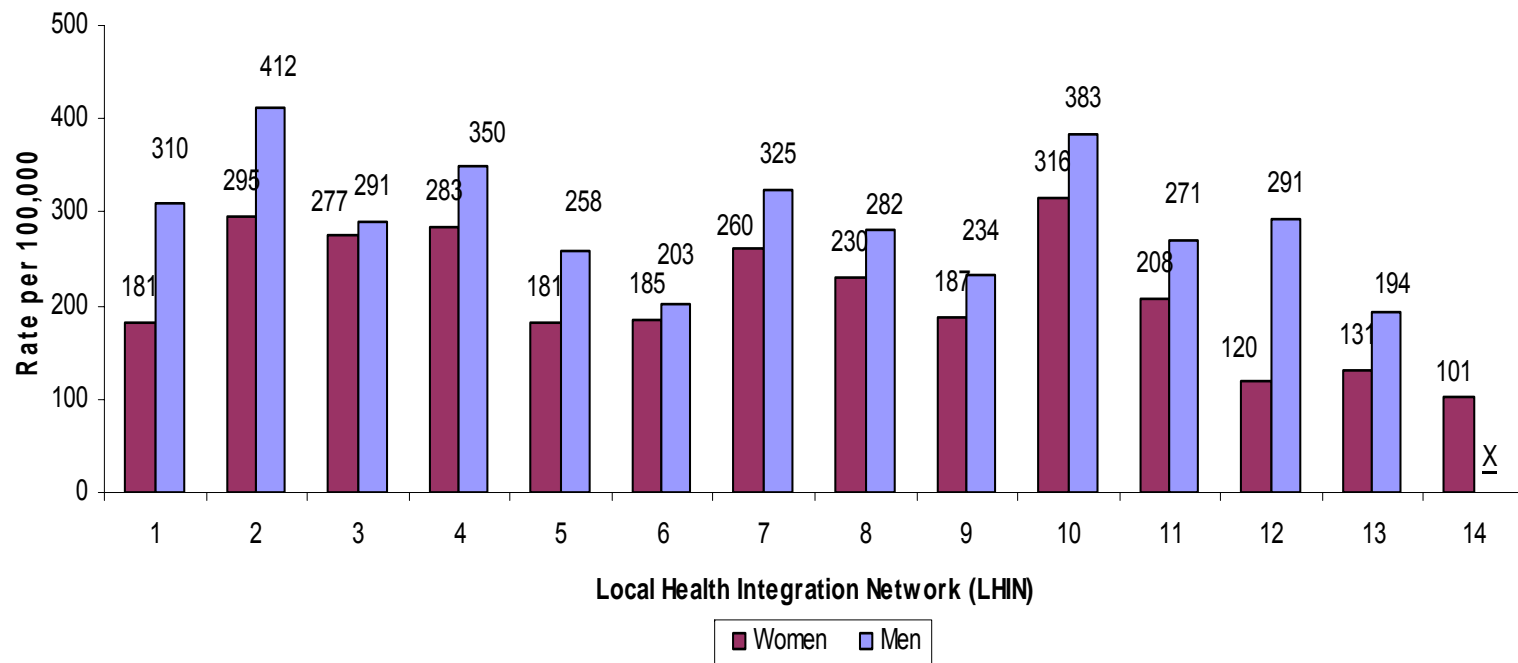
# Vitrectomy rate per 100,000 adults aged 20 and older with diabetes, by sex and age group, in Ontario, 2006/07



# Age-standardized laser photocoagulation rate per 100,000 adults aged 20 and older with diabetes, by sex and LHIN, in Ontario, 2006/07



# Age-standardized vitrectomy rate per 100,000 adults aged 20 and older with diabetes, by sex and LHIN, in Ontario, 2006/07

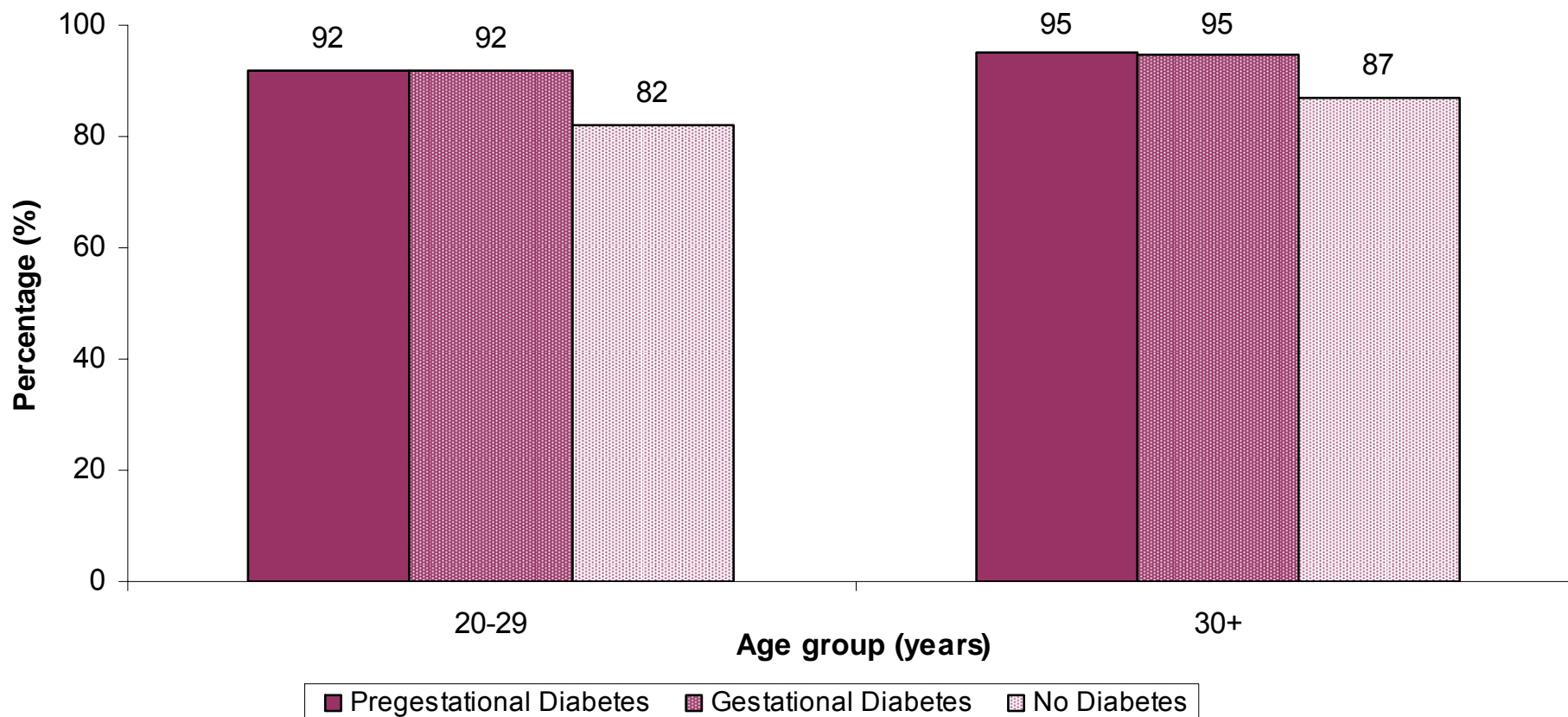


- LHIN**
1. Erie St. Clair
  2. South West
  3. Waterloo Wellington
  4. Hamilton Niagara Haldimand Brant
  5. Central West
  6. Mississauga Halton
  7. Toronto Central
  8. Central
  9. Central East
  10. South East
  11. Champlain
  12. North Simcoe Muskoka
  13. North East
  14. North West

---

# Diabetes and Pregnancy

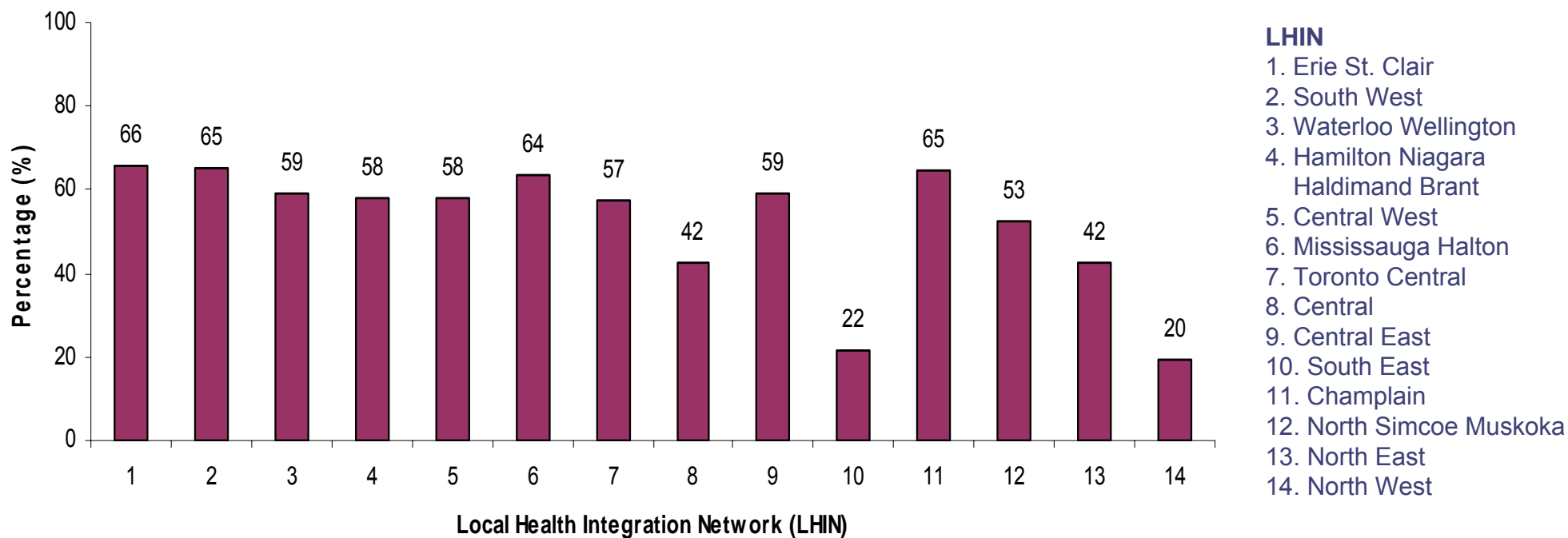
# Age-standardized percentage of pregnant women who saw an obstetrician during pregnancy,<sup>^</sup> by diabetes status and age group, in Ontario, 2002/03-2006/07



**Data sources:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Physician Database (IPDB)

<sup>^</sup> within nine months prior to delivery

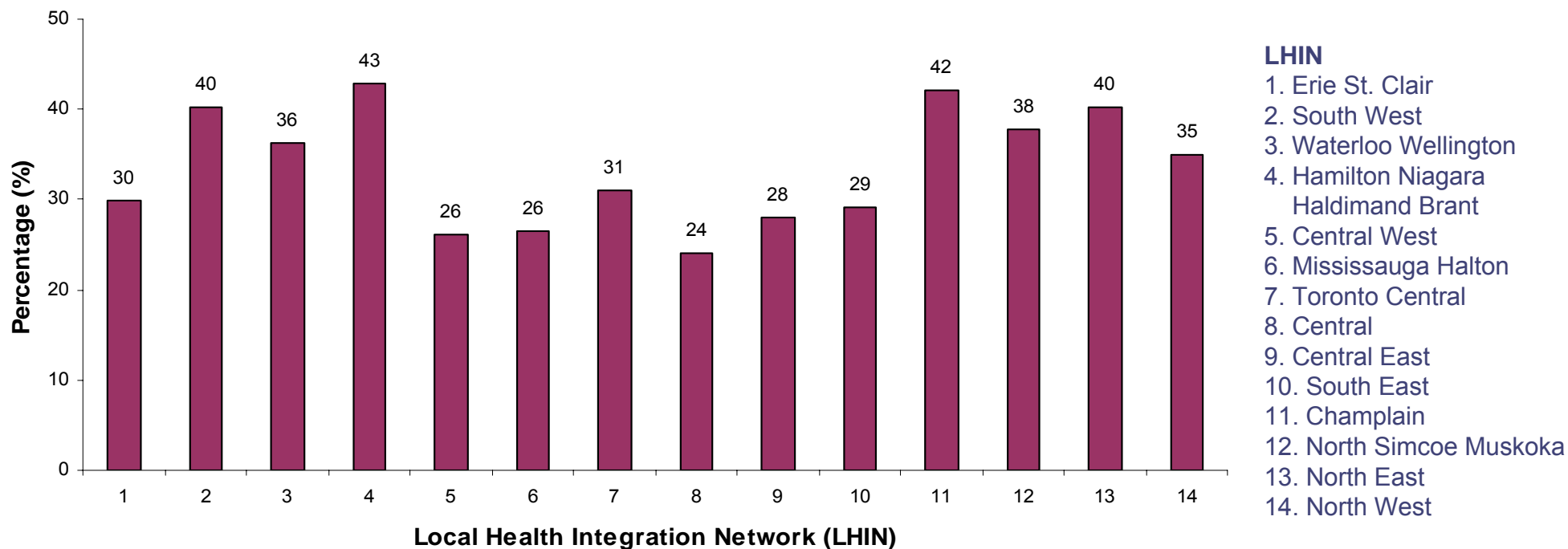
# Age-standardized percentage of pregnant women with pregestational diabetes who saw an endocrinologist and/or an internist during pregnancy,<sup>^</sup> by LHIN, in Ontario, 2002/03-2006/07



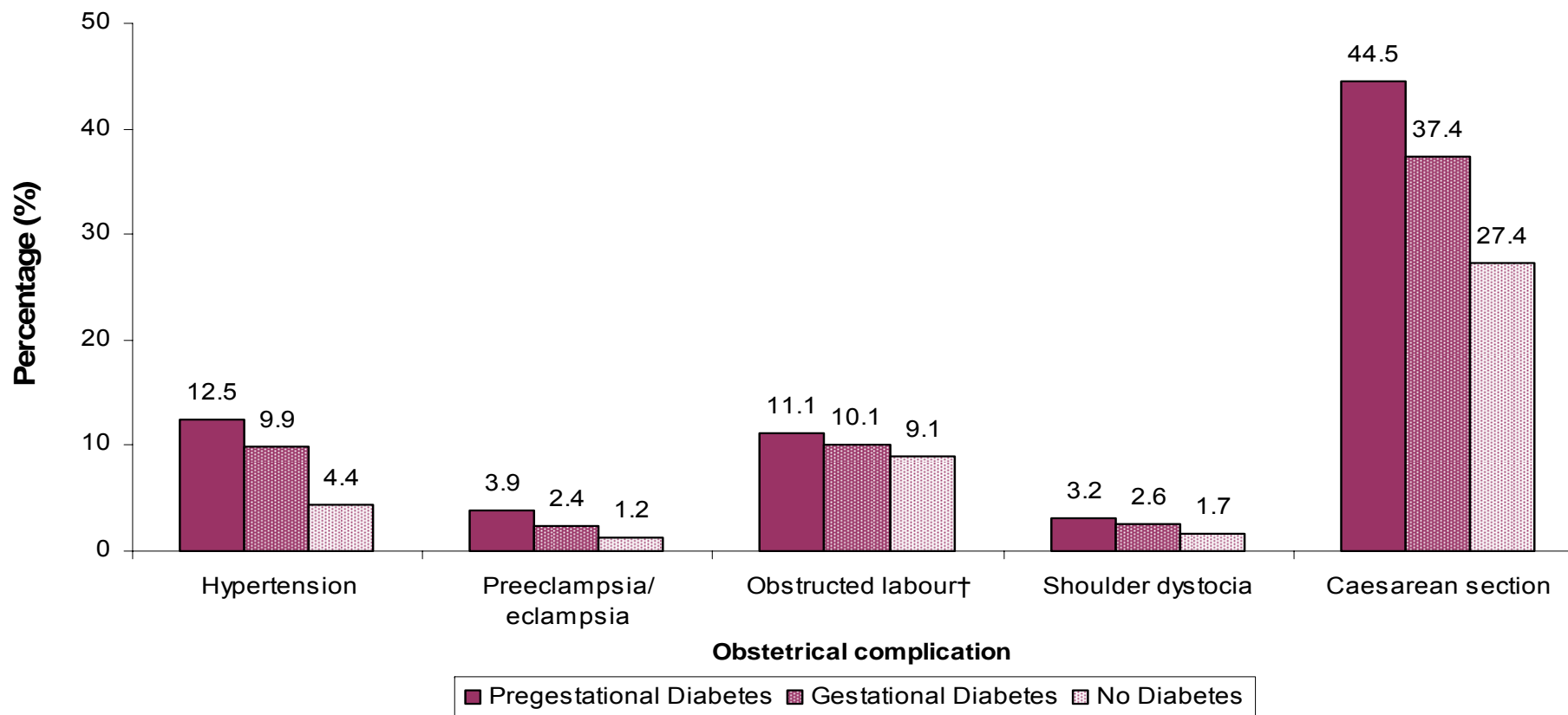
Data sources: Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Physician Database (IPDB); Registered Persons Database (RPDB)

<sup>^</sup> within nine months prior to delivery

# Age-standardized percentage of pregnant women with pregestational diabetes who had at least one eye care visit in the year before delivery, by LHIN, in Ontario, 2002/03-2006/07



# Age-standardized percentage of pregnant women who had obstetrical complications, by diabetes status, in Ontario, 2002/03-2006/07

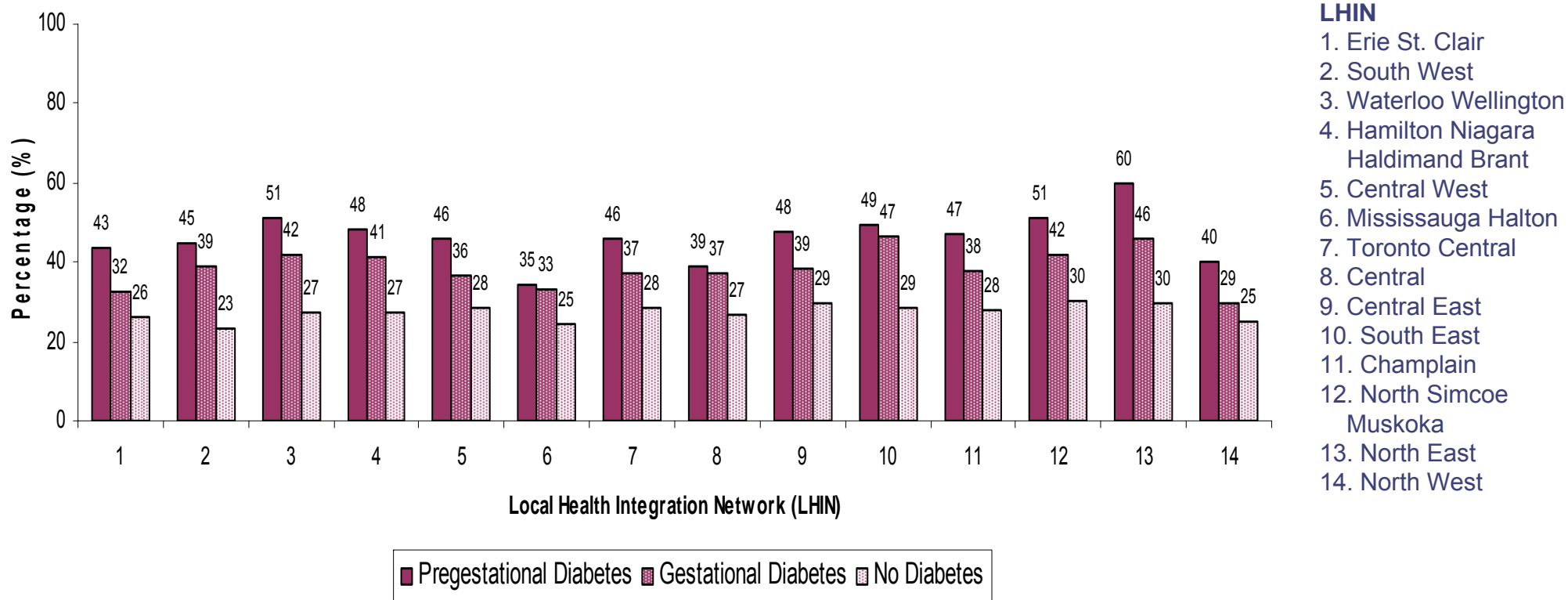


Data sources: Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

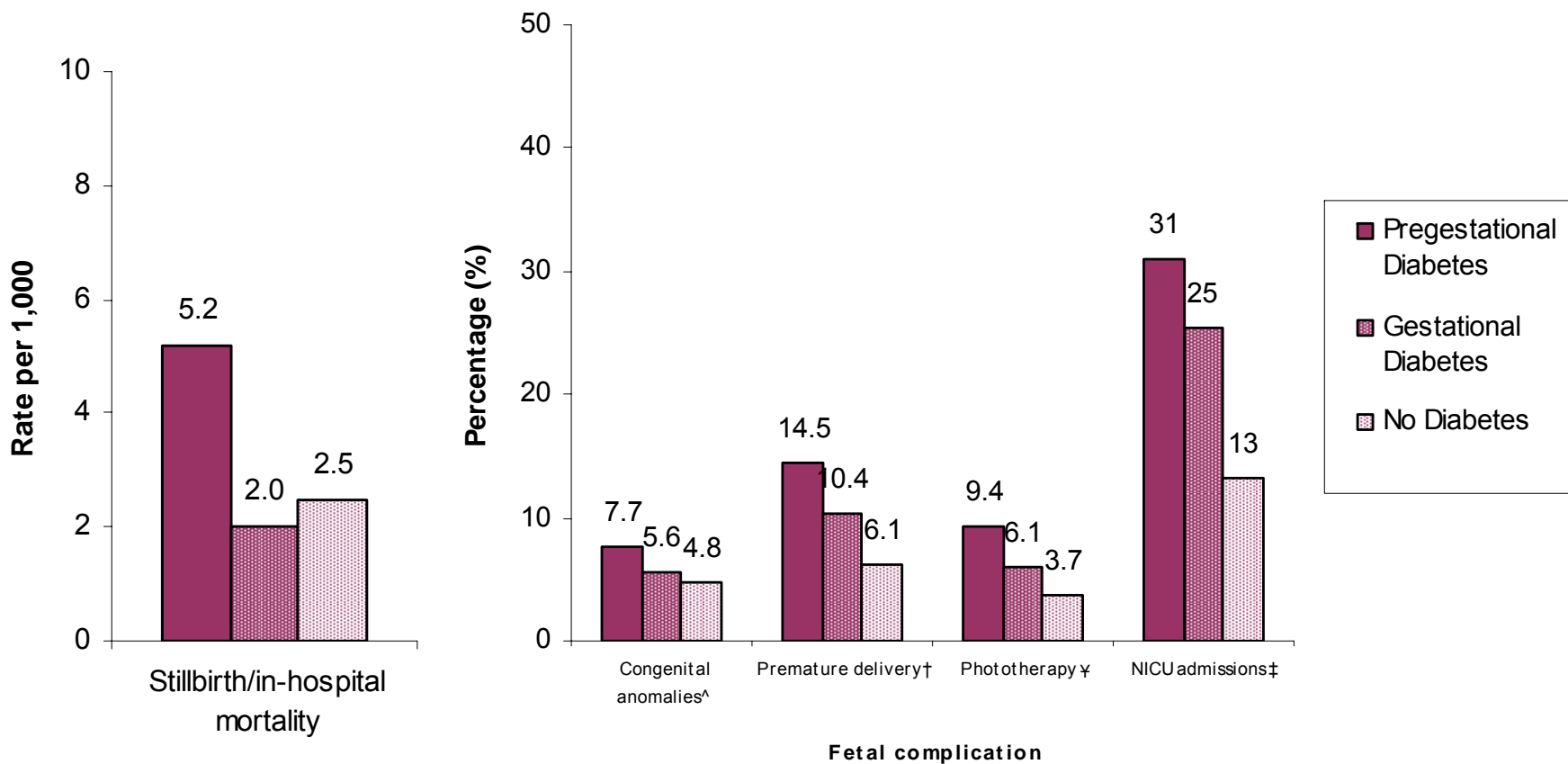
† Includes shoulder dystocia



# Age-standardized percentage of pregnant women who had a caesarean section, by LHIN and diabetes status, in Ontario, 2002/03-2006/07



# Age-standardized rates of fetal complications, by maternal diabetes status, in Ontario, 2002/03-2006/07



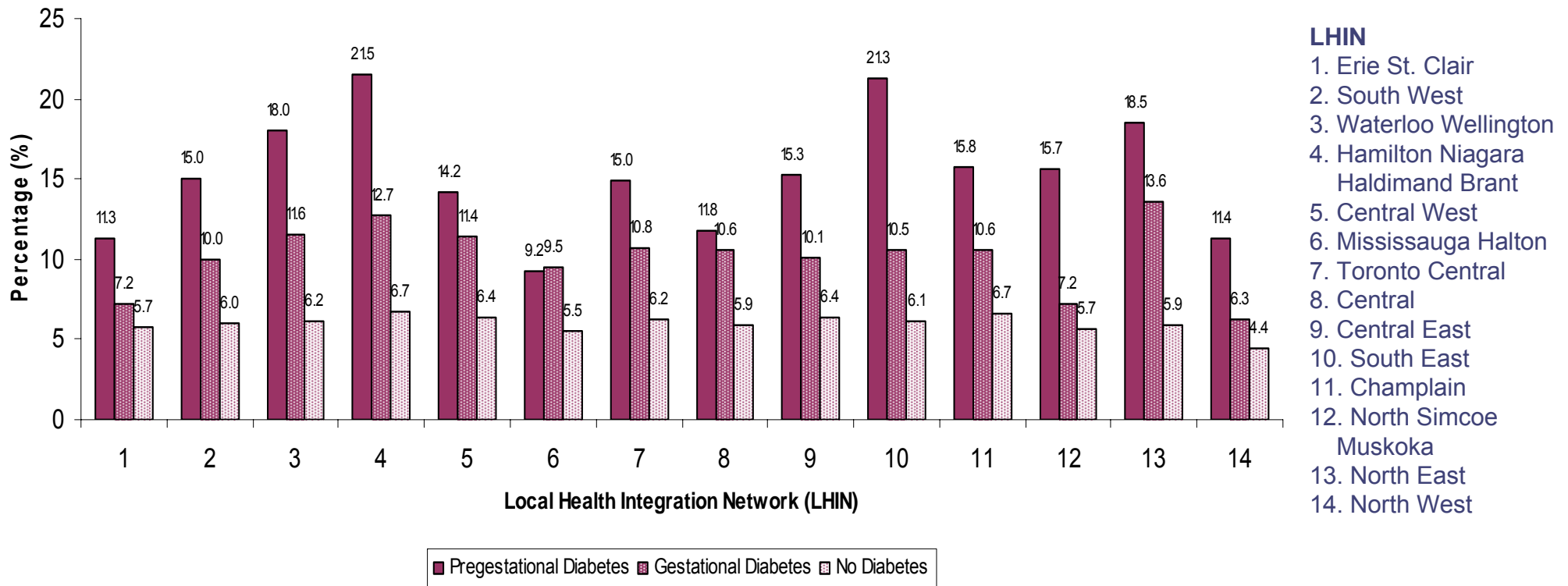
**Data sources:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Mother-Baby (MOMBABY) Linked Database

<sup>^</sup> includes major and minor congenital anomalies

<sup>†</sup> delivered before 37 weeks gestation

<sup>‡</sup> Hyperbilirubinemia requiring phototherapy

# Age-standardized percentage of infants who had a premature delivery,<sup>^</sup> by LHIN and maternal diabetes status, in Ontario, 2002/03-2006/07



Data sources: Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Mother-Baby (MOMBABY) Linked Database  
<sup>^</sup>delivered before 37 weeks gestation

# Summary of Findings

---

- **Diabetes is one of the most common conditions in our society.**
  - Nearly 1 in 10 Ontario adults overall and 1 in 4 over age 65 have diabetes.
- **Despite growing evidence on best practices for diabetes, gaps in care persist.**
  - People with diabetes have worse functional status and self-rated health than those without diabetes
  - Men had higher rates of diabetes complications than women.
  - Diabetes in pregnancy is associated with higher rates of complications.
  - Income matters when it comes to diabetes prevalence and complications.
  - Age is a strong risk factor for diabetes complications.
  - Performance on many measures varied across the province.

# Study Limitations

---

- Administrative data underestimates the true burden of diabetes
- Unable to discriminate between type 1 and type 2 diabetes
- Missing data:
  - Unable to assess appropriateness of care
  - No data on clinical parameters e.g. A1c, blood pressure, cholesterol levels
  - Surrogate measures
- Health care utilization in areas where physicians receive payment through AFPs may be under reported due to incomplete shadow billing

# Key messages

---

- Strategies to halt the diabetes epidemic are critically needed in order to minimize future burden on the health care system caused by diabetes and other obesity-related illnesses.
- Targeted programs are needed to reduce income-related disparities in diabetes outcomes
- Comprehensive patient-centred chronic disease management can improve quality and outcomes of care for diabetes.
- Province-wide, integrated, organized models of care delivery can improve health outcomes and reduce inequities in care.
- Improve quality, availability and timeliness of data to assess diabetes outcomes and care delivery in the province.

# For more information, please contact us:

---

## POWER Study

### St. Michael's Hospital

30 Bond Street (193 Yonge Street, 6th Floor)

Toronto, ON M5B 1W8

Telephone: (416) 864-6060, Ext. 3946

Fax: (416) 864-6057

[www.powerstudy.ca](http://www.powerstudy.ca)

[powerstudy@smh.toronto.on.ca](mailto:powerstudy@smh.toronto.on.ca)

*The POWER Study is funded by Echo: Improving Women's Health in Ontario, an agency of the Ministry of Health and Long-Term Care. This presentation does not necessarily reflect the views of Echo or the Ministry.*