Prevalence and predictors for being unscreened for diabetic retinopathy: A population-based study over a decade

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Background

- The global prevalence of diabetic retinopathy (DR) is est be 22% among those with diabetes.¹
- Screening for DR for early identification and treatment prevent severe and irreversible vision loss.²
- Large cross-sectional studies have suggested that 25-509 with type-2 diabetes have not visited any eye care provi on the recommended guidelines.³

Purpose

To determine the population-level predictors for bei unscreened for DR amongst individuals with diabete Ontario, Canada.

Methods

Data collection

Databases used: The Institute for Clinical Evaluative Science (ICES), Registered Person, Discharge Abstract, Ontario N Health Reporting System (OMHRS), Ontario Health Insu Plan (OHIP) Claims, Ontario Drug Benefit, Immigration, and Citizenship Canada Permanent Resident.

Study population

All individuals in Ontario with diabetes aged ≥ 20 years identified in 2011-2013 and 2017-2019 time periods.

Statistical analysis

- Prevalence of screened and unscreened individuals c for 2011-2013 and to 2017-2019 time periods.
- Comparison of proportions, chi-square analysis cond reported as relative risk (RR) and 95% confidence inte
- Mantel-Haenszel test used for calculation of RR com subcategories within each of the two time points.
- For each variable of interest, potential time interaction using the Breslow-Day test for homogeneity of RR.
- Independent samples t-test was used for aggregate of

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$ \begin{array}{c} 20 \text{ to } 39 \text{ years} & 26,547 (38.0) & 43,317 (62.0) & 29,923 (41.8\%) & 41,716 (58.2\%) \\ 40 \text{ to } 64 \text{ years} & 312,434 (56.9) & 236,626 (43.1) & 341,838 (58.0\%) & 247,710 (42.0\%) \\ 55 \text{ and above} & 400,677 (76.1) & 126,024 (23.9) & 519,790 (75.8\%) & 165,601 (24.2\%) \\ \hline \textbf{Income Quintile, n (row \%) \\ \hline \textbf{I} - Lowest & 158,246 (63.1) & 92,443 (36.9) & 205,793 (64.2\%) & 114,989 (35.8\%) \\ \hline \textbf{2} & 158,311 (64.8) & 86,263 (35.2) & 195,826 (56.4\%) & 99,884 (33.6\%) \\ \hline \textbf{3} & 149,511 (64.9) & 80,069 (35.1) & 183,109 (66.8\%) & 99,884 (33.6\%) \\ \hline \textbf{4} & 144,512 (65.1) & 77,398 (34.9) & 151,449 (66.9\%) & 79,933 (33.1\%) \\ \hline \textbf{5} - \text{Highest} & 124,930 (55.6) & 65,425 (34.4) & 144,035 (67.7\%) & 66,614 (23.3\%) \\ \hline \textbf{mmigrant, n (row \%)} \\ \hline \textbf{Wissing} & 3,568 (51.0) & 3,429 (49.0) & 1,339 (43.5\%) & 1,740 (56.5\%) \\ \hline \textbf{Immigrant, n (row \%)} \\ \hline \textbf{Kural Lites} & 51,946 (55.5) & 41,631 (44.5) & 59,015 (57.5\%) & 43,675 (42.5\%) \\ \hline \textbf{No} & 687,732 (65.4) & 364,336 (34.6) & 832,537 (65.1\%) & 338,575 (34.9\%) \\ \hline \textbf{Missing} & 516,885 (63.2) & 300,796 (36.8) & 632,577 (65.1\%) & 338,575 (34.9\%) \\ \hline \textbf{Missing} & 8,680 (59.7) & 5,866 (40.3) & 10,776 (50.7\%) & 371,532 (33.0\%) \\ \hline \textbf{Missing} & 8,680 (59.7) & 5,866 (40.3) & 10,776 (50.7\%) & 371,532 (33.0\%) \\ \hline \textbf{Mental Health Issues, n (row \%) \\ \hline \textbf{More} & 612,328 (65.2) & 327,446 (34.8) & 753,072 (67.0\%) & 371,532 (33.0\%) \\ \hline \textbf{Mental Health Issues, n (row \%) \\ \hline \textbf{More} & 612,328 (55.7) & 11,146 (44.3) & 16,729 (55.2\%) & 13,580 (44.8\%) \\ \textbf{Non-severe} & 13,395 (52.7) & 7,375 (37.3) & 121,750 (63.5\%) & 69,915 (35.5\%) \\ \hline \textbf{Access to Family Doctor \\ \textbf{No primary care} & 9,588 (39.9) & 14,465 (60.1) & 16,547 (46.5\%) & 19,025 (53.5\%) \\ \hline \textbf{Access to Family Doctor \\ \textbf{No primary care} & 9,588 (39.9) & 14,465 (60.1) & 16,547 (46.5\%) & 19,025 (53.5\%) \\ \hline \textbf{Mental Health} \\ \textbf{History} \\ \textbf{R=1.16} \\ \hline \textbf{Mental Health} \\ \textbf{History} \\ \textbf{R=1.17} \\ \hline \textbf{Mental Health} \\ \textbf{History} \\ \textbf{R=1.117} \\ \hline \textbf{More} \\ \hline \textbf{Martal Health} \\ \textbf{History} \\ \textbf{R=1.039} \\ \hline \textbf{Martal Health} \\ \hline Mart$	20 to 39 years 26,547 (38.0) 43,317 (62.0) 29,923 (41.8%) 41,716 (58.2%) 40 to 64 years 312,2454 (56.9) 236,626 (43.1) 314,888 (58.0%) 247,710 (42.0%) 65 and above 400,677 (76.1) 126,024 (23.9) 519,790 (75.8%) 165,601 (42.2%) Income Quintile, n (row %) 138,146 (63.1) 92,483 (36.9) 205,793 (64.2%) 114,989 (35.601 (42.2%) 1-Lowest 158,246 (63.1) 92,483 (36.9) 205,793 (64.2%) 114,989 (35.8%) 3 149,511 (64.9) 80,959 (35.1) 138,109 (66.8%) 90,867 (33.2%) 4 144,912 (65.1) 77,398 (34.9) 161,449 (66.9%) 79,933 (33.1%) 5-Highest 124,930 (65.5) 65,425 (34.4) 144,035 (67.7%) 66,614 (32.3%) Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (55.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.19) Immigrant, n (row %) Yes 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Multilities 151,315 (66.2) 70,524 (31.8) 178,127 (65.1%) 338,575 (34.9	Age Group, n (row	%)				
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$\begin{array}{c} 2 \\ 3 \\ 149,511 (64.8) \\ 4 \\ 144,512 (65.1) \\ 77,398 (24.9) \\ 183,109 (66.4\%) \\ 90,867 (33.2\%) \\ 4 \\ 144,512 (65.1) \\ 77,398 (24.9) \\ 161,449 (66.9\%) \\ 79,933 (33.1\%) \\ 77,939 (43.5\%) \\ 77,930 (43.5\%) \\ $	2 158,911 (64.8) 82,623 (35.2) 195,826 (66.4%) 98,884 (38.6%) 3 149,511 (64.9) 80,969 (35.1) 183,109 (65.8%) 90,867 (33.2%) 4 144,512 (65.1) 77,398 (34.9) 161,4449 (65.9%) 77,939 (33.1%) 5 Highest 124,930 (65.6) 65,425 (34.4) 144,035 (67.7%) 68,614 (32.3%) Missing 3,568 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Wes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Large cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,380 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (33.5%) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,395 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) None 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (46.5%) 19,025 (53.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (50.1) 16,547 (45.5%) 19,025 (53.5%) Acces	1 - Lowest	158,246 (63.1)	92,483 (36.9)	205,793 (64.2%)	114,989 (35.8%)	
$\begin{array}{c} 3 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 5 \\ 4 \\ 4 \\ 5 \\ 4 \\ 5 \\ 4 \\ 5 \\ 4 \\ 1 \\ 5 \\ 4 \\ 5 \\ 5 \\ 1 \\ 6 \\ 5 \\ 1 \\ 6 \\ 5 \\ 1 \\ 6 \\ 5 \\ 1 \\ 6 \\ 5 \\ 1 \\ 6 \\ 5 \\ 7 \\ 7 \\ 9 \\ 3 \\ 5 \\ 6 \\ 5 \\ 5 \\ 1 \\ 1 \\ 6 \\ 5 \\ 7 \\ 7 \\ 9 \\ 5 \\ 5 \\ 1 \\ 1 \\ 6 \\ 7 \\ 7 \\ 7 \\ 5 \\ 5 \\ 5 \\ 1 \\ 1 \\ 7 \\ 7 \\ 6 \\ 5 \\ 5 \\ 1 \\ 1 \\ 7 \\ 7 \\ 7 \\ 5 \\ 5 \\ 5 \\ 1 \\ 7 \\ 7 \\ 5 \\ 5 \\ 5 \\ 7 \\ 7 \\ 7 \\ 5 \\ 5 \\ 5 \\ 7 \\ $	3 149,511 (64.9) 80,969 (35.1) 182,109 (66.5%) 90,867 (33.2%) 4 144,512 (65.1) 77,398 (34.9) 161,449 (66.5%) 79,933 (33.3%) Missing 3,568 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,380 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,550 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Age, Young Adult <td>2</td> <td>158,911 (64.8)</td> <td>86,263 (35.2)</td> <td>195,826 (66.4%)</td> <td>98,884 (33.6%)</td>	2	158,911 (64.8)	86,263 (35.2)	195,826 (66.4%)	98,884 (33.6%)	
4 144,512 (55.1) 77,398 (34.9) 101,449 (65.9%) 79,933 (33.1%) 5 - Highest 124,930 (65.6) 65,425 (34.4) 144,035 (67.7%) 68,614 (32.3%) Missing 3,568 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,798 (68.0) 28,781 (31.4) 70,022 (69.1%) 31,380 (30.9%) Missing 8.668 (59.7) 5,866 (40.3) 10,776 (60.7%) 571,532 (33.0% None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0% Severe 13,395 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%)	4 144,512 (65.1) 77,398 (34.9) 161,449 (66.9%) 79,933 (33.1%) 5 - Highest 124,930 (65.6) 65,425 (34.4) 144,035 (67.7%) 68,614 (32.3%) Missing 3,558 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) Yes 68,7732 (65.4) 364,336 (34.6) 832,536 (56.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78.093 (30.5%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70.022 (69.1%) 31,330 (30.9%) Missing 8,580 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Missing 8,580 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) Non-severe 13,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) None 612,328 (55.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%)	3	149,511 (64.9)	80,969 (35.1)	183,109 (66.8%)	90,867 (33.2%)	
5-Highest 124,930 (65.6) 65,425 (34.4) 144,035 (67.7%) 68,614 (32.3%) Missing 3,568 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 332,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge citles 515,815 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Small citles 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 5,979 (39.3%) Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (35.5%) Age, Young Adult No Family Doctor Infinity Infinity Infinity RR=1.656 Immigrant RR=1.656 RR=1.119 Infity <t< td=""><td>5. Highest 124,930 (65.6) 65,425 (34.4) 144,035 (67.7%) 68,614 (32.3%) Missing 3,568 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,330 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mone 612,328 (55.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) None 612,328 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,380 (48.4%) Non-severe 13,395 (52.7) 67.373 (37.3) 121,750 (63.5%) 69.915 (35.5%) Age, Young Adult No Family No Family Montal Health History RR=1.149 Montal Heal</td><td>4</td><td>144,512 (65.1)</td><td>77,398 (34.9)</td><td>161,449 (66.9%)</td><td>79,933 (33.1%)</td></t<>	5. Highest 124,930 (65.6) 65,425 (34.4) 144,035 (67.7%) 68,614 (32.3%) Missing 3,568 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,330 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mone 612,328 (55.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) None 612,328 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,380 (48.4%) Non-severe 13,395 (52.7) 67.373 (37.3) 121,750 (63.5%) 69.915 (35.5%) Age, Young Adult No Family No Family Montal Health History RR=1.149 Montal Heal	4	144,512 (65.1)	77,398 (34.9)	161,449 (66.9%)	79,933 (33.1%)	
Missing 3,568 (51.0) 3,429 (43.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,177 (65.1%) 338,575 (34.9%) Narial Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,380 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6.979 (33.3%) Mental Health Issues, n (row %) None 612,328 (55.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) None 612,328 (55.2) 327,446 (34.8) 753,072 (57.0%) 31,580 (44.8%) Non-severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 13,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (35.5%) Access to Family Doctor RR=1.656 Mental Health Heath Heath </td <td>Missing 3,568 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,7378 (68.6) 28,781 (31.4) 70,022 (59.1%) 31,330 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor RR=1.656 Mental Health History RR=1.117 No Income RR=1.286 RR=1.039 RR=1.039 RR=1.039 RR=1.</td> <td>5 - Highest</td> <td>124,930 (65.6)</td> <td>65,425 (34.4)</td> <td>144,035 (67.7%)</td> <td>68,614 (32.3%)</td>	Missing 3,568 (51.0) 3,429 (49.0) 1,339 (43.5%) 1,740 (56.5%) Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,7378 (68.6) 28,781 (31.4) 70,022 (59.1%) 31,330 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor RR=1.656 Mental Health History RR=1.117 No Income RR=1.286 RR=1.039 RR=1.039 RR=1.039 RR=1.	5 - Highest	124,930 (65.6)	65,425 (34.4)	144,035 (67.7%)	68,614 (32.3%)	
Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,380 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) Nore 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Nore 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Nore 13,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (60.1) 16,547 (46.5%) 19,025 (53.5%) Mental Health No F amily Doctor Mental Health Mental Health History RR=1.149 Mental Realth No F a	Immigrant, n (row %) Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,380 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 371,532 (33.0% None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0% Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 13,395 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (35.5%) Access to Family Doctor RR=1.656 Mental Health RR=1.149 Mental Health Mistory RR=1.117 No Family Mental Health RR=1.117 </td <td>Missing</td> <td>3,568 (51.0)</td> <td>3,429 (49.0)</td> <td>1,339 (43.5%)</td> <td>1,740 (56.5%)</td>	Missing	3,568 (51.0)	3,429 (49.0)	1,339 (43.5%)	1,740 (56.5%)	
Yes 51,946 (55.5) 41,631 (44.5) 59,015 (57.5%) 43,675 (42.5%) No 687,732 (65.4) 364,336 (34.6) 832,536 (66.9%) 411,352 (33.1%) Rurality, n (row%) Iarge cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,380 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (60.1) 16,547 (46.5%) 19,025 (53.5%) Mental Health Ilstory RR=1.149 Mental Health RR=1.149 RR=1.117 Immigrant RR=1.286 Mental Health RR=1.039 <	Yes No51,946 (55.5)41,631 (44.5)59,015 (37.5%)43,675 (42.5%) 431,332 (33.1%)Rurality, n (row%)Iarge cities516,885 (63.2)300,796 (36.8) $632,577 (65.1\%)$ 338,575 (34.9%)Small cities151,315 (68.2)70,524 (31.8)178,176 (59.5%)78,093 (30.5%)Missing8,680 (59.7)5,866 (40.3)10,776 (60.7%)6,979 (33.3%)Mental Health Issues, n (row %)None612,328 (65.2)327,446 (34.8)753,072 (67.0%)371,532 (33.0%)None612,328 (65.2)327,446 (34.8)753,072 (67.0%)371,532 (33.0%)Severe13,995 (55.7)11,146 (44.3)16,729 (55.2%)13,580 (44.8%)Non-severe13,355 (62.7)67,375 (37.3)121,750 (63.5%)69,915 (36.5%)Access to Family Doctor No primary care9,588 (39.9)14,465 (60.1)16,547 (46.5%)19,025 (53.5%)Mental Health RR=1.818No Family Doctor RR=1.656Mental Health History RR=1.117Mental Health History RR=1.117	Immigrant, n (row	%)				
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$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Νο	687,732 (65.4)	364,336 (34.6)	832,536 (66.9%)	411,352 (33.1%)	
Large cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9%) Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5%) Rural Areas 62,798 (68.6) 28,781 (31.4) 70.022 (69.1%) 31,380 (30.9%) Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor No Family Doctor Inving in Urban Area No primary care 9,588 (39.9) 14,465 (60.1) 16,547 (46.5%) 19,025 (53.5%) Mental Health History RR=1.149 Mental Health RR=1.117 Immigrant RR=1.286 RR=1.039 Mental Health History	Large cities 516,885 (63.2) 300,796 (36.8) 632,577 (65.1%) 338,575 (34.9% Small cities 151,315 (68.2) 70,524 (31.8) 178,176 (69.5%) 78,093 (30.5% Rural Areas 62,798 (68.6) 28,781 (31.4) 70,022 (69.1%) 31,380 (30.9% Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0% Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (60.1) 16,547 (46.5%) 19,025 (53.5%) Age, Young Adult RR=1.818 No Family Doctor RR=1.656 Immigrant RR=1.286 RR=1.039	Rurality, n (row%)					
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Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0% Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor No Family Living in Urban Area RR=1.149 No Family Doctor RR=1.656 Mental Health History RR=1.117 Immigrant RR=1.286 Mental Health History RR=1.039	Missing 8,680 (59.7) 5,866 (40.3) 10,776 (60.7%) 6,979 (39.3%) Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (60.1) 16,547 (46.5%) 19,025 (53.5%) Age, Young Adult No F amily Doctor Mental Health Mental Health RR=1.818 No F amily Doctor Mental Health Mental Health Immigrant RR=1.286 Mental Health History RR=1.117	Rural Areas	62,798 (68.6)	28,781 (31.4)	70,022 (69.1%)	31,380 (30.9%)	
Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor No Family Re=1.149 Mental Health RR=1.656 Mental Health History RR=1.117 Immigrant RR=1.286 Re=1.039 Re=1.039	Mental Health Issues, n (row %) None 612,328 (65.2) 327,446 (34.8) 753,072 (67.0%) 371,532 (33.0%) Severe 13,995 (55.7) 11,146 (44.3) 16,729 (55.2%) 13,580 (44.8%) Non-severe 113,355 (62.7) 67,375 (37.3) 121,750 (63.5%) 69,915 (36.5%) Access to Family Doctor No primary care 9,588 (39.9) 14,465 (60.1) 16,547 (46.5%) 19,025 (53.5%) Age, Young Adult No Family Doctor RR=1.149 Urban Area RR=1.818 No Family Doctor Mental Health Immigrant RR=1.656 Mental Health History RR=1.286 Re=1.039 Re=1.039 Re=1.039	Missing	8,680 (59.7)	5 <i>,</i> 866 (40.3)	10,776 (60.7%)	6,979 (39.3%)	
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Immigrant RR=1.286 Low Income RR=1.039	Immigrant RR=1.286 RR=1.039				RR=1	.117	
RR=1.286	RR=1.286 RR=1.039	Im	migrant			• • • • •	
RR=1.286 RR=1.039	RR=1.286 RR=1.039		0		w mcome		
		RI	R=1.286	RR	=1.039		





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Results

- Proportion of unscreened patients decreased from 35% (405,967) in 2011-2013 to 34% (455,027) of the population with diabetes in 2017-2019 (RR = 0.967; 95% CI=0.964-0.9693; p<0.001).
- Having more comorbidities associated with higher screening rates.
- Even amongst highest healthcare users, only 67% were screened in both time points.

isk factors for being unscreened

- Age: Young adults aged 20-39 years old had the highest proportion of unscreened patients (62% and
- 58% in 2011-2013 and 2017-2019 respectively).
- **Income:** Having a lower income quintile (RR=1.039; 95% CI=1.036-1.044; p<0.001)
- **Recent immigrant:** (RR= 1.286; 95% CI=1.280-1.293; p<0.001)
- Live in urban area: (RR=1.149; 95% CI=1.145-1.154; p<0.001)
- **Mental health history** (RR=1.117; 95% CI=1.112-1.122; p<0.001)
- **No family doctor:** (RR=1.656; 95% CI=1.644-1.668; p<0.001)

Conclusion

Approximately a third of patients with diabetes in Ontario, Canada have not been screened for DR. Of all patients with diabetes, young adults, those with a low-income status, immigrants, residents in a large city, those with a prior history of mental illness, and no access to primary care are at the highest risk of not being screened for DR.

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