Induced abortion among immigrant women admitted in Quebec between 1997 and 2006

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1. Introduction

Fertility decline under replacement level is the result of the decision to reduce family size as well as the diffusion of more effective means of birth control. Canada is one of the countries that have first experienced these transformations. Modern contraception -poorly developed before the Second World War- quickly became a regular practice, even considering that, until 1969, the Criminal Code prohibited contraceptive purchase and dissemination of information. During the 1970's, contraception is freed from legal constraints, chirurgical sterilization become available and induced abortion is allowed, first under certain restrictions and since 1988 without impediments[1]. As Bélanger and Ouellet (2006) have pointed out, Canada's family planning system plays an important role in reducing barriers to contraception and in promoting access to information as soon as the young become sexually active. In addition, medical interventions such as sterilization and abortion are covered by the public health insurance. These measures explain the rapidity of transformations and the reduction of socioeconomic disparities.

Changes have been more dramatic in the French Canadian province of Quebec, where the Catholic Church --who is opposed to modern contraceptive methods -- had historically controlled health institutions. Even if Quebec had the lowest level of contraceptive use, few years later the province was leading country trends (Guibert-Lantoine, 1990, Krishnan and Martin, 2004). Induced abortion have also shown a significant growth: Quebec was the province which in 2005 held the largest number of legal abortions per 100 births (38.3%) (Statistique Canada, 2008)

Another phenomenon must be taken into account when anticipating Quebec's present and future trends. During the last decades there has been an increase in the proportion of women in reproductive ages that were born outside Canada: it rose from 8.5% in 1991 to 10.2% in 2001. Recent studies show that women born abroad show a higher fertility (Bélanger and Gilbert, 2006; Bélanger and Malenfant, 2006; Street, 2009). In 2001, the total fertility rate of foreign women living in Quebec was higher than that of non-immigrant women (2.05 and 1.49 respectively), particularly those who were born in other region than Europe.

[1] In 1969 a woman could only obtain an abortion for health reasons. In 1988, with the removal of abortion from the Criminal Code, a reason for obtaining an abortion was no longer required

Up to now, we don't know to what extent these fertility trends also reflect variations on women reproductive behaviours and contraceptive practices. Do women born abroad use modern methods with the same intensity and regularity as Canadian women do? Do they adopt sterilization once they have had the number of children they want? What is the likelihood that women will choose abortion if they have an unwanted pregnancy?

Living in a society where contraceptive methods and medical interventions (as sterilisations and surgical abortions) are not only available but also covered by the public health insurance could directly encourage their adoption. However, when it comes to an abortion, decisions may also depend on norms and values, determined by religious affiliation and institutional context (Bankole et al, 1998; Nahmias, 2004; Westoff, 2000). For some women, the recourse to induced abortion may not be an alternative even if it is legal; for others, abortion can be seen as legitimate mean to avoid an unwanted pregnancy whatever the obstacles.

The aim of this study is to determine to what extent immigrant women living in Quebec terminate a pregnancy through an induced abortion during the first ten years after arrival. We estimate the likelihood that women have an induced abortion[2] considering the effect of socio-demographic characteristics which proved to have an effect on pregnancy outcomes, as age, marital status and country of origin (a *proxy* to cultural and social backgrounds). We approach the effect of socio-economic characteristics by considering their immigrant status, educational attainment and language skills at time of admission in Quebec.

We describe the dataset and the target population in the following section. In section 3 we define the dependent and the independent variables and the statistical model. Section 4 includes the results for the fitted models and their interpretation. We conclude with a summary of our main findings.

[2] By induced abortions we mean surgical abortions. Medical abortion drugs are not considered in this study.

2. Methodology

2.1 Dataset

Quantitative studies on induced abortion are generally based on survey data among users, which normally raises the problem of under-reporting (Jones and Kost, 2007). By contrast, our study is based on two administrative files that ignore this limitation: databank from the *Régie de l'assurance maladie du Québec* (RAMQ) and databank from the *Ministère de l'Immigration et des Communautés culturelles* (MICC).

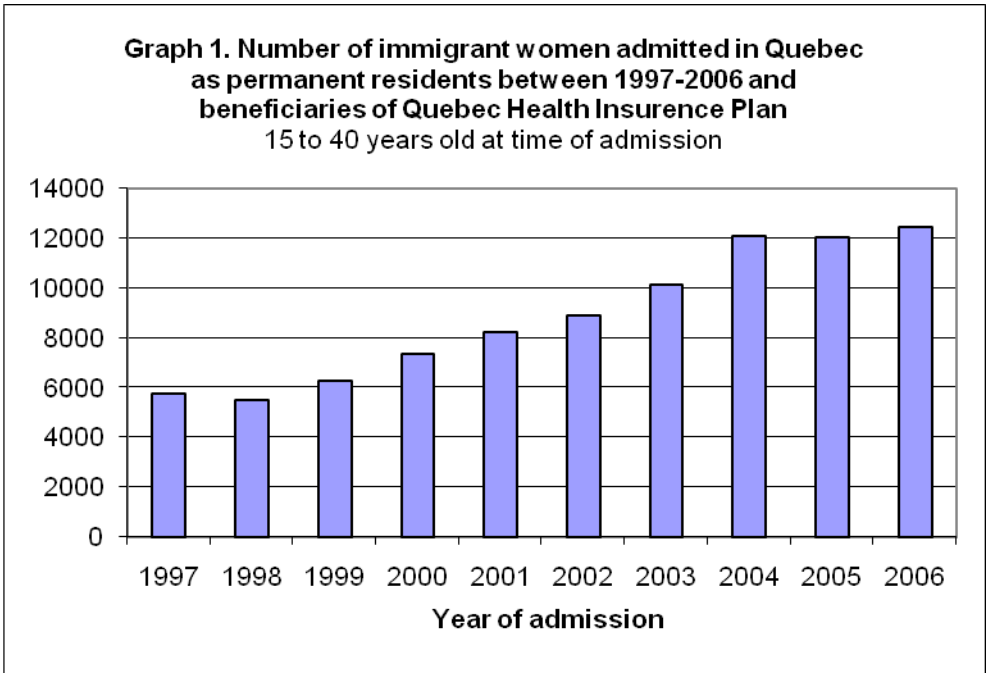
Permanent residents admitted in Quebec are eligible for the Quebec Health Insurance Plan three months after applying for registration (even if they are a Canadian citizen). This is an important fact because only insured persons can obtain medical services free of charge in Quebec[3]. However, healthcare services related to pregnancy, childbirth and termination of pregnancy are also covered during the waiting period[4]. Medical services are covered regardless of where they are performed, such as: private clinics; hospitals; rehabilitation centers; long-term care facilities, primary health centers and patient's home.

RAMQ databanks periodically update personal information on insured persons –insured persons registration file– and health services covered by the Health Insurance Plan –roster of paid services file–[5]. This makes possible to track all birth deliveries, surgical and spontaneous abortions among beneficiaries. This databank also provides information on age and sex of beneficiaries.

MICC databank in turn collects socio-demographic information on all permanent admissions in Quebec. The constitution of our dataset was possible due to the fact that the *MICC* annually match this databank to the *RAMQ* insured persons registration file in order to determine whether the immigrant population of Quebec is still living in the province ten years after arrival (MICC, 2007). In order to protect confidentiality, we obtained a favourable opinion from the *Commission d'accès à l'information du Quebec,* which is responsible for respecting access to documents held by public bodies and the protection of personal information.

[3] The medical services covered by the Health Insurance Plan are those that are medically necessary and rendered by a general practitioner (also called a "family doctor") or a medical specialist.
[4] To remain covered by the Quebec Health insurance plan as a person arriving in Quebec from outside Canada, insured persons must not spend 183 days or more (consecutive or not) outside Quebec during the 12 months following the date the coverage began. Absences of 21 days or less are not included in this calculation
[5] In French, they are called « fichier des personnes assurées (FIPA) » and «services rémunérés à l'acte ».

Our dataset was compiled using the same matching procedure that is applied by *MICC* for its own purposes. The final dataset contains raw information on socio-demographic and medical characteristics of immigrant women that obtained a legally induced abortion in Quebec. We focus on permanent resident women admitted in Quebec between January 1997 and December 2006 at age 15 to 40 and eligible for Quebec Health Insure Plan. We tracked all medical interventions related to a pregnancy or a termination of pregnancy since date of admission until December 2006. The dataset has been processed by the author.



2.3 Outcome variable

Induced abortion can be seen as the result of a process comprising the following phases: exposure to sexual intercourse, use of contraception, risk of pregnancy, prevention of birth when pregnancy is unwanted and access to abortion services. The study of induced abortion should consider the effect of all factors involved in each of these phases (Rossier *et.al*, 2007). However, available data focus on the latter, i.e. the recourse to abortion when pregnancy has been detected.

As we have mentioned above, the RAMQ databank records all medical interventions that are covered by the Quebec Health Insured Plan. This includes information about the *act code*[6]; *diagnostic code*; *date of occurrence; region of occurrence*, the *type of institution* and the medical personnel who performed the intervention.

For the purpose of this study, RAMQ extracted all interventions that corresponded to a selected list of *act codes* (see appendix for list of codes, Table A). We grouped each medical intervention considering the *act code* and the *date of occurrence*[7]. The three possible outcomes are: 1) birth delivery, 2) induced abortion (including all gestational ages); 3) spontaneous abortion (see appendix, Tables B).

We recorded 54 988 medical interventions corresponding to a birth delivery or a termination of pregnancy within the target population; 23% ended in induced abortion while 7% were terminated by spontaneous abortion. The outcome measure results in a dummy variable indicating the pregnancy outcome, coded (0) for a birth and (1) for an induced abortion. Pregnancies ending in spontaneous abortions were excluded from the analyses.

2.4 Explanatory variables

Women's characteristics are time-constant covariates reflecting the situation at the moment they were admitted in Quebec as permanent residents. This information was provided by the *MICC* databank on permanent admissions in Quebec[8]. Women's age at pregnancy outcome can be considered as a time-varying variable by subtracting the date of medical intervention to the date of women birth.

In the following table, we present the independent variables and their distribution. We consider *immigrant women with at least one pregnancy outcome* (a birth delivery or an induced abortion). All selected variables have a rate of response above 97 %.

[6] Code that classifies the type of medical intervention following the *Manual de facturation* (payment handbook) of RAMQ.

[7] Declaration of diagnostic codes is not mandatory. However, we control for inconsistencies when it was available. Different act codes registered the same date were considered as one medical intervention. This was possible because two or more medical specialist could have participated in the intervention.

[8] Applicants for permanent residence have to notify Canadian authorities of all changes in family and personal situation during the immigration process.

Women with at least one pregnancy outcome by Immigrant status (%).

Variables	Economic	Family reunification*	Refugee	Other immigrant	Total
Last residence	**100**	**100**	**100**	**100**	**100**
North America	0.6	2.8	0.2	1.1	1.4
Central America	1.6	4.1	5.2	4.6	3.4
Caribbean	3.4	7.6	5.3	31.0	6.3
South America	4.5	5.1	14.1	6.4	6.6
Western Europe	22.3	5.4	0.3	1.9	11.0
Eastern Europe	4.7	3.1	2.9	2.4	3.7
Southern Europe	0.6	1.6	3.4	0.7	1.5
Western Africa	1.7	3.0	7.6	6.7	3.5
Eastern Africa	0.7	1.0	10.4	2.9	2.7
Northern Africa	34.8	24.7	6.7	7.0	24.8
Central Africa	1.1	1.8	17.3	7.2	4.5
West Central Asia and Middle East	6.6	11.6	10.5	4.4	9.2
Eastern Asia	10.2	6.5	0.5	1.5	6.7
South-east Asia	4.5	7.5	0.6	6.4	5.0
Southern Asia	1.2	12.7	14.1	14.8	8.4
Other	1.4	1.5	0.7	0.9	1.3
Status abortion, last residence	**100**	**100**	**100**	**100**	**100**
Prohibited	18.0	31.1	43.8	50.7	28.9
Health	21.8	20.1	25.0	16.9	21.6
Health/ social grounds	18.8	19.5	19.0	19.4	19.1
No restrictions	40.7	28.9	11.5	12.2	29.8
No information	0.7	0.4	0.6	0.7	0.6
Marital status	**100**	**100**	**100**	**100**	**100**
Single	29.5	6.1	37.7	65.1	23.2
Married	66.3	92.8	52.7	31.6	73.0
Ever married	2.0	0.4	6.6	2.9	2.3
Engaged	1.8	0.7	2.9	0.3	1.5
Educational attainment	**100**	**100**	**100**	**100**	**100**
0 to 6 years	0.9	4.1	6.8	9.5	3.5
7 to 11 yeras	9.4	21.4	31.9	46.0	19.4
12 to 13 years	14.4	24.3	25.8	20.0	20.6
14 to 16 years	39.5	30.7	21.4	15.4	32.0
17 years +	34.6	17.7	8.6	5.4	22.3
No information	1.1	1.6	5.5	3.7	2.2
Language Skills	**100**	**100**	**100**	**100**	**100**
Mother tongue English	1.4	4.4	1.6	7.8	2.9
Mother tongue French	21.2	6.8	6.3	5.3	12.4
MT Other, know English	12.1	18.9	19.5	14.2	16.2
MT Other, know French	26.7	27.2	38.0	29.1	29.0
MT Other, know Both	27.7	13.3	7.7	7.0	17.8
MT Other, Neither	10.6	29.3	27.0	36.6	21.8
Total frequency	**13 138**	**13 017**	**6 060**	**1 122**	**33 337**

*Only partners and spouses

Source: Author's elaboration using RAMQ and MICC databanks.

- **Immigration category:** Candidates for permanent residence in Canada usually belong to one of these four categories: economic immigrants, family reunification, refugees and other immigrants.

    - Economic immigrants: Persons that have been selected based on their education, work experience, knowledge of English and/or French, and other criteria that have been shown to help them become economically established in Canada. This category includes skilled workers, entrepreneurs, investors, self-employed, and care-givers. This group includes the principal applicant and their dependent members (partners and/or other persons). This category represents 39% of target population.

    - Family reunification: Permanent residents that have been sponsored by a Canadian citizen or another permanent resident living in Canada. This category includes partners and spouses (either marriage or in common-law union), parents and grandfathers, dependent children, brothers or sisters, etc. In this study, the majority of women in this category are spouses or partners of the principal applicant; they represent 39% of target population.
    - Refugees: Persons that have been sponsored by Canadian government, refuges sponsored by private sector, those that have been recognised in Canada and persons that are in charge of refugees (partners). This category represents 18% of target population.
    - Other immigrants: This residual category includes all the other status (humanitarian cases, applicants whose refugee was not recognised, retired, etc.). It represents 3% of the target population.

- **Last country of residence before admission:** Last country of residence before admission was regrouped into 17 sub-regions (See appendix, Table D). The majority of women of the economic category came from Northern Africa, Western Europe and Eastern Asia while refugees came more frequently from African countries, South America and Southern Asia. Partners and spouses under family reunification show higher proportions from Northern Africa, Southern Asia and West Central Asia and Middle East.
- **Marital status:** This variable was recorded in four categories: single; married, ever married (separated, divorced or widowed) and engaged in a union at time of admission. Marital status is closely related to immigrant status. The majority of women in the family reunification and in the economic category are married, while refugees show a higher proportion of single and ever married women.
- **Language skills:** Canada's official languages are English and French although French is the first spoken language in Quebec. As expected, the latter is more frequent than English, whatever the group. However, 41% of women of the economic category declare to know both languages at time of admission; this situation is less frequent among the other groups.

- **Mother tongue:** 15% of women spoke English or French as mother tongue. The proportion reduces among family reunification category and refugees.
- **Educational attainment:** This variable is defined as the number of achieved years in formal education. The majority of women in the economic category declared having completed some years of post-secondary education, the proportion decreases among the other groups, especially refugee women.
- **Abortion legislation in the last country of residence:** In order to capture the influence of the institutional context where women lived before arriving to Canada, we classified the last country of residence considering the typology of abortion laws proposed by (Boland and Katzive, 2008). Each category indicates the circumstances under which a pregnant woman could legally obtain an abortion in the last country of residence: 1) countries where it is prohibited altogether or to save the woman's life; 2) laws that permit abortion to protect a woman's physical health, 3) laws that explicitly recognize threats to mental health as justification for abortion, 4) laws that explicitly recognized socioeconomic factors as grounds for abortion, 5) laws that permit abortion without restriction as to reason. We considered categories 3 and 4 jointly. The majority of women in the economic category concentrate on categories 3 to 5, while the category 1 is more frequent among refugees.
- We don't have information on **number of living births** before being admitted in Quebec. Women age and marital status will be considered as a *proxy* of the missing information.
- Regarding **geographical distribution** (figures not showed), 78% of immigrant women chose Montreal as place of destination and 5% chose the city of Quebec, meaning a broaden offer of health services and medical providers compared to those that established in smaller cities.

3. Model

Conventional modeling of dichotomous responses assumed that the responses on the same subject are conditionally independent given the covariates. However, women could have experienced more than one pregnancy outcome during the period under observation, meaning that data on the same subject is not really independent.

In order to relax the assumption of conditional independence among the responses for the same woman given the covariates, we use a multilevel model for clustered dichotomous responses. This model is known as random-intercept model. The nice feature of random-intercept model is that it includes a subject-specific random intercept in the linear predictor which models the unobserved heterogeneity. The random intercept ζ_j can be thought of as the combined effect of omitted subject-specific (time-constant) covariates that causes some women be more prone to the outcome (in our case, an induced abortion) than others (Rabe-Hesketh and Skrondal, 2008: 242)[9]. The model can be represented as:

$$\text{Logit}\{\Pr(y_{ij}=1 \mid \mathbf{x}_{ij},\zeta_j)\} = \beta_1 + \beta_2 x_{2j} + \ldots + \beta_n x_{nij} + \zeta_j$$

with $\zeta_j \mid X_{ij} \sim N(0,\psi)$ and ζ_j independent across subjects j

We also model the non linear effect of the age of women (a continuous variable) controlling for the other covariates using a set of cubic splines. This set is chosen using a search algorithm which provides the best fitting set of splines for the effect of a given continuous covariate net of other covariates (Royston and Sauerbrei, 2007)[10]

In summary, we fitted a random-intercept logistic regression model of pregnancy outcome on the women's age and the selected covariates. As in ordinary regression models, coefficients are display as exponentiated regression coefficients which are interpreted as odds ratios. We present the results in the next section.

[9] We use ***xtlogit*** Stata command for fitting the random-intercept logistic model.

[10] We run models using ***mvrs*** Stata command supported by ***xtgee*** models. This command was developed by Patrick Royston (MRC Clinical Trials Unit, London)

4. Results

We fit a general model including all independent variables. Tables show the estimated odd ratios and their 95% confidence intervals. Values at the bottom of the table correspond to the random part of the model. The value next to *sigma_u* reports the estimated standard deviation of the random intercept. The value next to *rho* reports the estimated residual intraclass correlation of the latent responses which quantifies the dependence among the dichotomous responses on the same person: It goes from 32% to 40%.

We present a full model and separate models for the main immigrant categories (economic, partners and spouses and refugees) in order to test interactions between them and the other covariates. Results are shown in Tables 1 to 4.

Graphs with the predicted probabilities of induced abortion by women's age and marital status are presented in Figures 1 to 3[11] for each immigrant category.

[11] They were estimated using ***gllamm*** postestimation Stata commands. See (Rabe-Hesketh and Skrondal, 2008).

Table 1. Random-intercept logistic regression model of pregnancy outcome. Women admitted in Quebec since 1997 with at least one outcome. **Full model (all immigrant status)** (n=32 675)

Outcome	OR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
[Women's age]						
Age_Spline0	.8706431	.0148433	-8.13	0.000	.8420313	.900227
Age_Spline1	.7392097	.0113246	-19.72	0.000	.7173438	.7617421
Age_Spline2	.9838788	.0141993	-1.13	0.260	.9564386	1.012106
Age_Spline3	.9996772	.014308	-0.02	0.982	.9720237	1.028117
[Immigrant Category=Economic]						
Partners/ Spouses	.6339556	.0286804	-10.07	0.000	.5801631	.6927357
Refugees	1.519609	.0832908	7.63	0.000	1.364825	1.691947
Other immigrants	1.344974	.1186321	3.36	0.001	1.131448	1.598797
[Last country of residence=Northern Africa]						
North America	.4280867	.0849794	-4.27	0.000	.2901082	.6316892
Central America	1.196933	.1323848	1.63	0.104	.9636605	1.486673
Caribbean	5.155924	.4335594	19.50	0.000	4.372495	6.079721
South America	1.704364	.1342797	6.77	0.000	1.460494	1.988955
Western Europe	.6456521	.0677241	-4.17	0.000	.5256707	.7930185
Eastern Europe	2.081008	.2203449	6.92	0.000	1.691007	2.560957
Southern Europe	.6746552	.1027106	-2.59	0.010	.5006031	.9092224
Western Africa	3.68022	.3379642	14.19	0.000	3.074013	4.405973
Eastern Africa	2.755259	.2782264	10.04	0.000	2.260518	3.35828
Central Africa	3.022264	.2793347	11.97	0.000	2.521503	3.622474
West Central Asia And Middle East	1.077423	.0877045	0.92	0.360	.9185368	1.263792
Eastern Asia	1.979153	.1931879	6.99	0.000	1.634528	2.396439
South-east Asia	1.478004	.1438644	4.01	0.000	1.221299	1.788664
Southern Asia	1.943746	.1576321	8.20	0.000	1.658096	2.278607
[Marital status=Single]						
Married	.3702428	.0156772	-23.47	0.000	.3407564	.4022807
Ever Married	1.678303	.16115	5.39	0.000	1.390395	2.025827
Engaged	.4573085	.0674637	-5.30	0.000	.3424815	.6106345
[Last country of residence=Legal abortion without restrictions]						
Prohibited	.5187908	.0368277	-9.24	0.000	.4514062	.5962345
Health	.6322236	.0477339	-6.07	0.000	.54526	.733057
Health and/or social grounds	.5081369	.038283	-8.99	0.000	.4383805	.5889931
[Educational attainment= 17 years or more]						
0 to 6 years	1.42721	.136327	3.72	0.000	1.183536	1.721055
7 to 11 years	1.701603	.099397	9.10	0.000	1.517527	1.908007
12 to 13 years	1.63672	.0898788	8.97	0.000	1.469709	1.822708
14 to 16 years	1.272856	.0623582	4.92	0.000	1.156321	1.401136
No information	1.072619	.1243092	0.60	0.545	.8546668	1.346151
[Language skills= French mother tongue]						
MT English	.8662462	.1172738	-1.06	0.289	.6643613	1.12948
MT Other, English	1.020729	.088322	0.24	0.813	.8615039	1.209382
MT Other, French	1.008658	.0749683	0.12	0.908	.8719234	1.166834

```
MT Other, Both    |   1.062956   .0839636     0.77   0.440      .9104965    1.240944
MT Other, None    |   .8786657   .0759122    -1.50   0.134     .7417956     1.04079
------------------+------------------------------------------------------------------
    /lnsig2u      |   .6538238    .048208                      .5593379    .7483096
------------------+------------------------------------------------------------------
     sigma_u      |   1.386679   .0334245                      1.322692    1.453762
         rho      |   .3688802   .0112232                      .3471683    .3911364
------------------------------------------------------------------------------------
Likelihood-ratio test of rho=0: chibar2(01) =  1328.99 Prob >= chibar2 = 0.000
```

Table 2. Random-intercept logistic regression model of pregnancy outcome. Women admitted in Quebec since 1997 with at least one pregnancy. **Economic category** (n=12 857)

Outcome	OR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
[Women's age]						
Age_Spline0	.8492261	.0233349	-5.95	0.000	.8047003	.8962156
Age_Spline1	.6559793	.0180969	-15.28	0.000	.6214519	.692425
Age_Spline2	1.05652	.0267792	2.17	0.030	1.005316	1.110332
[Last country of residence=Northern Africa]						
North America	.2264621	.1072548	-3.14	0.002	.0895071	.5729718
Central America	.7316482	.2013757	-1.14	0.256	.4266004	1.254826
Caribbean	2.707394	.5068328	5.32	0.000	1.875875	3.907501
South America	1.134439	.1778801	0.80	0.421	.834282	1.542587
Western Europe	.4519353	.0791507	-4.53	0.000	.3206263	.6370204
Eastern Europe	1.672447	.2996951	2.87	0.004	1.17712	2.376205
Southern Europe	.723159	.2686852	-0.87	0.383	.3491204	1.497933
Western Africa	2.662656	.5677615	4.59	0.000	1.753123	4.044063
Eastern Africa	3.034018	.9606517	3.51	0.000	1.631191	5.643278
Central Africa	2.121017	.5236321	3.05	0.002	1.307379	3.441018
West central Asia And middel East	1.139867	.1777034	0.84	0.401	.8397558	1.54723
Eastern Asia	1.659109	.2874587	2.92	0.003	1.181395	2.329995
South-east Asia	1.266846	.2585438	1.16	0.246	.8491937	1.88991
Southern Asia	1.806041	.4819143	2.22	0.027	1.070527	3.046896
[Marital status=Single]						
Married	.2672079	.0185722	-18.99	0.000	.2331776	.3062048
Ever Married	1.689547	.2856285	3.10	0.002	1.213024	2.353267
Engaged	.4001784	.0990016	-3.70	0.000	.2464177	.6498834
[Last country of residence=Legal abortion without restrictions]						
Prohibited	.4249024	.0729802	-4.98	0.000	.3034512	.5949625
Health	.584709	.0858417	-3.66	0.000	.4385044	.7796605
Health and/or Social grounds	.3361405	.0499857	-7.33	0.000	.2511557	.449882
[Educational attainment= 17 years or more]						
0 to 6 years	1.620267	.4519724	1.73	0.084	.937874	2.799166
7 to 11 years	1.579611	.1675103	4.31	0.000	1.28317	1.944536
12 to 13 years	1.376099	.1230523	3.57	0.000	1.154873	1.639703
14 to 16 years	1.104032	.0755695	1.45	0.148	.9654239	1.26254
No information	.6816757	.1935723	-1.35	0.177	.3907203	1.189295
[Language skills=French mother tongue]						
MT English	.8166979	.2511841	-0.66	0.510	.4469567	1.492305
MT Other, English	1.268312	.1992436	1.51	0.130	.9321971	1.725617
MT Other, French	1.48249	.1857767	3.14	0.002	1.159644	1.895219
MT Other, Both	1.186948	.1451842	1.40	0.161	.9339313	1.50851
MT Other, Neither	1.183554	.1903717	1.05	0.295	.8635244	1.62219
/lnsig2u	.7912837	.085083			.6245241	.9580433

```
-----------------+------------------------------------------------------------------------------
     sigma_u     |   1.485337   .0631885                      1.366513    1.614494
         rho     |   .4014172   .0204439                      .3620856    .4420604
------------------------------------------------------------------------------------------------
Likelihood-ratio test of rho=0: chibar2(01) =   457.24 Prob >= chibar2 = 0.000
```

Women admitted in the economic category

Results are shown in Table 2. Women who came from United States and Western Europe are less likely to have and induced abortion compared to those from Northern Africa (reference category). Women from Central America, South America, Southern Europe, West central Asia and Middle West and South-east Asia show no significant difference. By contrast, odds ratios are particularly high among women who came from Caribbean and other African regions: they multiply by 2 and 3. They are also more elevated among women from Eastern Europe, Eastern and Southern Asia.

Marital status has a significant effect on pregnancy outcome: the odds of having an induced abortion is lower among those who are more prone to be in a union at time of getting pregnant: married and engaged women have respectively 26% and 40% the odds of single women. By contrast, ever married women are more likely to terminate pregnancy: the odds multiply by almost 1.7

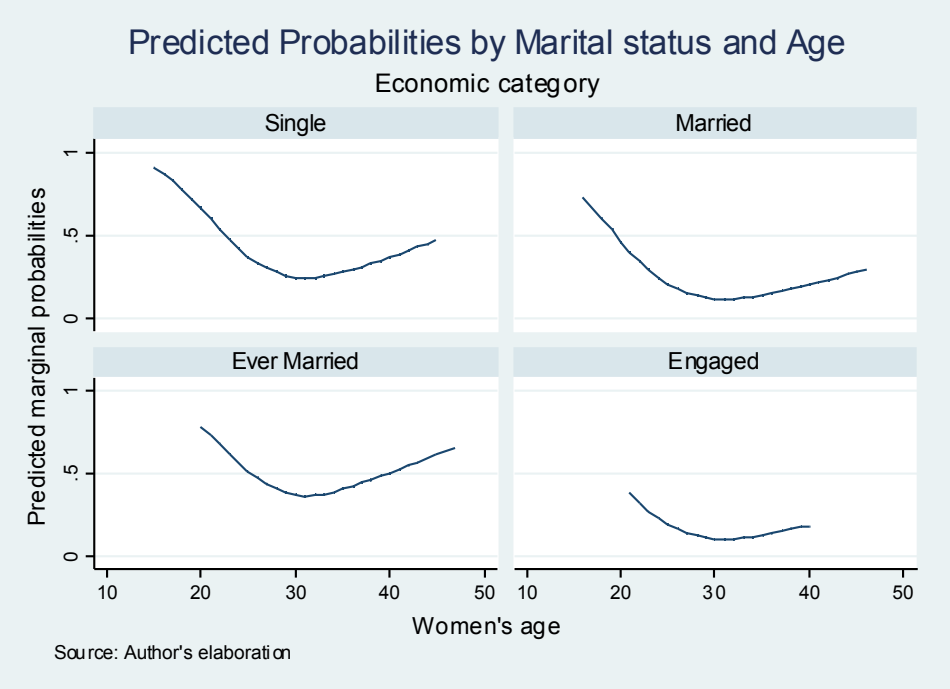
Women who came from a country where abortion is permitted by law under certain restrictions or prohibited altogether have a lower odds ratio compared to women who came from countries where voluntary termination of pregnancy is legally authorised with no restrictions as to reasons.

When it comes to educational attainment, we observe that the less educated women show no significant difference compared to women who completed 17 years or more of formal education. The broader differences appear between them and women that completed some primary or secondary education: the latter ones are more likely to terminate their pregnancy than most educated women.

Language skills also have an effect: women whose mother tongue it is not an official language but know French show a higher propensity to termination of pregnancy than women whose mother tongue is French. The other categories show no significant difference.

Figure 1 presents the predicted probabilities of having an induced abortion by marital status and age. We see that whatever the marital status, the probability is higher among adolescents and younger adults. It reduces towards 30 years old and it increases by 35 years old, although it is less important than in the younger ages.

Figure 1



Spouses and partners, family reunification category

Women of this category have a lower odds ratio compared to women in the economic category (63%) (Table 1, full model). Results for the specific model indicate that the effects of background and personal characteristics change when women are admitted as partner or spouse of a citizen or a permanent resident (Table 3).

Women from United States are less likely to terminate their pregnancy through an induced abortion than those from Northern Africa while those from Southern Europe and West Asia and Middle East show no significant difference. The other country regions have a higher odds ratio, especially women from Caribbean, South America and African regions.

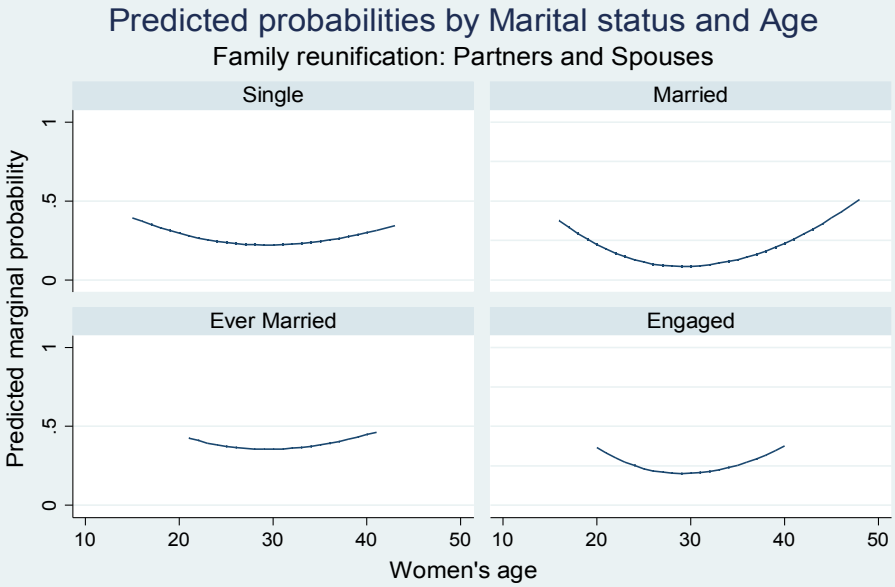
Married women have a lower chance compared to single women; the coefficient of engaged women is no longer significant. By contrast, ever married women continue to have a higher propensity: their odds ratio multiply by 2.6

As we have seen in the economic category, status of legal abortion in the last country of residence has an influence on the pregnancy outcome but differences between countries due to abortion legal status narrow.

Educational attainment also plays a role in the likelihood of having a pregnancy. In this case, all categories have a higher odds ratio compared to most educated women.

Finally, we found that language skills and mother tongue don't seem to have an influence in termination of pregnancy when women were admitted as partners.

As we see in Figure 2, even if termination of pregnancy among partners and spouses also depends on age, curves for this group are less pronounced. Among married women, the probability increases at the end of the reproductive years.



Source: Author's elaboration

Table 3. Random-intercept logistic regression model of pregnancy outcome. Women admitted in Quebec since 1997 with at least one pregnancy. **Partners or spouses/ family reunification** (n=12 766)

Outcome	OR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
[Women's age]						
Age_Spline0	.9726209	.0254975	-1.06	0.290	.9239089	1.023901
Age_Spline1	.8713252	.0210393	-5.70	0.000	.8310495	.9135527
Age_Spline2	.9730671	.0227315	-1.17	0.243	.9295187	1.018656
[Last residence=Northern Africa]						
North America	.607616	.1476164	-2.05	0.040	.377429	.9781898
Central America	1.684122	.2853229	3.08	0.002	1.208269	2.347381
Caribbean	9.47786	1.165885	18.28	0.000	7.447368	12.06196
South America	3.047334	.411211	8.26	0.000	2.339149	3.969925
Western Europe	1.433997	.2552773	2.02	0.043	1.011623	2.032719
Eastern Europe	2.406898	.4132235	5.12	0.000	1.719178	3.369726
Southern Europe	.7464886	.1921702	-1.14	0.256	.4507092	1.236374
Western Africa	4.491308	.6943154	9.72	0.000	3.317301	6.080802
Eastern Africa	3.096054	.751112	4.66	0.000	1.92444	4.980954
Central Africa	5.826824	1.110561	9.25	0.000	4.010491	8.465767
West central Asia And middle East	.9630245	.1251023	-0.29	0.772	.7465544	1.242262
Eastern Asia	2.179045	.3199479	5.30	0.000	1.634123	2.905679
South-east Asia	1.794491	.2555366	4.11	0.000	1.357468	2.372209
Southern Asia	2.551629	.3081637	7.76	0.000	2.013802	3.233093
[Marital status=Single]						
Married	.5449288	.0527806	-6.27	0.000	.450707	.658848
Ever Married	2.643542	.9200206	2.79	0.005	1.33643	5.229092
Engaged	.8917002	.3137896	-0.33	0.745	.4473843	1.777285
[Last country of residence=Legal abortion without restrictions]						
Prohibited	.5248462	.0540609	-6.26	0.000	.4288994	.6422567
Health	.6106035	.0674666	-4.46	0.000	.4917095	.7582457
Health and/or Social grounds	.5976743	.0647817	-4.75	0.000	.4832848	.7391387
[Educational attainment=17 years or more]						
0 to 6 years	1.51071	.2285096	2.73	0.006	1.123126	2.032046
7 to 11 years	1.784852	.17708	5.84	0.000	1.469441	2.167965
12 to 13 years	1.723035	.1627386	5.76	0.000	1.431855	2.073428
14 to 16 years	1.457521	.1300375	4.22	0.000	1.223692	1.736031
No information	1.794471	.3715775	2.82	0.005	1.195858	2.692731
[Language skills=French mother tongue]						
MT English	.8768791	.181763	-0.63	0.526	.5841162	1.316377
MT Other, English	1.056114	.1623292	0.36	0.722	.7814069	1.427394
MT Other, French	1.082571	.1539569	0.56	0.577	.8192253	1.43057
MT Other, both	1.233045	.1904901	1.36	0.175	.9109169	1.669087
MT Other, Neither	1.085565	.167635	0.53	0.595	.8020691	1.469265
/lnsig2u	.4470019	.0829158			.2844898	.6095139
sigma_u	1.250447	.0518409			1.152859	1.356295
rho	.3221638	.0181067			.2877457	.3586258

Likelihood-ratio test of rho=0: chibar2(01) = 381.20 Prob >= chibar2 = 0.000

Refugee women

Women of this category show higher odds ratio compared to women in the economic category: it multiplies by 1.5 (full model).

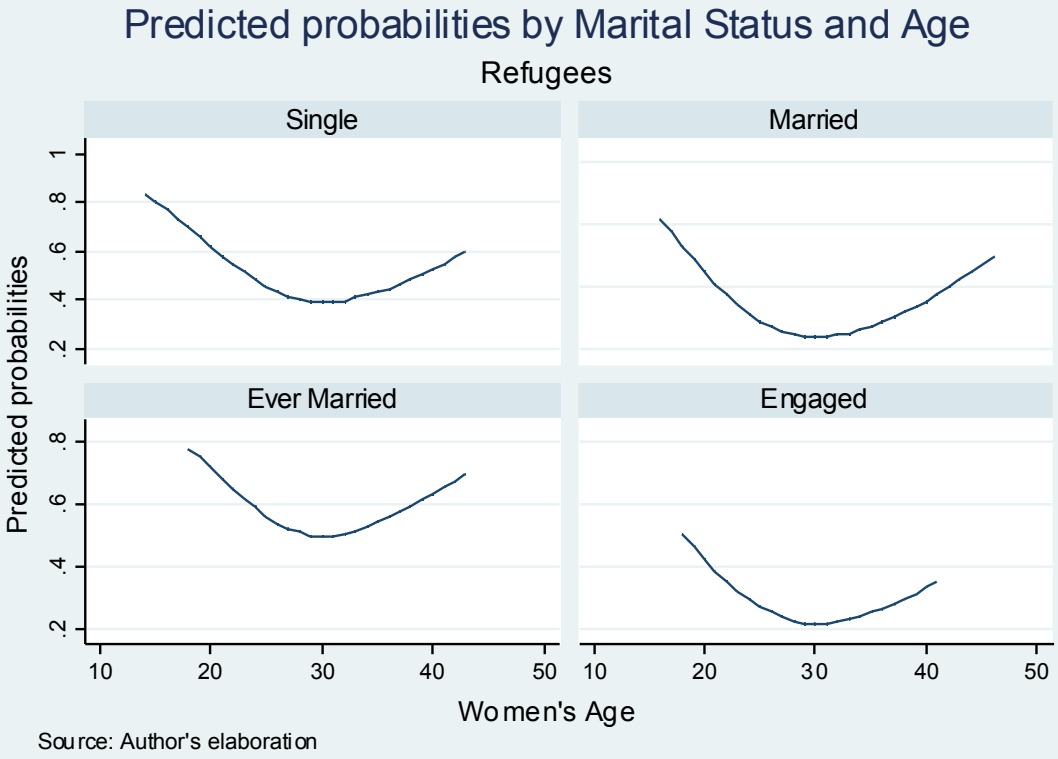
As we have seen in the previous section, the majority of women in the refugee category came from South America, East and Central Africa, West Central Asia and Middle East and Southern Asia. Most of women show higher odds ratios compared to those from Northern Africa. The exceptions are women from North America, Central America, Western and Southern Europe and Eastern Asia which show no significant difference, they are also less frequent among this category.

Marital status maintains its influence, as married and engaged women have a lower odds ratio compared to single women; ever married women still have the higher propensity: their odds ratio multiply by 1.7

Educational attainment plays also a role in the likelihood of having a pregnancy within this group. As we have already seen for economic category, women with at least some secondary and postsecondary education have higher odds ratios compared to most educated women.

Language skills are also important: those who know at least one official language (English or French) are less likely to terminate their pregnancy compared to women whose mother tongue is French. The same result is observed among women who don't speak any official language.

Figure 3 presents the predicted probabilities of having an induced abortion by marital status and age. We see that the probability is higher among adolescents and younger adults. It reduces towards 30 years old and it recovers again by 35 years. This pattern is observed in all marital status.



Source: Author's elaboration

Table 4. Random-intercept logistic regression model of pregnancy outcome. Women admitted in Quebec since 1997 with at least one pregnancy. **Refugees** (n=5954)

Outcome	OR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
[Women's age]						
Age_Spline0	.794717	.0301732	-6.05	0.000	.7377254	.8561113
Age_Spline1	.6538324	.0219267	-12.67	0.000	.6122389	.6982517
Age_Spline2	1.017443	.0312228	0.56	0.573	.9580518	1.080517
[Last residence=Northern Africa]						
North America	.8208464	.7784248	-0.21	0.835	.1279531	5.265906
Central America	1.333873	.3233466	1.19	0.235	.8294175	2.145141
Caribbean	4.162172	.9921089	5.98	0.000	2.608705	6.640721
South America	1.70045	.3220581	2.80	0.005	1.17314	2.464779
Western Europe	2.910231	1.872231	1.66	0.097	.8247577	10.26901
Eastern Europe	3.356447	1.06909	3.80	0.000	1.797863	6.266182
Southern Europe	1.147987	.3677346	0.43	0.667	.6127338	2.150812
Western Africa	3.834399	.8157292	6.32	0.000	2.527045	5.818108
Eastern Africa	3.083298	.6622414	5.24	0.000	2.023912	4.697205
Central Africa	2.526564	.5107644	4.58	0.000	1.700017	3.754977
West central Asia And middle East	2.137053	.4826872	3.36	0.001	1.372644	3.327152
Eastern Asia	2.257464	1.286031	1.43	0.153	.7391097	6.894976
South-east Asia	2.839035	1.314205	2.25	0.024	1.145895	7.033908
Southern Asia	2.230684	.4771746	3.75	0.000	1.466743	3.392516
[Marital status=Single]						
Married	.4268506	.0346169	-10.50	0.000	.3641202	.5003882
Ever married	1.736867	.2435451	3.94	0.000	1.319503	2.286245
Engaged	.5009993	.1186683	-2.92	0.004	.3149334	.7969948
[Last country of residence=Legal abortion without restrictions]						
Prohibited	.8253894	.1532901	-1.03	0.301	.5735549	1.187798
Health	.836908	.1739105	-0.86	0.392	.5569254	1.257646
Health and/or Social grounds	.8026436	.1739274	-1.01	0.310	.5248959	1.227361
[Educational attainment=17 years or more]						
0 to 6 years	1.475655	.278438	2.06	0.039	1.019468	2.135975
7 to 11 years	1.762632	.2549677	3.92	0.000	1.327498	2.340396
12 to 13 years	1.868197	.2658141	4.39	0.000	1.413548	2.469078
14 to 16 years	1.3835	.1985722	2.26	0.024	1.044257	1.832952
No information	.9760077	.1999248	-0.12	0.906	.6532714	1.458186
[Language skills=French mother tongue]						
MT English	.5822044	.1862787	-1.69	0.091	.3109782	1.089986
MT Other, English	.6663458	.1168485	-2.31	0.021	.4725365	.9396452
MT Other, French	.6724307	.0974104	-2.74	0.006	.5062206	.8932133
MT Other, Both	1.10667	.2019827	0.56	0.579	.7738593	1.582611
MT Other, Neither	.4597013	.0799314	-4.47	0.000	.3269426	.6463681
/lnsig2u	.7890685	.091405			.609918	.968219

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-----------------+------------------------------------------------------------------
     sigma_u     |   1.483693   .0678085                      1.356569    1.622729
         rho     |   .400885   .0219533                       .3587187    .4445716
------------------------------------------------------------------------------
Likelihood-ratio test of rho=0: chibar2(01) =   420.55 Prob >= chibar2 = 0.000
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5. Overall conclusions

The aim of this paper was to determinate to what extent immigrant women admitted in Quebec between 1997 and 2006 were likely to terminate a pregnancy through an induced abortion. Our study takes advantage of administrative files that focuses on immigrant residents. The intention was to obtain accurate data on reproductive behaviours for a subpopulation that is often misrepresented in Canadian surveys, generally due to sample size or to research purposes.

The main findings are:

- Globally, abortion is more frequent among adolescents and younger adults probably to postpone first childbirth. Abortion is also more frequent among women transiting their last reproductive years, probably after achieving desired family size.
- The likelihood to terminating a pregnancy varies among immigrant status at time of admission. Refugee women seem to be more prone to recourse to abortion than women who immigrated under the economic category. This result is consistent with findings in northern European countries which have similar health systems (Vangen *et.al*, 2008.).
- By contrast, partners and spouses in family reunification tend to continue their pregnancy, particularly those who came from United States, West Central Asia and the Middle East, Southern Europe and Northern Africa. Gender roles, women's labour participation and cultural values should be considered to explain their lower propensity to voluntary termination of pregnancy.
- Women who come from countries where abortion decisions still depends on medical or legal committees are more likely to continue their pregnancy once they are in Quebec.
- Women with some years of secondary or postsecondary education tend to recourse to abortion more frequently than most educated women, particularly those who don't migrate under sponsorship (economic category) or migrate under critical circumstances (refugees).

These women are probably more prone to enter the labour market under less favourable conditions.

- Refugee women whose mother tongue is not an official language show a lower propensity to terminate their pregnancy.

Our results show that social backgrounds play a role in the process leading to an abortion in interaction with immigrant status, which in turn anticipates the integration pathways in the host society. Further analysis will be done to validate and extend these results.

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Appendix

Table A List of selected Act Codes using RAMQ databank (roster of paid services).

Act Code	Liste de services rémunérés à l'acte
	OBSTETRIQUE
	L'ACCOUCHEMENT
06903	Accouchement
06919	Accouchement d'un bébé, après le premier jumeau, supplément
06923	Accouchement par voie vaginale post-césarienne incluant les soins et la surveillance intra partum, supplément
06943	Accouchement : samedi, dimanche, jour férié ou de 19 h à 7 h
06912	Césarienne avec ou sans stérilisation
06913	Césarienne et hystérectomie
06946	Césarienne dans les cas complexes prévus en annexe, supplément
	GYNECOLOGIQUE
	TROMPES
	Suture
06430	Traitement chirurgical, grossesse tubaire (ectopique)
06451	Avec avortement thérapeutique
	UTÉRUS ET COL UTÉRIN (*suite*)
	Manipulation
06900	Avortement incomplet (spontané) par extraction menstruelle
06906	par curetage
06908	Avortement thérapeutique par extraction menstruelle (incluant le bloc para cervical, la dilatation du col, l'insertion de tiges laminaires)
06938	en cabinet, supplément
06909	par curetage (incluant le bloc para cervical, la dilatation du col, l'insertion de tiges laminaires)
06939	en cabinet, supplément
06941	Avortement thérapeutique à partir de 14 semaines : Un temps : (incluant le bloc para cervical, la dilatation du col, l'insertion de tiges laminaires) aspiration, curetage et évacuation du fœtus
06947	en cabinet, supplément
06948	Deux temps 1er temps : induction, toutes méthodes incluant, le cas échéant, l'évacuation du fœtus (P.G. 2.4.7.7 A)
06949	2e temps : curetage, le cas échéant (P.G. 2.4.7.7 A)
06951	en cabinet, supplément
06924	Cerclage du col chez la parturiente

Source : RAMQ. http://www.ramq.gouv.qc.ca/fr/professionnels/medomni/manuel/man100.shtml

Table B Pregnancy outcome based on *Act code* using RAMQ databank (roster of paid services).

Outcome variable	Act code
0. Birth	06903- 06919- 06923-06943-06912-06913-06946-06924
1. Induced abortion	06908-06909-06938-06939-06941-06947-06948-06949- 06951
2. Spontaneous abortion	06900-06906-06430-06451

Source: Table A.

Table D. Classification of last country of residence using *MICC* databank.

Region	Countries
North America	Greenland, Sante Pierre et Miquelon, U-S
Caribbean & Bermuda	Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Bermuda, Cayman Islands, Cuba, Dominica, Dominican Republic Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Netherlands Antilles, Puerto Rico, Saint Kiss and Nevis, Saint Lucia, Saint Vincent and Grenadines, Trinidad y Tobago, Turks, Virgin Islands
Central America	Belize, Costa Rica, El Salvador, Guatemala, Honduras, México, Nicaragua, Panama,
South America	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Malvinas, French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela
Western Europe	Austria, Belgium, France, Germany, Liechtestein, Luxemburg, Monaco, Netherlands, Switzerland
Eastern Europe	Bulgaria, Czech Republic, Slovakia, Hungary, Poland, Romania, Estonia, Latvia, Lithuania, Belarus, Republic of Moldova, Russian Federation, Ukraine
Northern Europe	Republic of Ireland, Denmark, Finland, Iceland, Norway, Sweden, United Kingdom
Southern Europe:	Albania, Andorra, Gibraltar, Greece, Italy, Malta, Portugal, San Marino, Spain, Vatican City State, Bosnia and Herzegovina, Croatia, Macedonia, Slovenia, Yugoslavia
Western Africa:	Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana,Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger Nigeria, Saint Helena, Senegal, Sierre Leone, Togo
Eastern Africa:	Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi,Mauritius, Mayotte, Mozambique, Réunion Rwanda, Seychelles, Somalia, Tanzania, Uganda, Zambia, Zimbawe
Northern Africa:	Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara
Central Africa:	Angola, Cameroon, Republic Central African, Chad, Congo, Equitorial Guinea, Gabon, Sao Tome and Principe, Zaire
Southern Africa:	Botswana, Lesotho, Namibia, Republic of South Africa, Swaziland
West Central Asia and the Middle East:	Afghanistan, Cyprus, Iran, Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine/West Bank/ Gaza Strip, Qatar, Arabia Saudi, Syria, United Arab Emirates, Yemen
Eastern Asia:	Republic of China, Hong Kong, Japan, North Korea, South Korea, Macau, Mongolia, Taiwan
South-east Asia:	Brunei Darussalam, Cambodia, Indonesia, Laos, Malasya, Myanmar, Philippines, Singapore, Thailand, Vietnam
Southern Asia:	Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
Oceania:	Australia, New Zealand, and Islands

Source: Statistics Canada's classification.