Disparities in uptake of Prenatal Screening in Canada: A population-based cohort study

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Running Title: Unequal uptake of PNS in Ontario, Canada

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ABSTRACT

Background: It is recommended that all pregnant women be offered prenatal screening (PNS) for Down syndrome and open neural tube defects. However, emerging private-pay prenatal tests may compromise access. Screening rates and associated maternal, health care provider and regional characteristics warrant consideration in order to optimize the offer of this component of prenatal care.

Methods: A population-based retrospective cohort study was conducted in Ontario, Canada with pregnant women ≥ 16 weeks gestation in 2007-2009. We ascertained PNS rates using linked health administrative and PNS datasets, and examined maternal, provider, and regional characteristics associated with screening uptake. Relative rates were estimated.

Results: Of 264,737 pregnant women, 62% received screening. A greater proportion of women initiated screening in the first rather than second trimester (50.0% vs. 12.2%). Screening rates were lower among rural compared to urban women; adjusted relative rate (aRR) =0.64 (95% confidence intervals [CI] 0.63-0.66). Compared with women receiving first trimester care from obstetricians, those receiving family physician or midwifery care were less likely to screen (aRR=0.91; 95% CI 0.90-0.92; aRR=0.40; 95% CI 0.38-0.43, respectively). Women in lower income neighbourhoods were slightly less likely to screen (aRR=0.95; 95% CI 0.94-0.96, lowest versus highest quintile), but immigrants were more likely to screen than non-immigrants (aRR=1.15; 95% CI 1.15-1.16).

Interpretation: There are significant regional, provider and maternal differences in PNS use. Access discrepancies will intensify with private-pay non-invasive prenatal testing; policy efforts to reduce barriers to PNS and optimize its offer are warranted.

Key words: Prenatal Screening, access to health services, population-based

INTRODUCTION

The Society of Obstetrics and Gynecology of Canada recommends that all pregnant women be offered a range of prenatal screening (PNS) tests to identify pregnancies at risk for specific chromosome abnormalities and open neural tube defects [1]. Most women will gain reassurance in the first or early second trimester that their fetus is unlikely to be affected by a specific disorder; those identified to be at high risk will offered diagnostic testing to guide further counselling and decision-making about pregnancy course and necessary care at delivery. Professional guidelines do not specify one particular screening protocol because local infrastructure, timing of prenatal care, and value-based preferences vary, but they do specify that a high performing test must be universally available to women, regardless of ability to pay [1-4].

Screening practices and performance parameters differ across jurisdiction [5-8] (Table 1) and are shifting quickly. Most prominently, non-invasive prenatal testing (NIPT) for chromosome abnormalities (i.e. using maternal serum as a source of fetal DNA) is becoming commonplace, reducing the demand for risk-bearing invasive prenatal diagnosis [9-11]. Particularly in jurisdictions where this remains available only through private pay [12-14], attention to access barriers is important. Literature to date suggests that despite international policies recommending universal offer of PNS, uptake varies by maternal preferences [15-20], provider practice patterns [21-25], and maternal socio-demographic characteristics [26-32].

In light of the shifting and increasingly market-driven landscape of PNS in Canada [33], our objectives were to describe screening rates for publically insured screening tests across healthcare regions in Ontario (population 13 million) and to determine whether there are regional, provider, or maternal characteristics associated with screening uptake that warrant consideration as policy efforts mobilize to optimize the availability of emerging technology.

MATERIALS AND METHODS

Study design

We conducted a population-based retrospective cohort study on pregnancies > 16 weeks gestation and an estimated conception date between December 1 2007 and November 30 2009. We chose 16 weeks gestation since most women should be offered PNS by this point in their pregnancy. The study used multiple linked health and demographic datasets from Ontario, Canada. Ontario provides universal health care insurance that includes access to all routine pregnancy care services for all legal residents.

Databases

Regional PNS laboratories routinely upload screening results into a centralized database, now the Better Outcomes Registry and Network (BORN Ontario). Using encoded health card numbers, we linked the PNS data to health administrative datasets housed at the Institute for Clinical Evaluative Sciences (ICES; linkage rate = 94%). Databases included the Discharge Abstract Database (DAD), the Same-Day Surgery (SDS) database, and the National Ambulatory Care Reporting System (NACRS) administered by the Canadian Institute for Health Information (CIHI). These contain demographic and clinical information from all Ontario-based acute-care

facilities, day surgery clinics, and emergency departments, respectively [34]. Other databases included the Ontario Health Insurance Plan (OHIP) fee-for-service claims file, which provides diagnostic and service provision information for approximately 94% of Ontario physicians; the Ontario Registered Persons Database (RPDB), which includes demographic information for all residents eligible to receive health care in Ontario; the ICES physician database (IPDB), which records physician demographics and specialties; and the Citizenship and Immigration Canada (CIC) file for immigrants landed in Ontario since 1985. Research Ethics Boards at Sunnybrook Hospital in Toronto and the Children's Hospital of Eastern Ontario in Ottawa, Canada approved this study.

Study cohort

Live and stillbirths were identified using hospitalization discharges; gestational age at delivery was used to estimate conception date [35]. Deliveries with an indeterminate gestational age were excluded. Spontaneous and therapeutic abortions were determined using the DAD, SDS, NACRS, and OHIP. Gestational age at abortion was used to estimate conception date and to exclude aborted pregnancies with a gestation </=16 weeks. We included aborted pregnancies where gestational age was not recorded if the woman had an OHIP service code denoting care or diagnostic imaging >16 weeks gestation. Aborted pregnancies with no gestational age recorded and no OHIP records denoting care >16 weeks gestation were excluded. We considered one pregnancy per woman during the study period, prioritizing those that reached delivery and then those that occurred earliest within the study period.

Outcome measure: uptake of PNS

Five regional laboratories support PNS in Ontario. For all pregnancies in our cohort, we used the PNS dataset to determine receipt and modality of PNS (Table 1). Women receiving PNS that did not conform to routine modalities were classified as 'Other.'

Predictors of screening

We categorized maternal age at delivery/abortion (≤20 years; 21-34 years; ≥35 years) as this is a predictor of screening [28]. We linked all women to previous birth hospitalizations to determine maternal age at the time of first childbirth (≤20 years; 21-34 years; ≥35 years), a strong indicator of social risk [36]. We enumerated parity by all previous deliveries (0, 1, 2, >/=3) and identified those that were stillbirths. We identified women with a spontaneous or therapeutic abortion in the past 5 years using DAD, SDS, NACRS, and OHIP records [37]. A unique maternal-newborn matching number on the mother's delivery record and on the infant's hospital birth record enabled linkage [35, 38] to identify those with a prior delivery of a child with a congenital malformation diagnosed in hospital within one year of birth.

Postal code of residence at conception was used to link to 2006 Census data to describe neighborhood income quintiles, a proxy for socioeconomic status [39, 40]. Each woman was assigned a Rurality Index of Ontario (RIO) score specific to the year 2008, categorized as major urban (score of 0-9), non-major urban (score of 10-39) and rural (score ≥40) [41]. The CIC dataset determined immigration status; categorized as Canadian resident, Immigrant landed ≥5 years ago, Immigrant landed <5 years ago, and refugee status.

We used all OHIP records 14 weeks following estimated conception date to identify the first trimester care provider for each woman in a hierarchical fashion. Women for whom there were prenatal care visit billings were assigned to the physician providing the majority of those services (family physician – FP or obstetrician - OB). The remaining women were assigned to the FP providing the majority of other primary care services during the first trimester. Women with outpatient billings to other physicians where assigned as "other", and women with no billings were assigned to midwifery care (if there were midwifery-specific OHIP records during the pregnancy) or to no care.

Statistical analysis

Since the outcome – being screened - was common (>60%) in our cohort, we used log-binomial regression to examine the associations between factors of interest and receipt of screening [42]. We tested correlations among variables prior to selecting variables to enter into the multivariate model. Statistical analyses were conducted using SAS 9.2 (SAS Institute INC., Cary, North Carolina). All tests were two-tailed; $p<0.05$ was used as the level of statistical significance.

RESULTS

We identified 264,737 pregnancies >16 weeks gestation during the study period. Overall, 62% of women in the cohort received PNS during their pregnancy, but uptake varied considerably by region (80% had screening in central Toronto, <40% had screening in southwest and northern regions). Overall, approximately 50% of pregnant women initiated screening in the first trimester (i.e. integrated PNS or first trimester combined screening) and 12% initiated screening in the second trimester (serum integrated screening or the 4 marker QUAD test; Figure 1). While

screening initiated in the first trimester was more common across all regions, reaching 58-66% in central, urban regions (regions 5-8), the difference in the proportion of women who initiated screening in the first compared to second trimester was marginal in four - of the more remote - regions (regions 1, 10, 13, 14; Figure 1).

First or second trimester screening varied by maternal socio-demographic, regional, and provider characteristics. More specifically, 80-84% of women over 21 years at delivery versus only 63% of women ≤20 were screened in the first trimester ($p<0.001$). Almost 83% of recent refugee immigrants versus 65% of less recent refugee immigrants pursued screening in the first trimester ($p<0.001$). As income quintile increased, so did the proportion of women pursuing first trimester screening (72% and 87% from lowest to highest income quintile; $p<0.001$), with a greater proportion of first trimester screening in urban versus rural women (82% vs 64%, respectively; $p<0.001$). Rates of screening were lower in women who received FP or midwifery care versus OB care (57-69% vs 83%; $p<0.001$; Table 2). Median overall screening rates – at the provider practice level - were higher for OBs (median 75%; IQR 52%-90%) compared with FPs (median 59%; IQR 33%-81%).

After adjustment for all predictors, rurality was a major predictor of overall screening rates; women from rural (Relative Rate [aRR] 0.67; 95% Confidence Interval [95% CI] 0.66-0.68) and non-major urban areas (aRR 0.76; 95% CI 0.75-0.76) were less likely to be screened than women from major urban areas. Prenatal care provider type was also associated with receipt of screening. Compared with women receiving first trimester care from an OB, those receiving FP care were slightly less likely to receive screening (aRR 0.91; 95% CI 0.90-0.92) and those receiving care that was not billed as specifically prenatal (by FPs or other physicians) or those

receiving care from a midwife were even less likely to receive screening [(aRR 0.72; 95% CI 0.71-0.73); (aRR 0.65; 95% CI 0.64-0.67); (aRR 0.40; 95% CI 0.38-0.43), respectively] (Table 3).

Other factors associated with lower screening rates were younger maternal age at delivery/abortion (aRR 0.85; 95% CI 0.84-0.86) for mothers </=20 years versus mothers >/=35 years) and multi-parity (aRR 0.76; 95% CI 0.75-0.78 for mothers with parity >/= 3 versus nulliparous mothers). Immigrants, regardless of landing date or refugee status, were more likely to receive screening than non-immigrants (aRR 1.15; 95% CI 1.15-1.16). Women living in areas with lower income were less likely to receive screening (aRR 0.95; 95% CI 0.94-0.96 for lowest versus highest quintile), although this association was modest (Table 3).

INTERPRETATION

This large, population-based study indicates that while uptake of first trimester screening is higher than second trimester screening, there are significant differences in use of PNS among pregnant women in Ontario. Uptake varies by region and relatedly, by urban/rural location. Receipt of PNS is higher in those cared for by obstetricians and higher – although to a lesser extent - in women with fewer social risks. These differences exist in the context of high first trimester prenatal visit rates and a universal health insurance system.

The association between uptake and living in remote areas is consistent with population-based studies in other jurisdictions [28, 31, 32], and with surveys that report reduced screening offer among rural providers [21-23, 25]. In a study of prenatal care provider practices, reasons

associated with low rates of screening offer include maternal age <35, lack of relevant family history, or lack of patient request [21-23[. Low antenatal care volume (i.e. <50 pregnant women/year) was also associated with low screening uptake [21]. A similar study found that 52.2% of FPs in Newfoundland routinely offered PNS to all pregnant women and identified the same reasons for non-offer [25]. These studies also identified providers' generalized concerns about false positive results, limited availability of abortion/supportive services for affected pregnancies, and the value-laden nature of screening for disabilities as barriers to screening [21-23, 25]. Our *population-level* finding that PNS varies by prenatal care provider type is novel. The aforementioned studies did not identify provider group differences in attitudes related to PNS offer. Since 47% of pregnant women in Ontario receive at least some prenatal care from FPs [34], further attention to the practices of different provider types is warranted.

The association of maternal socio-demographic characteristics, age and income related barriers with lower screening has been reported in other jurisdictions, but with stronger effects than those identified herein [28-30, 32]. While predictors may differ across jurisdictions, age and income may have revealed stronger effects elsewhere because provider and regional effects were untested. While multi-parity is often associated with older age and greater risk for aneuploidy, we found reduced screening uptake among multiparous women. This could reflect lower perceived risk or greater comfort with the notion of an affected child [15], or could reflect a provider assumption that those who declined screening once, may decline it in subsequent pregnancies. Reassuringly, immigrant status was not identified as a barrier to screening, unlike studies of other screening tests (e.g. PAP smears) [43]. Finally, the first-trimester initiated screening tests were more common across all regions. As efforts shift towards non-invasive

testing strategies and first trimester pregnancy health assessments [44], high rates of first trimester-initiated tests suggest that Ontario is well positioned to move towards a first trimester based screening paradigm [33].

Strengths and Limitations

This study represents the first Canadian population-level analysis of PNS uptake and comes at a time when specific attention to access challenges is of utmost importance. It is limited in its ascertainment of screening uptake in that it does not reflect screening *offer;* it is the offer of screening that is universally recommended but current data infrastructure precludes this analysis. Other limitations include (i) potential over-estimate of first trimester screening rates since some results coded as first trimester screening may reflect intended but incomplete integrated PNS, (ii) our inability to capture uptake of NIPT given its recent entry into the screening environment in Ontario, (iii) our exclusion of provider care not captured in OHIP billing data (e.g. salaried physicians at community health centres), and (iv) our incomplete capture of midwifery care. In addition, a small proportion of women appeared to receive screening but no prenatal care, perhaps underestimating prenatal care provided. Finally, by only linking 94% of the screening records to ICES data, we may have slightly underestimated screening rates, but there is no evidence to suggest that linkage rate would vary by any of the characteristics evaluated.

Conclusion and implications for practice, policy, and future research

These findings highlight existing vulnerabilities in the PNS system in Ontario, Canada and have important implications for the delivery and evaluation of evolving PNS services. As PNS technologies advance and services extend beyond the detection of aneuploidies and open neural

tube defects to more common adverse pregnancy and/or developmental outcomes [42], attending to access in an increasingly strained fiscal environment is challenging but important. As a complex intervention, ensuring access requires optimizing education and preference-sensitive decision-making among pregnant women and prenatal care providers as well as measuring *offer*. A whole systems approach to screening - one that engages all components of a screening system in a comprehensive and evaluative process [45] may be well-suited to optimizing access and maximizing the overall quality of this service. Specific attention through outreach and education is owed to women residing in remote areas and women who receive early prenatal care from non-obstetricians. While these findings are specific to the Ontario context, national research and policy attention to PNS infrastructure is needed as this recommended service is inconsistently funded/available across jurisdictions [46]. The expanding presence of market-driven pressures from US-based vendors offering non-invasive prenatal testing for private pay can only fuel further access challenges, warranting a unified and forward-thinking response from the prenatal care community.

Contribution to authorship:

All authors meet authorship criteria. All authors contributed substantially to conception and design, acquisition of data, analysis and interpretation of data. RH, MC, and AG drafted the article and revised it critically for important intellectual content. XM, TH and MW revised it critically for important intellectual content and all authors gave final approval of the version to be published.

Details of ethics approval:

Ethics approval for this study was obtained from Research Ethics Boards at Sunnybrook Hospital Sciences Centre in Toronto, Canada, approved Nov 11, 2011, reference 2012 0900 283 000 and the Children's Hospital of Eastern Ontario in Ottawa, Canada, approved June 17, 2013, reference 11/175X.

Table 1: Publically funded PNS tests in Ontario*

Screening Modality	Timing	Markers analyzed	Detection Rate/ False Positive Rate[6]
First Trimester combined Screening (FTS)	Week 11-13	NT, PAPP-A, *fb*hCG	83.9%/4.0%
Integrated PNS (IPS)	1st phase Week 11-13	NT, PAPP-A	88.4%/3.3%
	2nd phase^ Week 15-20	AFP, hCG, uE3	
Serum Integrated PNS (SIPS)	1st phase Week 11-13	PAPP-A	FPR=3.3%**
	2nd phase^ Week 15-20	AFP, hCG, uE3, DIA	
Four-marker second trimester serum screening (QUAD)	Week 15-20	AFP, hCG, uE3, DIA	82.5%/5.6%***

AFP = Alpha-Fetoprotein; DIA = Dimeric Inhibin-A; *fb*hCG = free-beta subunit of human Chorionic Gonadotropin; hCG = human Chorionic Gonadotropin; NT = Nuchal Translucency; PAPP-A = Pregnancy-Associated Plasma Protein A; uE3 = unconjugated Estriol

^Result issued upon the completion of 2nd phase of the screening; if 2nd phase incomplete, reported as FTS.

*Other available tests are AFP only for ONTD, NT only for multiple pregnancies, and PAPPA plus second trimester QUAD test when NT is not available at the first trimester. Non-invasive prenatal testing is insured for high-risk women and available through private pay for women who do not meet high-risk criteria.

** Insufficient data to generate detection rate. This is an estimate for the FPR given the small volume of uptake on this particular screen test in Ontario.[i]

***Unpublished data

Table 2 – Characteristics of study cohort by trimester screened

Characteristic	Total pregnancies (N)	Total screened pregnancies N (%)	Proportion screened in 1st trimester	Proportion screened in 2nd trimester	P value
TOTAL	264,737	164,783(62.2%)	132,355	32,428	
Maternal age at delivery/abortion					
≤ 20 years	19,622	7894 (40.2%)	4,986 (63.2%)	2,908 (36.8%)	<0.001
21 to 34 years	197,976	122489 (61.9%)	98,308 (80.3%)	24,181 (19.7%)	
≥ 35 years	47,139	34400 (73.0%)	29,061 (84.5%)	5,339 (15.5%)	
Maternal age at first delivery					
≤ 20 years	38,411	16096 (41.9%)	10,786 (67.0%)	5,310 (33.0%)	<0.001
21 to 34 years	126,701	71172 (64.0%)	102,750 (81.1%)	23,951 (18.9%)	
≥ 35 years	28,453	21986 (77.3%)	18,819 (85.6%)	3,167 (14.4%)	
Parity (previous deliveries)					
0	134,061	86098 (64.2%)	69,353 (80.6%)	16,745 (19.4%)	<0.001
1	87,628	56134 (64.1%)	45,820 (81.6%)	10,314 (18.4%)	
2	30,525	17215 (56.4%)	13,396 (77.8%)	3,819 (22.2%)	
3 or more	12,523	5336 (42.6%)	3,786 (71.0%)	1,550 (29.0%)	
Previous delivery of a stillborn child	2,163	1436 (66.4%)	1,160 (80.8%)	276 (19.2%)	0.66
Previous abortion in the past 5 years	39,047	24504 (62.8%)	19,726 (80.5%)	4,778 (19.5%)	0.44
Previous delivery of a child with a congenital anomaly	9,229	5284 (57.3%)	4,124 (78.0%)	1,160 (22.0%)	<0.001
Immigration status					
Canadian resident	193,187	111734 (57.8%)	18,691 (77.9%)	5,303 (22.1%)	<0.001
Non-refugee immigrant – landed ≥ 5 years ago	31,308	23991 (76.6%)	17,082 (74.3%)	5,895 (25.7%)	
Non-refugee immigrant – landed < 5 years ago	31,274	22977 (73.5%)	2,758 (75.0%)	921 (25.0%)	
Refugee immigrant – landed ≥ 5 years ago	5,423	3679 (67.8%)	1,580 (65.9%)	819 (34.1%)	
Refugee immigrant – landed < 5 years ago	3,545	2399 (67.7%)	92,244 (82.6%)	19,490 (17.4%)	
Neighbourhood income quintile					
1 (lowest)	60,660	35653 (58.8%)	25,629 (71.9%)	10,024 (28.1%)	<0.001
2	53,750	32980 (61.4%)	25,485 (77.3%)	7,495 (22.7%)	
3	53,273	33367 (62.6%)	27,270 (81.7%)	6,097 (18.3%)	
4	53,604	34722 (64.8%)	29,687 (85.5%)	5,035 (14.5%)	
5 (highest)	41,928	27474 (65.5%)	23,912 (87.0%)	3,562 (13.0%)	
Missing	1,522	587 (38.6%)	372 (63.4%)	215 (36.6%)	
Rurality index					
Major urban (RIO score 0-9)	199,919	136297 (68.2%)	111,869 (82.1%)	24,428 (17.9%)	<0.001
Non-major urban (RIO score 10-39)	45,320	21222 (46.8%)	15,921 (75.0%)	5,301 (25.0%)	
Rural (RIO score 40+)	16,697	6457 (38.7%)	4,158 (64.4%)	2,299 (35.6%)	
Missing	2,801	807 (28.8%)	407 (50.4%)	400 (49.6%)	
First trimester care provider					
Prenatal OB physician care	84,553	64726 (76.6%)	63,251 (82.8%)	13,134 (17.2%)	<0.001
Prenatal GP/FP physician care	118,520	76385 (64.5%)	55,790 (86.2%)	8,936 (13.8%)	
Primary GP/FP physician care	36,684	18415 (50.2%)	10,460 (56.8%)	7,955 (43.2%)	
Other physician care	7,707	2997 (38.9%)	572 (83.6%)	112 (16.4%)	
Midwife only care	2,562	684 (26.7%)	2,063 (68.8%)	934 (31.2%)	
No care	14,711	1576 (10.7%)	219 (13.9%)	1,357 (86.1%)	

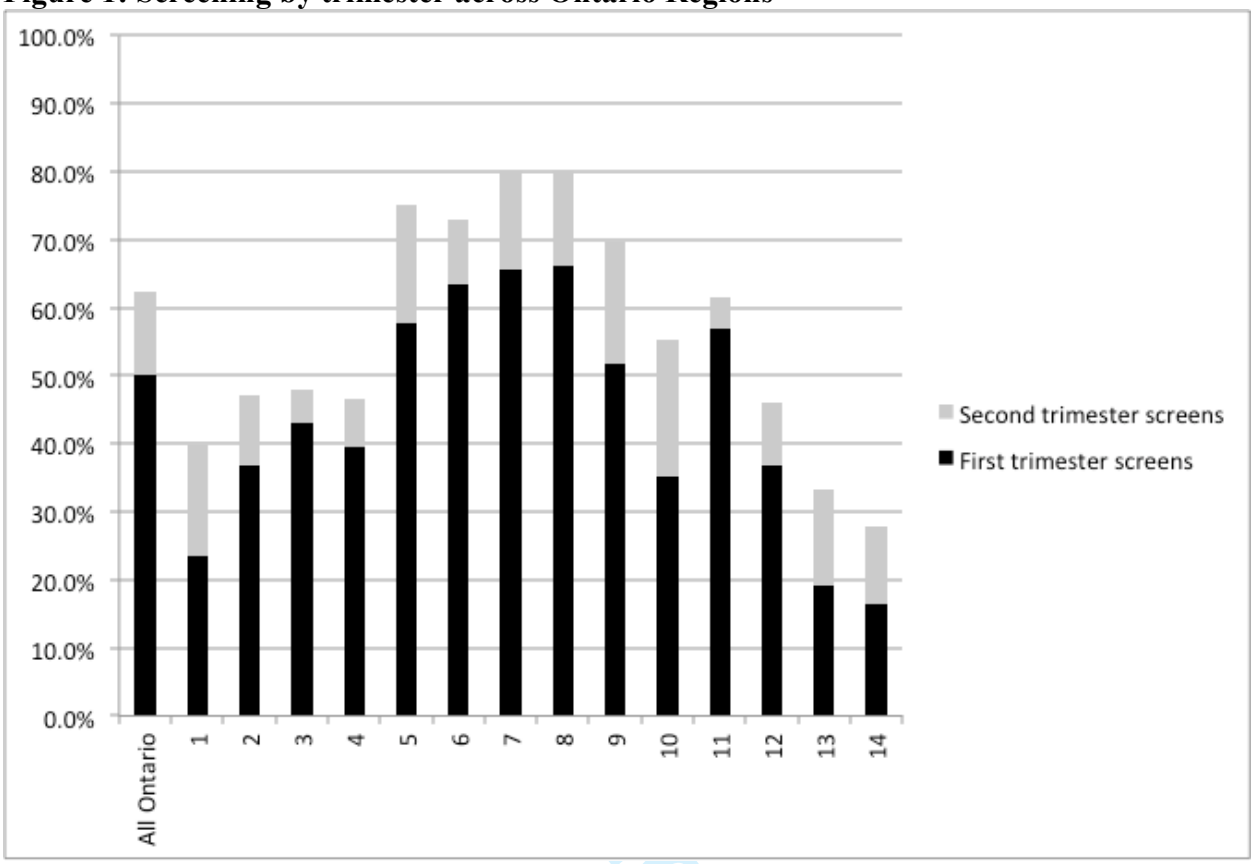
*Row percentages are presented in this table** Distribution of missing data across health regions not reported due to small cell sizes for some types of testing

Table 3 – PNS coverage and rate ratios by study characteristics

Characteristic	Total pregnancies (N)	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
TOTAL	264,737		
Maternal age at delivery/abortion			
≤ 20 years	19,622	0.55 (0.54-0.56)	0.81 (0.80-0.83)
21 to 34 years	197,976	0.85 (0.84-0.86)	0.94 (0.93-0.95)
≥ 35 years	47,139	1.00 (ref)	1.00 (ref)
Maternal age at first delivery			
≤ 20 years	38,411	0.54 (0.53-0.55)	0.85 (0.84-0.86)
21 to 34 years	126,701	0.83 (0.82-0.84)	1.00 (0.99-1.01)
≥ 35 years	28,453	1.00 (ref)	1.00 (ref)
Parity (previous deliveries)			
0	134,061	1.00 (ref)	1.00 (ref)
1	87,628	1.00 (0.99-1.01)	0.97 (0.96-0.97)
2	30,525	0.88 (0.87-0.89)	0.89 (0.89-0.90)
3 or more	12,523	0.66 (0.65-0.68)	0.76 (0.75-0.78)
Previous delivery of a stillborn child	2,163	1.07 (1.04-1.10)	1.04 (1.03-1.06)
Previous abortion in the past 5 years	39,047	1.01 (1.00-1.02)	1.00 (0.99-1.01)
Previous delivery of a child with a congenital anomaly	9,229	0.92 (0.90-0.93)	1.00 (0.99-1.02)
Immigration status			
Canadian resident	193,187	1.00 (ref)	1.00 (ref)
Non-refugee immigrant – landed ≥ 5 years ago	31,308	1.33 (1.32-1.34)	1.15 (1.15-1.16)
Non-refugee immigrant – landed < 5 years ago	31,274	1.27 (1.26-1.28)	1.15 (1.14-1.16)
Refugee immigrant – landed ≥ 5 years ago	5,423	1.17 (1.15-1.20)	1.08 (1.06-1.10)
Refugee immigrant – landed < 5 years ago	3,545	1.17 (1.14-1.20)	1.10 (1.08-1.12)
Neighbourhood income quintile			
1 (lowest)	60,660	0.90 (0.89-0.91)	0.95 (0.94-0.96)
2	53,750	0.94 (0.93-0.95)	0.97 (0.96-0.98)
3	53,273	0.96 (0.95-0.97)	0.97 (0.96-0.98)
4	53,604	0.99 (0.98-1.00)	0.98 (0.98-0.99)
5 (highest)	41,928	1.00 (ref)	1.00 (ref)
Missing	1,522	0.59 (0.55-0.63)	0.97 (0.93-1.01)
Rurality index			
Major urban (RIO score 0-9)	199,919	1.00 (ref)	1.00 (ref)
Non-major urban (RIO score 10-39)	45,320	0.69 (0.68-0.70)	0.76 (0.75-0.76)
Rural (RIO score 40+)	16,697	0.57 (0.56-0.58)	0.67 (0.66-0.68)
Missing	2,801	0.42 (0.40-0.45)	0.63 (0.60-0.67)
First trimester health care provider			
Prenatal OB physician care	84,553	1.00 (ref)	1.00 (ref)
Prenatal GP/FP physician care	118,520	0.84 (0.83-0.85)	0.91 (0.90-0.92)
Primary GP/FP physician care	36,684	0.66 (0.65-0.66)	0.72 (0.71-0.73)
Other physician care	7,707	0.51 (0.49-0.52)	0.65 (0.64-0.67)
Midwife only care	2,562	0.35 (0.33-0.37)	0.40 (0.38-0.43)
No care	14,711	0.14 (0.13-0.15)	0.15 (0.14-0.16)

CI = Confidence Interval; RIO = Rurality Index of Ontario; RR = Rate Ratio;
a - Row percentages are presented in this table for each characteristic

Figure 1: Screening by trimester across Ontario Regions



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