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Morbidity among resettled refugees at arrival in Ontario, Canada (1994–2017): a controlled interrupted time series study examining the effect of the Immigration Refugee Protection Act, 2002

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ABSTRACT

Background Immigration inadmissibility on medical grounds is common among high-income countries. In Canada, the Immigrant and Refugee Protection Act (IRPA) became law in 2002. With humanitarian protection as a priority, IRPA removed medical inadmissibility based on exceeding a cost threshold for the projected use of health and social services for resettled refugees. Our objective was to determine whether resettled refugees arriving in Ontario after IRPA became law (2004–2017) were more likely to exceed the cost threshold than those who arrived before (1994–2002).

Methods We linked population-based immigration (1994–2017) and healthcare data (1994–2019) in Ontario, Canada and conducted interrupted and controlled interrupted time series (ITS and CITS, respectively) analyses using segmented regression. We examined morbidity prevalence (a proxy for exceeding the cost threshold), in the pre-IRPA and post-IRPA periods among resettled refugees and three control groups—successful asylum seekers, economic immigrants and other Ontario residents. Morbidity prevalence levels and slopes across years were estimated comparing the post-IRPA to pre-IRPA period within resettled refugees and each control group (ITS), and for resettled refugees relative to each control group comparing the same periods (CITS).

Results Morbidity prevalence levels and slopes did not increase significantly within resettled refugees arriving after compared with before IRPA, nor when compared with control groups. Increasing morbidity prevalence among all immigrant groups post-IRPA suggested that subsequent policy changes linked to excessive demand policies may have impacted morbidity.

Conclusion Evolving medical inadmissibility policies suggest the need to provide a fulsome evaluation, balancing possible implications with the documented contributions immigrants make to Canada.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Many countries have medical inadmissibility immigration policies, likely motivated by the perception that immigrants with poor health and disability are undesirable and financially burdensome.

⇒ In Canada, an immigration policy in 2002 removed medical inadmissibility for resettled refugees based on the potential for 'excessive demand' of health and social services.

WHAT THIS STUDY ADDS

⇒ Morbidity prevalence, a proxy for excessive healthcare demand, did not increase among resettled refugees compared with three control groups after the 2002 immigration policy was implemented, although morbidity prevalence appeared to increase in all immigrant groups over time.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ While this policy change did not have the expected relative effect on morbidity prevalence among resettled refugees, it is difficult to know whether this relates to the implementation of this policy or subsequent policy changes that likely impacted morbidity trends in all immigrant groups.

INTRODUCTION

Immigration inadmissibility based on pre-existing health conditions and perceived disability has a long history in Canada[1] with similar policies in many other high-income countries.[2–4] A historical analysis of Canada's medical inadmissibility laws[1] describes these laws as reflecting the perception of worthwhile and burdensome citizens. Until recently,[1] two theories or models have structured Canada's medical inadmissibility laws: (1) the medical model, which views ill health or disability as a defect of the individual who must be cured or fixed and (2) the economic model, which emphasises the financial impact that ill health or disability may have on the individual, an employer or the state.

In Canada, all permanent residents (PRs) (typically 250 000–300 000 immigrants per year, but increasing steadily to 465 000 by 2025[5]) and some temporary resident applicants must undergo a mandatory medical exam to assess immigration inadmissibility based on (1) posing a danger to public health (eg, having specific infectious diseases), (2) posing a danger to public safety (eg,

at risk of violent behaviour) or (3) placing 'excessive demand' on health or social services. Excessive demand is operationalised as having a health condition which could negatively affect wait times or exceed a threshold in annual healthcare costs (until 2018, social service costs were included). On 28 June 2002, the Canadian Government legislated the Immigration & Refugee Protection Act (IRPA)[6] which, among many substantive changes to immigration policy, prioritised humanitarian protection and family reunification. As such, resettled refugees and some family-class immigrants were formally exempt from medical inadmissibility based on the potential to surpass the 'excessive demand threshold'. This health and social service cost threshold was assessed at CAD$6655/year in 2017, tripled to CAD$19 812/year in 2018[7] and in 2022 was CAD$24 057.[8]

A linked population-weighted survey study[9] found that refugees arriving under IRPA did not have significantly greater odds of non-life threatening or serious chronic conditions in comparison to the Canadian-born population. However, it is unclear if and how these chronic conditions lined up with the excessive demand threshold, if the prevalence of these conditions increased among refugees or if the prevalence differed by refugee groups after IRPA was implemented. The objective of our study was to understand whether resettled refugees arriving after IRPA implementation (between 2004 and 2017) were more likely to surpass the 'excessive demand threshold', compared with those arriving prior to this policy change (between 1994 and 2002) in Ontario, Canada. We expected that IRPA's prioritisation of 'protection-related concerns' and removal of the excessive demand criteria would translate into the admission of resettled refugees with greater morbidity and greater healthcare use. We hypothesised that an IRPA effect would be supported if there was a significant increase in morbidity prevalence among resettled refugees in the post-IRPA period compared with those who arrived in the pre-IRPA period, with no morbidity prevalence change in the control groups. We also hypothesised that IRPA may have been implemented gradually with steady increases in morbidity prevalence over time among resettled refugees compared with the control groups.

METHODS

Study design

We conducted a controlled interrupted time series (CITS) study with all resettled refugees arriving in Ontario, Canada's most populous province, and three control groups: (1) 'protected persons' (successful asylum seekers who gained PR), (2) economic immigrants and (3) other Ontario residents, between 1994 and 2017. Other Ontario residents include those not identified as PR in the Immigration, Refugees and Citizenship Canada (IRCC) Database (arrivals to Ontario between 1985 and 2017) and mostly include residents born in Ontario or Canada as well as immigrants arriving to Ontario <1985 and immigrants who arrived to other parts of Canada and remigrated to Ontario. Other Ontarians were matched 4:1 to a resettled refugee on birthdate (within 30 days), sex (male or female) and residential geography (census metropolitan area). All study subjects were Ontario residents and eligible for provincial healthcare insurance,[10] which provides access to most medically necessary healthcare services for Indigenous persons, PRs, temporary residents with work permits and Canadian citizens. Ontario's healthcare system is publicly funded with revenue raised through taxation. We excluded those who became eligible for provincial health insurance more than 4 months after their arrival date to align morbidity assessment, as closely as possible, with the assessment of excessive demand during the PR application. The outcome was assessed during the 2 years of healthcare use following either the date of PR (ie, for temporary permit holders, whose first healthcare eligibility date is before their PR date, this ensured that healthcare use aligned to PR processes) or on the date of first healthcare eligibility (ie, for those whose healthcare eligibility occurred ≤4 months after their arrival date). For other Ontarians outcome, assessment began on the same day as their matched resettled refugee. During the follow-up, study subjects were censored for death and out-migration from Ontario. Based on available data at the time of study initiation, the maximum follow-up date was 31 July 2019. See online supplemental figure S1 for details on cohort creation.

We followed relevant reporting guidelines.[11 12]

Data sources

We linked individual records across Ontario immigration, healthcare and vital statistics databases using unique encoded identifiers available at ICES (formerly the Institute for Clinical Evaluative Sciences). ICES is an independent, non-profit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyse healthcare and demographic data, without consent, for health system evaluation. Details of the administrative databases and the study measures used in this study are described in online supplemental tables S1 and S2, respectively. The healthcare registry includes information on all Ontario residents who have been eligible for publicly funded healthcare and received a health card number since 1990. There were minimal differences in characteristics between immigrants who were linked to the healthcare registry compared with those who were unlinked,[13] suggesting low linkage bias. About 92% of refugees and 82.5% of economic immigrants in the IRCC database were linked to the healthcare registry.

Immigration policy change and intervention periods

The policy change of interest was the IRPA, legislated on 28 June 2002.[6] Intervention and control groups were categorised into three groups based on the arrival date: 'pre-IRPA' (1 January 1994–28 June 2002), 'peri-IRPA' (29 June 2002–28 June 2004) and 'post-IRPA' (29 June 2004–31 December 2017).

Intervention and control groups

The intervention group consisted of all persons arriving as resettled refugees. We included three control groups for whom the 'excessive demand' policy was either not applicable (protected persons (successful asylum seekers), other Ontarians) or remained in effect after IRPA was implemented. We stratified analyses according to age at immigration: adults (≥19 years of age) and children (0–18 years of age).

Outcome

Morbidity prevalence was measured using The Johns Hopkins ACG System[14] which categorises healthcare users into Resource Utilisation Band (RUB) categories (non-users (0) to very high resource users (5)) based on hospitalisations, emergency department visits and physician visits during the 2 years of follow-up. RUB assignment was further dichotomised to identify the proportion who were in the 'moderate to very high' RUB (3–5) categories, referred to as 'morbidity prevalence' throughout. We determined this threshold to be a reasonable measure of the excessive demand threshold[7 15] (online supplemental table S3). We also conducted sensitivity analyses using high to very high RUBs (4–5) (online supplemental table S3).

Sociodemographic variables

Sociodemographic variables for all study members included sex (female or male), age category (children: 0–6, 7–12, 13–18 years; adults: 10-year intervals) and neighbourhood material deprivation quintile (1=low marginalisation to 5=high marginalisation).[16] For immigrants, among adults, we examined education level and marital status at arrival, and for both children and adults, we examined 12 world regions of birth.

Analyses

Interrupted time-series (ITS) analyses (ie, uncontrolled) were conducted[17] to examine level and slope changes in morbidity prevalence separately among resettled refugees and the control groups in the post-IRPA compared with the pre-IRPA periods. Weighted segmented linear models were used to regress morbidity prevalence against year of admission, weighting by the corresponding population. Segmented regression models were fitted for the pre-IRPA and post-IRPA periods, separately by immigration category. The peri-IRPA period was excluded from regression analyses since immigrants arriving in this period were likely a combination of those whose immigration application was assessed both before and after IRPA implementation. Relevant intercepts and slopes were computed. A discontinuity in the prevalence level was estimated by extrapolating fitted morbidity values forward from the pre-IRPA period and backward from the beginning of the post-IRPA period to the midpoint of the washout period 28 June 2003.

Next, we conducted CITS analyses using segmented weighted linear regression, comparing resettled refugees with each of the control groups in separate models. We tested for both relative slope (post-IRPA vs pre-IRPA periods) and relative morbidity prevalence level (discontinuity at the extrapolated midpoint, as described above) changes. All p values were two sided and reported at a 0.05 significance level.

Since the excessive demand threshold is measured in dollars but healthcare cost data were not available in Ontario prior to 2002, we supplemented the above analyses by estimating healthcare costs[18] in the first 2 years after arrival for immigrants (and matched other Ontarians) arriving between 2015 and 2017. Average crude and age–sex standardised (using the 2017 Ontario population as the standard) per capita healthcare costs for each study group were compared with the excessive demand threshold for 2017.[7]

Sensitivity analyses

In sensitivity analysis, we adjusted for age and sex, as there may have been shifts in the sex and age distributions over time independent of IRPA. We conducted two additional sensitivity analyses: (1) using a stricter definition of morbidity (RUB 4–5) and (2) by refugee resettlement group, specifically government-assisted, privately sponsored and blended-visa office referred refugees since these three groups are selected differently for immigration.[19–21]

RESULTS

Descriptive characteristics

The proportion of resettled refugees and protected persons in older age groups (50+) was higher in the post-IRPA compared with the pre-IRPA era, while for economic immigrants the distribution of the population among age groups remained similar (tables 1 and 2). A greater proportion of adult resettled refugees had a secondary education or less at arrival in the post-IRPA era compared with the pre-IRPA era while a greater proportion of adult protected persons and economic immigrants had some or completed university in the post-IRPA era. About half of all adults and children arriving as resettled refugees and protected persons in both eras lived in the highest deprivation neighbourhoods.

Interrupted time series modelling

For adults (table 3, figure 1), there was no significant increase in morbidity prevalence among resettled refugees or in any of the control groups at the time of IRPA implementation nor were there any significant comparative level or slope increases in the post-IRPA versus pre-IRPA eras.

For children (table 3, figure 2), there was no significant morbidity prevalence increase for resettled refugees (1.77 (−2.44, 5.97)) while among the comparison groups there was a significant increase among protected persons (5.50 (1.76, 9.23)) and other Ontarians (2.42 (0.56, 4.29)). There was a significant decrease among economic immigrants (−3.83 (−5.14, –2.53)) which is what led to the significantly greater comparative increase in morbidity prevalence in resettled refugee children vs economic immigrant children in the post-IRPA versus pre-IRPA era (5.60 (1.20–10.0)). While morbidity prevalence slopes were greater in the post-IRPA versus pre-IRPA eras for resettled refugee children and all control groups; the comparative slope was only significantly higher in comparison to other Ontario residents (0.94 (0.30, 1.57)).

Both crude and age–sex standardised 2-year per capita healthcare costs for resettled refugees (CAD$3671.20 and CAD$6548.17) arriving between 2015 and 2017, were lower than the excessive demand threshold cited by the Government of Canada for 2017 (CAD$6655) (online supplemental table S4).

Sensitivity analyses

Adjustment for age and sex in ITS and CITS regression analyses among adults and children (online supplemental tables S5 and S6) did not change the interpretation of our main findings.

Observed and fitted trends in RUB 4–5 prevalence among resettled refugee adults and children (online supplemental figures S1 and S2 and online supplemental tables S7 and S8, respectively) do not suggest that RUB 4–5 prevalence among resettled refugee adults or children increased after IRPA implementation.

When we examined resettled refugee subgroups separately, we also found no evidence that RUB 3–5 prevalence among adults or children increased after IRPA was implemented (results not shown).

DISCUSSION

Summary of main findings

We found that IRPA and the removal of inadmissibility based on excessive demand for health and social services for resettled refugees in 2002 did not result in relative increases in morbidity prevalence among resettled refugee children and adults. We found no significantly greater comparative increases in morbidity prevalence between resettled refugees compared with any of the control groups arriving in the post-IRPA compared with pre-IRPA era. The lack of significant comparative slope results does not support the possibility of IRPA being implemented gradually. Our findings were similar when we examined more severe morbidity. Finally, even many years after IRPA was implemented (2015–2017), resettled refugees' annual per capita healthcare costs in the first 2 years did not surpass the 2017 excessive demand threshold.

Comparison with previous research

In a separate study,[22] we found evidence suggesting refugees (resettled refugees and protected persons combined) with a

Table 1 Characteristics of adults (19+ years) arriving as resettled refugees, protected persons and economic immigrants in Ontario before and after the implementation of the Immigration Refugee Protection Act (IRPA) (28 June 2002) and other Ontarians matched 4:1 to resettled refugee adults, N (% of column) unless otherwise indicated

	Pre-IRPA arrivals (1 January 1994–28 June 2002)				Post-IRPA arrivals (29 June 2004–31 March 2017)			
Characteristics	Resettled refugees	Protected persons	Economic immigrants	Other Ontarians*	Resettled refugees	Protected persons	Economic immigrants	Other Ontarians*
N	22 236	39 573	286 922	88 943	41 456	69 144	367 706	165 779
Sex								
Female	10 243 (46.1)	16 729 (42.3)	135 777 (47.3)	40 971 (46.1)	20 633 (49.8)	33 431 (48.3)	189 541 (51.5)	82 526 (49.8)
Male	11 993 (53.9)	22 844 (57.7)	151 145 (52.7)	47 972 (53.9)	20 823 (50.2)	35 713 (51.7)	178 165 (48.5)	83 253 (50.2)
Age category†								
19–29 years	8720 (39.2)	15 747 (39.8)	76 089 (26.5)	34 890 (39.2)	14 693 (35.4)	20 686 (29.9)	99 097 (27.0)	58 806 (35.5)
30–49 years	11 822 (53.2)	19 663 (49.7)	201 380 (70.2)	47 285 (53.2)	19 673 (47.5)	37 725 (54.6)	247 572 (67.3)	78 623 (47.4)
50–59 years	1124 (5.1)	1962 (5.0)	8076 (2.8)	4490 (5.0)	4054 (9.8)	6033 (8.7)	19 332 (5.3)	16 226 (9.8)
60–69 years	472 (2.1)	1383 (3.5)	1041 (0.4)	1883 (2.1)	1946 (4.7)	2815 (4.1)	1586 (0.4)	7766 (4.7)
70–79 years	86 (0.4)	719 (1.8)	238 (0.1)	347 (0.4)	869 (2.1)	1557 (2.3)	110 (0.0)	3468 (2.1)
80+ years	12 (0.1)	99 (0.3)	98 (0.0)	48 (0.1)	221 (0.5)	328 (0.5)	9 (0.0)	890 (0.5)
Education at arrival								
Secondary or Less	12 444 (56.0)	25 927 (65.5)	52 277 (18.2)	n/a	30 682 (74.0)	36 421 (52.7)	52 217 (14.2)	n/a
Trade/non-university diploma	4990 (22.4)	6366 (16.1)	47 981–47 985§	n/a	3899 (9.4)	12 855 (18.6)	48 126 (13.1)	n/a
Some or completed university	4802 (21.6)	7280 (18.4)	186 662 (65.1)	n/a	6120 (14.8)	19 701 (28.5)	255 603 (69.5)	n/a
Missing	0 (0.0)	0 (0.0)	1–5‡	n/a	755 (1.8)	167 (0.2)	11 760 (3.2)	n/a
Marital status at arrival								
Single	7566 (34.0)	16 309 (41.2)	70 003 (24.4)	n/a	36 (0.1)	17 (0.0)	62 (0.0)	n/a
Married, common-law	13 569 (61.0)	19 354 (48.9)	208 883 (72.8)	n/a	14 066 (33.9)	25 011 (36.2)	113 610 (30.9)	n/a
Separated, divorced or widowed	1096–2000§	3896 (9.8)	7972 (2.8)	n/a	24 219 (58.4)	35 475 (51.3)	246 182 (67.0)	n/a
Missing	1-5‡	14 (0.0)	64 (0.0)	n/a	3135 (7.6)	8641 (12.5)	7852 (2.1)	n/a
World region of birth								
Caribbean	46 (0.2)	609 (1.5)	7699 (2.7)	n/a	22 (0.1)	5296 (7.7)	6832 (1.9)	n/a
Central America	321 (1.4)	912 (2.3)	1916–1920§	n/a	17 (0.0)	2595 (3.8)	2838 (0.8)	n/a
South America	253 (1.1)	1202 (3.0)	6780 (2.4)	n/a	529 (1.3)	10 732 (15.5)	9412 (2.6)	n/a
Eastern Europe, USSR (former)	164 (0.7)	4887 (12.3)	42 268 (14.7)	n/a	240 (0.6)	6142 (8.9)	24 196 (6.6)	n/a
Middle East/North Africa	5377 (24.2)	6116 (15.5)	25 839 (9.0)	n/a	25 297 (61.0)	7083 (10.2)	45 106 (12.3)	n/a
West/Central/East/ South Africa, Africa unspecified	1956 (8.8)	7064 (17.9)	7449 (2.6)	n/a	7138 (17.2)	13 083 (18.9)	11 880 (3.2)	n/a
South Asia	3540 (15.9)	14 799 (37.4)	71 280 (24.8)	n/a	6586 (15.9)	13 666 (19.8)	113 695 (30.9)	n/a
Australasia, Southeast Asia and Oceania/Asia unspecified	635 (2.9)	156–160§	23 163 (8.1)	n/a	1489 (3.6)	435 (0.6)	74 154 (20.2)	n/a
East Asia	39 (0.2)	1991 (5.0)	79 519 (27.7)	n/a	48 (0.1)	7780 (11.3)	54 187 (14.7)	n/a
Europe other, Yugoslavia (former)	9896 (44.5)	1831 (4.6)	18 138 (6.3)	n/a	88 (0.2)	2324 (3.4)	20 541 (5.6)	n/a
North America, Western Hemisphere	1-5‡	1-5‡	2865 (1.0)	n/a	1-5‡	8 (0.0)	4865 (1.3)	n/a
Not stated	7–11§	0 (0.0)	1–5‡	n/a	1–5‡	0 (0.0)	0 (0.0)	n/a
Material resources quintile†								
1 (low marginalisation)	916 (4.1)	1896 (4.8)	41 230 (14.4)	20 923 (23.5)	1826 (4.4)	3914 (5.7)	52 531 (14.3)	41 338 (24.9)
2	2178 (9.8)	2872 (7.3)	44 084 (15.4)	18 683 (21.0)	2447 (5.9)	5080 (7.3)	50 436 (13.7)	33 994 (20.5)
3	2258 (10.2)	5222 (13.2)	50 783 (17.7)	16 478 (18.5)	5612 (13.5)	8581 (12.4)	62 236 (16.9)	29 691 (17.9)
4	4590 (20.6)	9004 (22.8)	66 022 (23.0)	15 512 (17.4)	9416 (22.7)	15 148 (21.9)	85 697 (23.3)	28 615 (17.3)
5 (high marginalisation)	10 864 (48.9)	19 863 (50.2)	79 366 (27.7)	15 793 (17.8)	21 980 (53.0)	36 093 (52.2)	115 449 (31.4)	31 457 (19.0)
Missing	1430 (6.4)	716 (1.8)	5437 (1.9)	1554 (1.7)	175 (0.4)	328 (0.5)	1357 (0.4)	684 (0.4)

*Matched to resettled refugees 4:1 on birthdate (within 30 days), sex (M or F) and residential geography.
†Assigned at the time Resource Utilisation Band (RUB) assessment began.
‡Small cells (<6) suppressed in accordance with ICES (formerly the Institute for Clinical Evaluative Sciences) policy.
§Non-missing data, reported as ranges without percentage to reduce risk of reidentification in accordance with ICES (formerly the Institute for Clinical Evaluative Sciences) policy.
n/a, not available.

Table 2 Characteristics of children (0–18 years) arriving as resettled refugees, protected persons and economic immigrants in Ontario before and after the implementation of the Immigration Refugee Protection Act (IRPA) (28 June 2002) and other Ontarians matched 4:1 to resettled refugee children, N (% of column) unless otherwise indicated.

	Pre-IRPA arrivals (1 January 1994–28 June 2002)				Post-IRPA arrivals (29 June 2004–31 March 2017)			
Characteristics	Resettled refugees	Protected persons	Economic immigrants	Other Ontarians*	Resettled refugees	Protected persons	Economic immigrants	Other Ontarians*
N	13175	13047	137473	52701	29419	16667	155300	117719
Sex								
Female	6178 (46.9)	6195 (47.5)	65601 (47.7)	24713 (46.9)	14206 (48.3)	8125 (48.7)	73466 (47.3)	56829 (48.3)
Male	6997 (53.1)	6852 (52.5)	71872 (52.3)	27988 (53.1)	15213 (51.7)	8542 (51.3)	81834 (52.7)	60890 (51.7)
Age group†								
0–6 years	4656 (35.3)	3223 (24.7)	51700 (37.6)	18637 (35.4)	10961 (37.3)	3538 (21.2)	58402 (37.6)	43967 (37.3)
7–12 years	4577 (34.7)	5160 (39.5)	50580 (36.8)	18304 (34.7)	9972 (33.9)	6622 (39.7)	53374 (34.4)	39854 (33.9)
13–18 years	3942 (29.9)	4664 (35.7)	35193 (25.6)	15760 (29.9)	8486 (28.8)	6507 (39.0)	43524 (28.0)	33898 (28.8)
World region of birth								
Caribbean	24 (0.2)	69 (0.5)	2975 (2.2)	n/a	13 (0.0)	1068 (6.4)	2697 (1.7)	n/a
Central America	212 (1.6)	309 (2.4)	820 (0.6)	n/a	15 (0.1)	956 (5.7)	920–924‡	n/a
South America	143 (1.1)	449 (3.4)	3037 (2.2)	n/a	534 (1.8)	3145 (18.9)	2887 (1.9)	n/a
Eastern Europe, USSR (former)	108 (0.8)	1400 (10.7)	18144 (13.2)	n/a	675 (2.3)	1029 (6.2)	7660 (4.9)	n/a
Middle East/North Africa	2911 (22.1)	2225 (17.1)	22564 (16.4)	n/a	17926 (60.9)	2037 (12.2)	29077 (18.7)	n/a
Western/Central/East/ South Africa, Africa unspecified	993 (7.5)	2807 (21.5)	3790 (2.8)	n/a	4552 (15.5)	3417 (20.5)	5523 (3.6)	n/a
South Asia	3043 (23.1)	4954 (38.0)	33563 (24.4)	n/a	3806 (12.9)	3023 (18.1)	46487 (29.9)	n/a
Australasia, Southeast Asia and Oceania/Asia unspecified	211 (1.6)	33 (0.3)	9964 (7.2)	n/a	1250 (4.2)	68 (0.4)	28224 (18.2)	n/a
East Asia	40 (0.3)	139 (1.1)	28347 (20.6)	n/a	22 (0.1)	813 (4.9)	14887 (9.6)	n/a
Europe other, Yugoslavia (former)	5474 (41.5)	571 (4.4)	9552 (6.9)	n/a	604 (2.1)	672 (4.0)	9607 (6.2)	n/a
North America, Western Hemisphere	14–18‡	91 (0.7)	4717 (3.4)	n/a	22 (0.1)	439 (2.6)	7328 (4.7)	n/a
Not stated	1–5§	0 (0.0)	0 (0.0)	n/a	0 (0.0)	0 (0.0)	1–5§	n/a
Material resources quintile†								
1 (low marginalisation)	473 (3.6)	467 (3.6)	18581 (13.5)	12832 (24.3)	1002 (3.4)	773 (4.6)	18269 (11.8)	30497 (25.9)
2	1168 (8.9)	768 (5.9)	21285 (15.5)	11006 (20.9)	1318 (4.5)	1009 (6.1)	20299 (13.1)	24352 (20.7)
3	1306 (9.9)	1492 (11.4)	24143 (17.6)	9311 (17.7)	4324 (14.7)	1897 (11.4)	26208 (16.9)	19781 (16.8)
4	2714 (20.6)	2734 (21.0)	30641 (22.3)	8486 (16.1)	6659 (22.6)	3321 (19.9)	35936 (23.1)	18989 (16.1)
5 (high marginalisation)	6901 (52.4)	7381 (56.6)	40433 (29.4)	10281 (19.5)	16084 (54.7)	9606 (57.6)	54205 (34.9)	23665 (20.1)
Missing	613 (4.7)	205 (1.6)	2390 (1.7)	785 (1.5)	32 (0.1)	61 (0.4)	383 (0.2)	435 (0.4)

*Matched to resettled refugees 4:1 on birthdate (within 30 days), sex (M or F) and residential geography.
†Assigned at the time Resource Utilisation Band assessment began.
‡Non-missing data reported as ranges without percentage to reduce risk of reidentification in accordance with ICES (formerly the Institute for Clinical Evaluative Sciences) policy.
§Small cells (<6) suppressed in accordance with ICES (formerly the Institute for Clinical Evaluative Sciences) policy.
n/a, not available.

manageable maternal morbidity were more likely to be admitted after IRPA became law than before. Another study[9] found refugees who arrived under IRPA had lower or similar odds of chronic conditions compared with a Canadian-born reference population; however, this study did not compare refugees in relation to IRPA. We could not find additional studies in Canada or elsewhere exploring the impact of medical inadmissibility policies on the health of immigrants at arrival or early in resettlement.

Understanding our findings

There are several potential reasons for our findings. First, applicants' immigration medical exam (IME) data and the calculation visa officers used to assess excessively were not available for analysis. Second, we used data collected over the 2 years following arrival to measure morbidity, therefore, some healthcare use during this period may be based on incident, rather than conditions present prior to arrival. Differential development of incident conditions across groups may have dampened differences. Third, the prevalence of our main measure of morbidity (RUBs 3–5) was high (~50%) which is inconsistent with the understanding that exceeding demand for health and social services leading to inadmissibility is an infrequent occurrence.[23] However, our sensitivity analyses using more severe morbidity (RUB 4–5) also do not demonstrate an IRPA effect. A fourth possible reason may that neither the United Nations High Commissioner for Refugees who refer government-assisted refugees for resettlement nor those who refer refugees for private sponsorship to Canada implemented changes in their selection processes in response to IRPA. Finally, it is possible that resettled refugees who would surpass the excessive demand threshold did not, or could not, apply for resettlement since high levels of morbidity may be a barrier or act as a deterrent to participating in immigration processes.

Table 3 Level and slope changes in morbidity prevalence (Resource Utilisation Bands (RUBs) 3–5): interrupted time series (ITS) and comparative interrupted time series (CITS) results among resettled refugees and control groups, adults (19+ years) and children (0–18 years)

			Adults		Children	
Model #	Intervention (I), control (C) group	Analytical approach	Level changes at IRPA implementation % RUB 3–5 (95% CI)	Slope changes post-IRPA vs pre-IRPA % RUB 3–5 (95% CI)	Level changes at IRPA implementation % RUB 3–5 (95% CI)	Slope changes post-IRPA vs pre-IRPA % RUB 3–5 (95% CI)
1	Resettled refugees (I)	ITS	3.41 (–2.81, 9.62)	0.70 (–0.21, 1.60)	1.77 (–2.44, 5.97)	**1.56 (0.92, 2.20)**
	Protected persons (C)	ITS	0.82 (–1.90, 3.53)	**0.97 (0.51, 1.42)**	**5.50 (1.76, 9.23)**	**1.27 (0.66, 1.89)**
	Resettled refugees vs protected persons	CITS	2.59 (–2.41, 7.59)	–0.27 (–1.03, 0.49)	–3.73 (–9.05, 1.59)	0.29 (–0.56, 1.13)
2	Resettled refugees (I)	ITS	3.41 (–2.81, 9.62)	0.70 (–0.21, 1.60)	1.77 (–2.44, 5.97)	**1.56 (0.92, 2.20)**
	Economic immigrants (C)	ITS	**–1.65 (–3.25, -0.04)**	**0.85 (0.59, 1.11)**	–3.83 (–5.14, - 2.53)	**1.26 (1.04, 1.47)**
	Resettled refugees vs economic immigrants	CITS	5.05 (–1.37, 11.48)	–0.15 (–1.09, 0.79)	**5.60 (1.20, 10.0)**	0.31 (–0.37, 0.98)
3	Resettled refugees (I)	ITS	3.41 (–2.81, 9.62)	0.70 (–0.21, 1.60)	1.77 (–2.44, 5.97)	**1.56 (0.92, 2.20)**
	Other Ontarians (C)	ITS	1.66 (–0.39, 3.70)	0.04 (–0.26, 0.33)	**2.42 (0.56, 4.29)**	**0.63 (0.34, 0.91)**
	Resettled refugees vs other Ontarians	CITS	1.75 (–2.82, 6.32)	**0.66 (0.00, 1.32)**	–0.66 (–4.83, 3.52)	**0.94 (0.30, 1.57)**

Bolded values are statistically signficant.
IRPA, Immigrant and Refugee Protection Act.

While we did not find evidence supporting our hypotheses related to IRPA, we note a clear inflection point and a sustained upward trend in morbidity prevalence for all immigrant groups, not seen among other Ontarians, that begins shortly after IRPA was implemented and continues throughout the post-IRPA period. Quantitatively, we can see this by the significant slope increases among resettled refugees compared with other Ontarians in the post-IRPA versus pre-IRPA eras (ie, table 3—adults 0.66 (0.00–1.32), children 0.94 (0.30–1.57), data not shown—adult GARs/BVORs 1.05 (0.27–1.82), children GARs/BVORs 1.28 (0.41–2.14)). We did not assess slope increases for protected persons or economic class immigrants relative to other Ontarians, but a visual inspection of figures 1 and 2 suggests these are likely to be at least clinically significant. These findings may be indicative of a successful Supreme Court of Canada challenge in 2005 which caused 'a dramatic shift in the legal landscape for medical inadmissibility referrals'.[24] In 2008, visa officers changed how medical inadmissibility was assessed, implementing a procedure for applicants to contest medical inadmissibility. This is described as a move from a 'narrow and often generic focus on problems and costs' to a more individualised admissions process that considers context.[25 26] This change in procedure may have led to the gradual post-IRPA increases in morbidity prevalence we see across all refugee and immigrant categories.

STRENGTHS AND LIMITATIONS

Our study has several strengths. CITS analyses are considered a robust and effective statistical methodology to evaluate interventions implemented at a defined point in time.[17] We had 8 years of immigrant arrival cohorts pre-IRPA implementation to establish a baseline for morbidity prevalence and 13 years of immigrant arrival cohorts post-IRPA implementation to examine the potential impact of IRPA. In terms of limitations, economic immigrants (one of our comparison groups) has a relatively lower

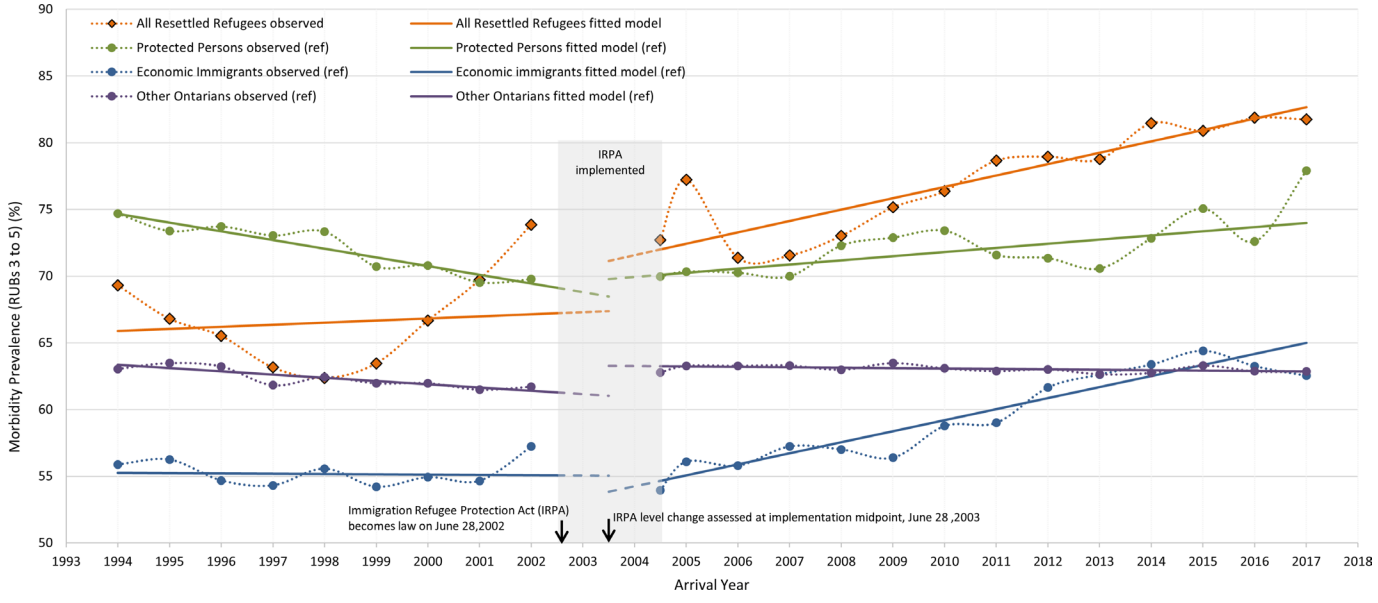

Figure 1 Adults arriving as resettled refugees in Ontario, Canada (1994–2017) compared with those arriving as protected persons, economic immigrants and matched other Ontarians—observed and fitted morbidity (resource utilisation band (RUB) 3–5) prevalence, before (1994–2002) and after (2004–2017) implementation of the IRPA (28 June 2002).

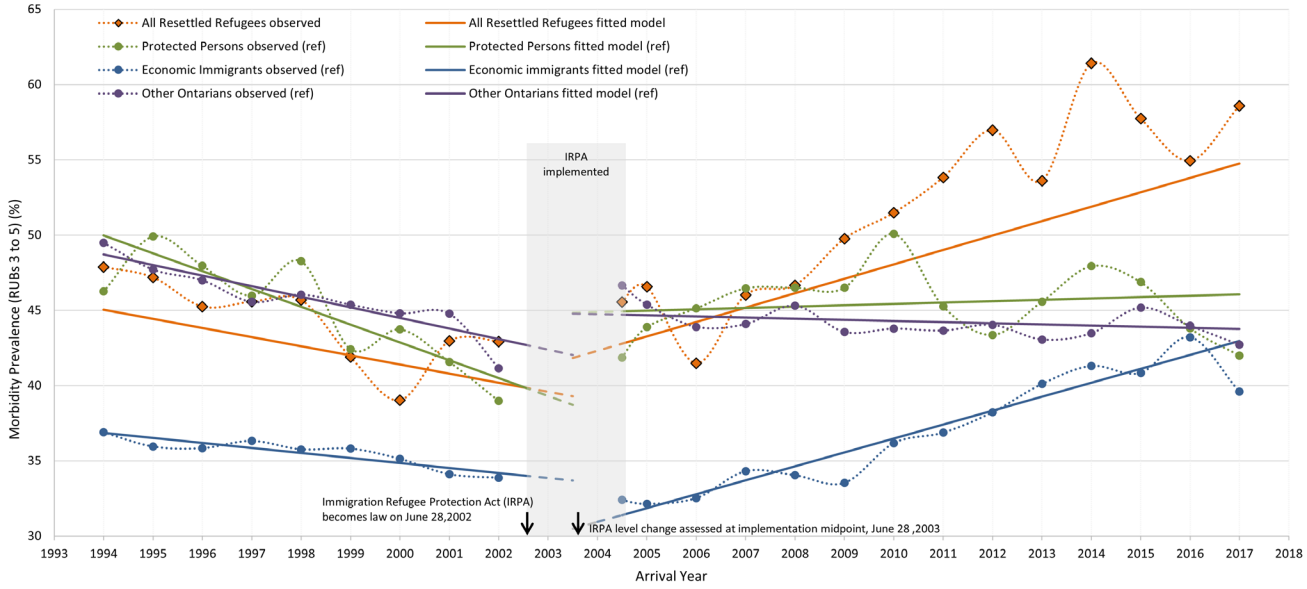

Figure 2 Children arriving as resettled refugees arriving in Ontario, Canada (1994–2017) compared with those arriving as protected persons, economic immigrants and matched other Ontarian children—observed and fitted morbidity (resource utilisation band (RUB) 3–5) prevalence, before (1994–2002) and after (2004–2017) implementation of the IRPA (28 June 2002).

linkage rate to the healthcare registry (83%) than other groups,[13] which is likely because this group is more mobile and may not reside in Ontario and because there is a larger proportion of East Asian immigrants with a limited number of distinct surnames making linkage more challenging. Importantly, the linkage rate for economic immigrants did not vary much across immigration years. Since excessive demand is measured in dollars it would have been ideal to measure healthcare costs throughout the study period; however, healthcare costs data are not available in Ontario prior to 2002. During the study period, the excessive demand threshold included average costs related to physician and hospital services, lab tests, pharmaceutical drugs and social services; however, data on outpatient lab tests, some drugs and social service use costs were not available to incorporate into our threshold. These costs are expected to be minimal in comparison to physician and hospital services but are also highly correlated with physician services and hospital use so even if these data were available, they are unlikely to differentially (across time and groups) impact the patterns we observed. Finally, we did not account for matching in the model comparing resettled refugees and other Ontario residents. Matching would have created wider confidence intervals. We found differences only in the pre–post slope changes in children and these were large enough that accounting for matching would not change the findings.

Conclusion

We did not find evidence that IRPA led to an increase in the prevalence of morbidity among resettled refugees. Moreover, 2-year per capita healthcare costs for resettled refugees arriving between 2015 and 2017 were lower than the 2017 excessive demand threshold. We noted a significant rise in morbidity prevalence throughout the post-IRPA period affecting all immigrant groups which is possibly related to a policy change in 2005 changing how excessive demand was assessed for all immigrants. Recently (2018–2022), the Government of Canada has acknowledged that the excessive demand provision was a barrier to entry for many immigrants with otherwise manageable health conditions.[27] Accordingly, in March 2022,[28] the excessive demand threshold was raised to three times that of an average Canadian's costs and special education and related services were excluded. These policies were motivated by a desire to align regulations with 'Canadian values' and inclusion of persons with disabilities.[27] This statement may be considered a recognition of the social model of health and disability[1] which describes that disability is caused by the way society is organised rather than a person's impairment. Given continued changes to medical inadmissibility policies related to excessive demand, there is a need to provide a fulsome evaluation which balances the possible implications for the health and social care of immigrants with the documented contributions immigrants make to communities across Canada.

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Contributors SW, AG, TS, HL and NRS conceived of and designed the study and along with HL and TS developed the methodological approach. SW conducted the literature search and synthesised the existing literature. HL conducted formal analysis and SW developed the figures and data visualisation. SW and AG wrote the original draft and SW, AG, TS, HL, MH and NRS contributed to the interpretation of the data. AG acquired funding. All authors revised it critically for important intellectual content, have approved the final version to be published and are accountable for all aspects of the work. AG is the guarantor.

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Patient consent for publication Not applicable.

Ethics approval This study involves human participants. We linked individual records across Ontario immigration, healthcare and vital statistics databases using unique encoded identifiers available at ICES. ICES is an independent, non-profit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyse healthcare and demographic data without consent for health system evaluation.

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Data availability statement Data may be obtained from a third party and are not publicly available. The dataset from this study is held securely in coded form at ICES. While legal data sharing agreements between ICES and data providers (eg, healthcare organisations and government) prohibit ICES from making the dataset publicly available, access may be granted to those who meet prespecified criteria for confidential access, available at https://www.ices.on.ca/DAS (email: das@ices.on.ca). The full dataset creation plan and underlying analytical code are available from the authors on request, understanding that the computer programmes may rely on coding templates or macros that are unique to ICES and are therefore either inaccessible or may require modification.

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