A multilevel approach to the study of induced abortion among migrant women in Italy

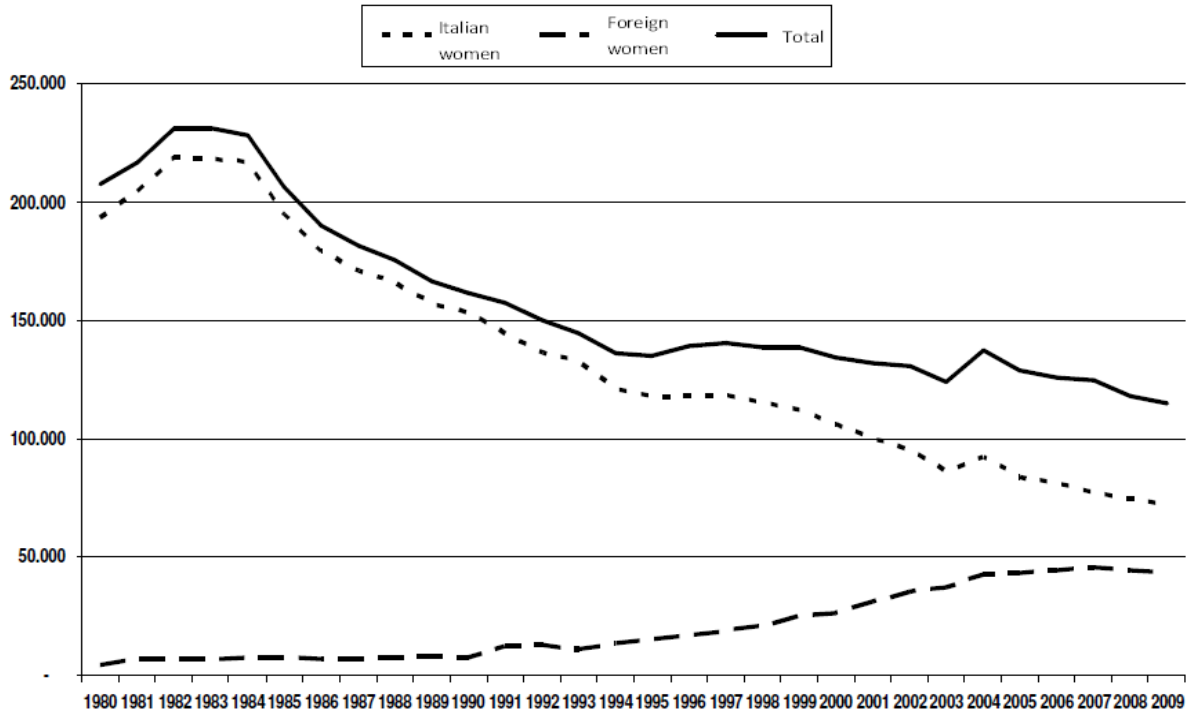
Patrizia Farina – *Department of Sociology and Social research*, University of Milan – Bicocca
Livia Elisa Ortensi – *Department of Statistics and Quantitative Methods*, University of Milan – Bicocca

1. Introduction

Induced abortion is one of the most problematic aspects of women's reproductive lives, both for ethical reasons and because of the possible psychological and health consequences.

Abortion was legalized in Italy in 1978 and is performed free of charge in public or private clinics authorized by the health authorities[1]. Absolute figures show that the number of abortion declined by 40% (from 208,000 to 115,000) in the following thirty years. In the same period of time the gross abortion rate reached a peak of 17.2 abortions per 1,000 women of reproductive age in 1982, and then steadily declined. The current abortion rate recorded for Italy, 7.9‰ per 1,000 women in 2010, is one of the lowest among developed countries.

Figure 1. Number of requested abortion by nationality 1980-2009



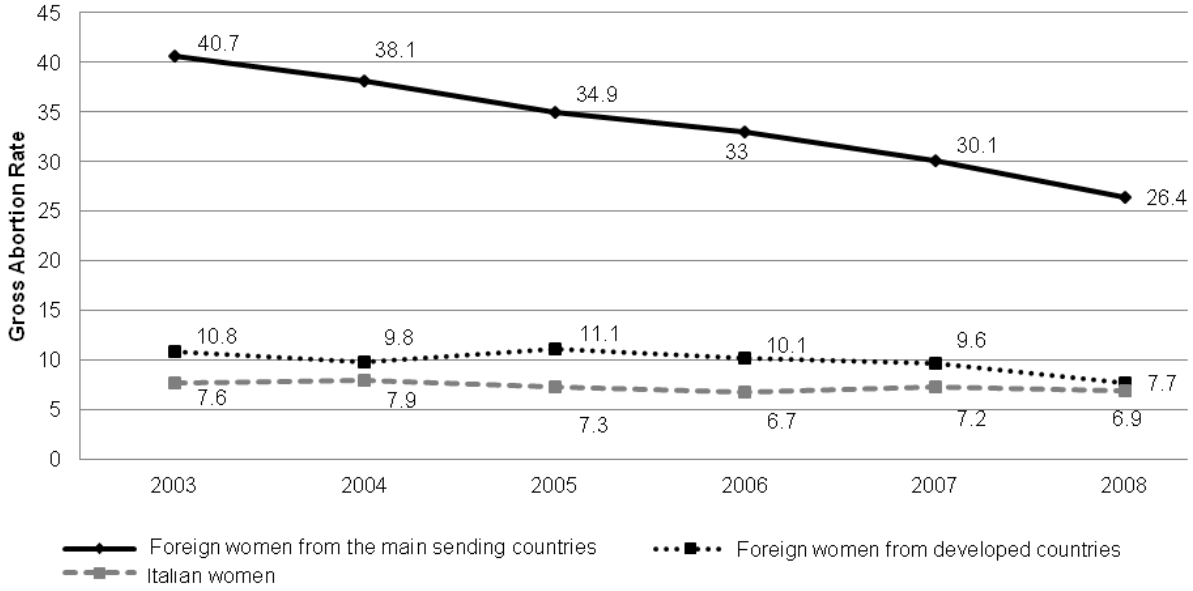
Source: Ministero della Salute, 2011

The reduction in the incidence of induced abortion is entirely due to the decrease amongst Italian nationals: while the number of immigrant women rose rapidly in the last 20 years, the number of

[1]The law n. 194/1978 (Italian Parliament, 1978) allows termination in the second trimester of the pregnancy in case of risk to the woman's life or if the foetus carries genetic malformations.

abortions requested by foreign citizens increased at an even higher speed. According to the most recent data (Ministero della Salute, 2011) abortions requested by immigrants currently account for 34.2% of the total number of abortions, while foreign women represent only 11.3% of the female population. Even if the gross abortion rate among migrant women from the main sending countries is declining, the level recorded in 2008 is still more than 3 times higher than the rate for Italian women. Over-representation of foreign women or ethnic minorities in national statistics for abortion and for unintended pregnancies have been observed in many other countries (e.g. Orjuela et.al, 2009; Rasch et al., 2008; Guttmachen Institute 2011; Finer and Zolna, 2011), which makes it a topic of substantial interest in the field of sexual and reproductive health.

Figure2. Gross abortion rate by broad groups of nationalities, 2003-2008



Source: Ministero della Salute, 2011

The aim of this paper is to contribute to the international debate on determinants of abortion amongst immigrants, illustrating results from a dedicated survey including data on abortion experience, contraception and migration. In particular the risk of experiencing an abortion in Italy will be related to pre-migration experience of abortion and to the most widespread migration models among female communities settled in Italy.

The structure of this paper is as follows. Section 2 addresses methodological issues related to official data on abortion in Italy and describes the sample survey, paying close attention to problems related to the topic under study and the target population, and to the multilevel approach chosen for data analysis; section 3 shows the main results arising from descriptive analysis and from multilevel models; finally, section 4 provides conclusions and further interpretation of results.

2. Methods

2.1 Data

The abortion law approved in 1978 calls for monitoring of the abortion trends. This responsibility was assigned to the Italian Statistical Office and the Ministry of Health. Since that time, data have been collected by each hospital, using an individual and anonymous form (Istat D.12) which contains information about the woman and the pregnancy, and about the operation requested.

Data collected over the years have some major limitations from the particular point of view of our analysis, and in general from that of all studies focused on foreign women. Firstly, no information is provided about migration history, including in particular the year of arrival in Italy, although empirical evidences show that "migration seniority" is strongly positively correlated with indicators of cultural, social, political and economic integration (Cesareo and Blangiardo, 2011). The reproductive histories (number of live births, stillbirths, miscarriages, voluntary abortions), even if available, do not provide any data on place of event, preventing the possibility of understanding the link between these events and migration.

Legal status is also unspecified and naturalized women are not distinguishable from native Italian women.

The major general limitation, however, is that this data refers only to women who have experienced an abortion. On this basis, the comparison with women who have never experienced abortion is not possible.

To overcome some of these limitations we used data from the first Survey of Sexual and Reproductive Health of Migrant Women (SHMW). This cross-sectional survey involved 2,011 migrants aged 15-49 living in the Italian region of Lombardy[2] in 2010 and is representative of the main nationalities through a quota sampling based on figures released by the ORIM- Regional Observatory on Migration (Ismu Foundation, 2011). Undocumented and naturalized women are included in the sample. To reach the number of interviews required for each nationality, a combination of facility-based and respondent-driven sampling has been used. 52.4% of interviewees were recruited from a variety of facilities (hospitals, family planning clinics and other services). In order to correct the bias resulting from the under sampling of non-users of these services, 47.6% of the sample was instead respondent-driven. To obtain a regionally representative sample, a data weighting procedure followed the gathering of data[3]. The sampling was conducted in 9 out of the 12 provinces of Lombardy, covering urban and rural contexts.

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[2] Lombardy is the most important migration destination in Italy and is the region where 25% of the total national number of migrants is settled.

[3] The weight is the combination of three partial multipliers:

Due to the difficulty of the topics under study all the interviewers (all women and cultural facilitators or social workers) underwent special training relevant to the objectives of the study, including interviewing skills and fieldwork protocol. All the interviewers were carefully chosen from the communities selected in the sample. For these reasons less than 15% of the women initially involved refused the interview.

The questionnaire included some background information and a set of items on prenatal care and delivery assistance for first and last births, induced abortion and miscarriage, contraception, and opinions on gender equality. Most of the items are comparable with the international DHS (Demographic and Health Surveys) standard, while migration-specific items have been included.

Variables for countries of origin included in the analysis are from the World Bank Data Catalog. The proportions of first generation family migrants[4] in each community is estimated from the 2011 wave of the ORIM survey (Farina and Ortensi, 2012).

Although this data affords us a valuable improvement on the set of available information it has some limitations. Firstly, the use of a cross sectional survey which does not have a retrospective event-oriented design results in it being impossible to include some important qualitative variables in the analysis. Information such as marriage status, working condition, age and number of children ever born at each abortion would be useful to provide a more detailed analysis.

Secondly, and for the same reason, the direction of causality has to be discussed with caution (Davies, 1987).

Thirdly, as a higher incidence of abortion among poor women is known from many international studies (e.g. Jones & Kavanaugh, 2011) a variable interpreting the economic circumstances of respondents at the time of each abortion should also be included.

Finally, there is the risk of having a double selection effect, as we have data only on women who both were alive at the time of the interview and had not returned to their countries of origin.

In spite of these limitations, as data about abortion and contraception are rare in social research, this dataset is a unique source of information in the Italian and European contexts about contraception and the sexual and reproductive health of migrants.

Let δ_t be the macro-area sampling fraction[3] - Let ε_i^R be the proportion of women of age class i according to regional estimates
Let γ_s be the country sampling fraction[3]
Let ε_i^S be the proportion of women of age class *i* according to the survey
Let ε_i^R be the proportion of women of age class *i* according to the age structure for immigrants at the regional level made available by the Regional Observatory (Blangiardo, 2010).
The final weight is therefore defined as $v_{sti} = \frac{1}{\delta_t} * \frac{1}{\gamma_s} * \frac{\varepsilon_i^R}{\varepsilon_i^S}$ and provides corrections for nationality and age structure.

[4] We define family migrants as first generation migrant women who migrated with their partner or after the partner and who are full time housewives.

2.1 Methods

The outcome of our analysis is dichotomous, indicating whether or not a woman had ever experienced at least one abortion (Model 1) or if she had experienced at least one abortion in Italy (Model 2). As our dataset has a hierarchical structure with women (level 1) nested in communities (level 2), we used a multilevel approach. Due to this structure, the odds of experiencing the outcome of interest are not independent, because women from the same country of origin share common exposure to community characteristics. Single-level logistic regression requires the assumption of independence of the observations, conditional on the explanatory variables and uncorrelated residual errors. This assumption is usually not met when analyzing nested data such as ours. We therefore chose to use a generalized linear mixed model approach, fitting a two level random intercept logistic regression[5]. This model is still quite efficient, allowing the simultaneous examination of the effects of group-level and individual background variables on occurrence of abortion, and thus accounting for the non-independence of observations within groups. From the multilevel analysis it is possible to estimate the variance in incidence of abortion between the communities. This variance represents the unexplained variation that remains after accounting for the factors included in the model.

The model specifies as follows:

$$\text{logit}\left\{\Pr\left(y_{ij}=1|x_{ij},\zeta_j\right)\right\}=\beta_1+\beta_2 x_{2j}+\cdots+\beta_n x_{nj}+\zeta_j$$

Where $\Pr\left(y_{ij}=1|x_{ij},\zeta_j\right)$ is the probability of experiencing an abortion (according to each model definition) for the i^{th} woman in the j^{th} cluster. x_{ij} is a vector of covariates corresponding to the i^{th} woman in the j^{th} cluster. The random intercepts $\zeta_j \sim (N,\psi)$ are assumed to be independent and identically distributed across communities j and independent of the covariates x_{ij}. Given ζ_j and x_{ij} the responses y_{ij} for the i^{th} women in the j^{th} clusters are independently Bernoulli distributed.

Finally, to facilitate the interpretation of results, we include in the analysis predicted posterior mean probabilities of having experienced an abortion for each model[6].

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[5] The multilevel models are fitted using the gllamm command in Stata 12. A standard error based on Huber/White/sandwich estimators of the covariance matrix is used in the model along with 30 integration points in the final model to assure a higher level of accuracy (Rabe-Hesketh and Skrondal, 2012)

[6]The elaborations were performed using the application gllapred in Stata (Rabe-Hesketh and Skrondal, 2012)

3. Results

3.1 Abortion: variation in incidence between communities

While the higher incidence of abortion among foreign women emerges as a topic of major concern, wide differences in abortion rates also emerge between different groups of nationalities. Estimates of abortion rate per 1,000 women released for the Italian region of Lombardy[7] (Farina, 2010; Farina and Ortensi, 2011) highlight wide differences between communities.

Higher levels of abortion are observed for nationalities where the "first generation female worker model" is most widespread, as in the case of women from Eastern Europe, Latin America and Nigeria. Conversely, the incidence of abortion is lower for nationalities where family migrants greatly outnumber other categories of migration among women, as in the case of Egypt or Pakistan.

Table 1. Abortion rate per 1000 women of age 15-49 by nationality and broad groups of citizenship. Lombardy 2005-2009

Abortion rate	***2005***	***2006***	***2007***	***2008***	***2009***
Lombardy	**9.7**	**9.7**	**9.8**	**9.1**	**8.8**
Eastern Europe	**35.4**	**29.8**	**26.2**	**20.3**	**17.6**
Albania	20.2	17.5	16.4	15.2	13.3
Bulgaria	25	21	14.8	13.6	11.8
Poland	18.4	10.8	13.5	10	10.8
Romania	60.5	51.5	40.7	22.7	20.9
Ukraine	30	26	22.8	20.2	16.1
Russia	31.5	29.1	19.8	23.2	14.6
Moldova	42.1	23.7	47.8	47.3	28.7
Asia	**27.3**	**25.6**	**22.1**	**23.5**	**20.5**
China	34.7	31.5	27.3	32.7	28.3
Philippines	21	16.8	16.3	18.3	15.4
Pakistan	16	15.1	13.1	12.6	17.4
Northern Africa	**18.6**	**19**	**16**	**15.4**	**13.8**
Egypt	8.1	12	2.5	8.6	6.4
Morocco	22.4	22.3	20	18.4	17.6
Sub Saharan Africa	**46.1**	**36.9**	**38.4**	**33.1**	**31.6**
Burkina Faso	35.3	22.4	34	23.3	33.3
Cape Verde	68.2	43	29.7	29.7	31.8
Cameroon	97.1	50	69.2	52	51.1
Côte d'Ivoire	52.3	52.6	51.6	39	39.7
Ghana	33.2	29.2	29	21.1	18.1
Mauritius	31.9	22.7	13.2	12.4	19.2
Nigeria	77.3	49.3	54.2	57.6	60.5
Somalia Eritrea Ethiopia	33.1	26	33.4	27.9	23.4
Senegal	35.9	35.7	31.3	26.9	21.9
Latin America	**49.7**	**43.4**	**38.7**	**37.2**	**32.2**
Cuba	37.6	30.4	34	31.4	31.8
Bolivia	203.2	190.9	187.1	145.4	72.5
Ecuador	47.7	35.2	29.8	27.5	25.4
Peru	57.5	53.2	44.9	48.1	44.1
Brazil	24.3	25.4	21	21.4	18.6
All foreign women from the main countries of origin	**35.8**	**31.4**	**27.9**	**24.5**	**21.3**

Source: Current authors' elaboration on Istat D12 and Regional Observatory for Integration and Multi-ethnicity

[7]Abortion rate by nationality including undocumented migrants are currently not available at national level. In the case of Lombardy estimates of the number of women by nationality including undocumented migrants as well as migrants that are legally present but not registered at the Office of Vital Statistics are provided from 2001 by the ISMU Foundation. This information is very important to avoid overestimation, as the information about the legal status of the women is not recorded.

Analysis of official microdata and ORIM survey data on Lombardy also shows that jobless, unmarried and low educated women are much more highly represented among women hospitalized for abortion than in the whole population.

Table 2. Incidence of socio-economical characteristics by area of origin and type of population, Lombardy – Italy 2009 (percentages)

Women's characteristics	*Population*	*Eastern Europe*	*Asia*	*Northern Africa*	*Sub-Saharan Africa*	*Latin America*
Unemployed	*Women hospitalized for abortion*	21.7	12.5	19.1	30.9	20.9
	All foreign women	9.7	5.2	9.5	17.1	7.1
Unmarried, Divorced or Widowed	*Women hospitalized for abortion*	47.7	46.4	61.7	26.5	68.1
	All foreign women	41.8	23.8	39.3	28.2	53
Highest level of educational attainment': University Degree	*Women hospitalized for abortion*	5.8	4.7	2.3	4.1	3.8
	All foreign women	20.1	16.7	8.3	17.1	15
Highest level of educational attainment': High school	*Women hospitalized for abortion*	32.0	19.6	22.4	22.0	32.6
	All foreign women	47.4	32.5	35.2	33.2	47.8
Highest level of educational attainment': Junior High school /middle school	*Women hospitalized for abortion*	49.6	54.8	52.0	55.0	52.9
	All foreign women	28.4	36.8	42.2	41.9	34.3
No Diploma	*Women hospitalized for abortion*	12.7	20.9	23.2	18.9	10.7
	All foreign women	4.1	13.9	14.3	7.8	2.9

Source: Current authors' elaboration on Istat D12 and Regional Observatory for Integration and Multi-ethnicity

3.2 Sample characteristics and induced abortion

The mean age of the women interviewed is 32. Some variability exist between nationalities, with a higher percentage of women aged 40 and over among women from Ukraine and Moldova. These women also have a higher overall age at arrival. The overall level of education is not negligible, with a higher prevalence of university graduated among Egyptians (37%) and from Eastern Europe, especially those from Ukraine (35.2%) and Moldova (27.9%). The percentage of married women varies widely between nationalities, with higher percentages in communities mostly characterized by male breadwinner migration such as women from India (87.6%), Bangladesh (79.9%) or Egypt (79.8%).

As for information about sexual and reproductive health, median age at first intercourse is 19, but this value is generally lower among migrants from sub-Saharan Africa, excluding Somali.

The proportion of women who experienced at least one abortion varies widely from 60% among Chinese to 4.9% among Pakistani. There is a narrower range in the incidence of women who had at least one experience of abortion in Italy, with the highest percentages among Ghanaians (30.7%) and the lowest again among Pakistanis.

Table 3. Sample characteristic

Country of origin	*Number of interviews (unweighted)*	Median age	Median age at arrival	% graduated	% Currently married	Main religion	% housewives
Albania	100	33	25	18.2%	70.0%	Muslim (54%)	27.1%
Bangladesh	19	29	25	0.0%	79.9%	Muslim (100%)	74.7%
Burkina Faso	99	34	25	0.0%	61.2%	Muslim (61.3%)	26.9%
China	80	32	25	5.1%	50.0%	Other* (45.4%)	19.6%
Côte d'Ivoire	109	35	24	3.5%	56.9%	Christian (57.4%)	18.2%
Ecuador	79	32	24	6.7%	39.6%	Christian (95.7%)	5.7%
Egypt	270	30	24	37.6%	79.8%	Muslim (75.7%)	63.1%
Eritrea	120	31	20	12.6%	49.8%	Christian (78.1%)	13.8%
Ethiopia	89	34	25	9.6%	42.9%	Christian (86.2%)	9.1%
Ghana	62	34	23	12.0%	49.0%	Christian (84.7%)	21.9%
India	80	31	27	4.5%	87.6%	Other* (100.0%)	74.5%
Moldova	79	37	29	27.9%	58.2%	Christian (93.7%)	9.4%
Morocco	99	31	24	18.9%	68.2%	Muslim (91.9%)	45.7%
Nigeria	71	30	23	10.8%	30.8%	Christian (86.3%)	18.5%
Pakistan	29	28	23	0.0%	63.3%	Muslim (100%)	73.4%
Peru	79	34	24	10.7%	42.9%	Christian (96.3%)	7.9%
Philippines	80	33	24	20.5%	54.4%	Christian (97.8%)	4.5%
Romania	160	31	26	15.1%	60.3%	Christian (80.4%)	26.3%
Senegal	120	33	27	4.2%	65.0%	Muslim (96.9%)	44.6%
Somalia	80	36	25	9.5%	36.9%	Muslim (97.9%)	10.8%
Sri Lanka	30	29	20	8.0%	52.5%	Other* (82.4%)	12.6%
Ukraine	77	37	28	35.2%	48.1%	Christian (80.5%)	16.9%
Total	*2.011*	32	25	15.5%	59.3%	Christian (52.3%)	28.3%

Table 4. Percentage of women aged 15-49 according to characteristics of interest.

Country of origin	*Median age at first intercourse*	*Women who had had at least one abortion*	*Women who had had at least one abortion in Italy*	*% of sexually active women* women who always used only modern methods of contraception*	*% of sexually active women* who never used contraception*
Albania	19	17.6%	8.4%	4.8%	7.8%
Bangladesh	18	5.3%	5.3%	68.6%	18.6%
Burkina Faso	16	15.6%	11.8%	69.9%	22.8%
China	20	60.7%	26.7%	64.5%	17.1%
Côte d'Ivoire	17	36.3%	20.4%	48.3%	5.8%
Ecuador	17	22.4%	18.0%	25.1%	0.0%
Egypt	22	10.0%	8.5%	63.5%	21.0%
Eritrea	19	25.5%	23.6%	28.2%	9.5%
Ethiopia	17	19.0%	6.3%	78.3%	3.3%
Ghana	16	35.1%	30.7%	60.7%	8.8%
India	22	10.0%	8.5%	51.8%	10.8%
Moldova	18	27.7%	6.0%	24.4%	3.3%
Morocco	21	8.8%	5.4%	60.8%	8.9%
Nigeria	17	54.9%	26.0%	52.3%	5.9%
Pakistan	20	4.9%	0.0%	35.4%	35.4%
Peru	18	27.9%	19.5%	16.9%	1.5%
Philippines	22	9.2%	9.2%	31.0%	8.9%
Romania	18	44.6%	23.7%	23.9%	13.1%
Senegal	20	11.1%	7.4%	34.8%	28.2%
Somalia	24	29.5%	28.1%	22.3%	56.4%
Sri Lanka	20	20.6%	20.6%	65.7%	27.1%
Ukraine	18	50.1%	14.5%	11.7%	12.9%
Total	19	26.2%	14.4%	34.0%	10.7%

*Women who had at least a first intercourse

Contraception also plays an important role not so far not fully investigated as no data are available for migrants. Evidence from our data shows that even if some women were born and socialized in countries where contraception use is low, unmet need[9] in emigration is negligible, at around 3%;

[9] According to the United Nations (2011),women with unmet need are those who are fecund and sexually active but are not using any method of contraception, and report that they do not want any more children or that they want to delay the birth of their next child.

this means that risk of abortion is not directly predicted simply by the incidence of the use of contraception. The most important point is that, even if the incidence of the use of contraception among migrants is quite high, the exclusive use of modern contraceptives is considerably lower, suggesting that contraceptive failures rather than contraceptive use may be related to the occurrence of abortion.

Among women who had had at least one sexual intercourse, high percentages of never-users of contraception are observed among women from Somalia and Pakistan. On the other hand, women who always used only modern methods of contraception are highly represented among women from Ethiopia, Burkina Faso and Bangladesh.

3.3 Multilevel Analysis

To analyze the impact of individual and community factors on the incidence of abortion, only women who have had at least one intercourse have been selected. The multilevel analysis is therefore based on a subsample of about 1,500 women (level 1) grouped in 22 nationalities of origin (level 2).

To measure the overall degree of homogeneity in occurrence of abortion within a community we fit a multilevel logistic model without observed covariates, and calculate intracommunity correlation. For different women i and i' in the same community j the intracommunity correlation is 0.16. After controlling for individual factors such as age (allowing a square term), previous use of contraception, education, religion and age at first intercourse, and macro factors such as the total fertility rate (TFR) in the country of origin (allowing a square term) and the proportion of family migrants among women in the community, the residual intraclass correlation ρ is reduced by 63% and is thus very small. The quantification of the unobserved heterogeneity obtained by considering the median odds ratio for pairs of randomly sampled women having the same covariate values[10] and comparing the woman who has the larger community random intercept with the woman who has the smaller community random intercept is 1.543, which is not a very large odds ratio compared with those for observed variables included in the model.

Education proved to be a significant covariate, with higher odds ratios for women with higher levels of educational attainment. More highly educated women therefore seem to be more likely to control

[10] This measure of heterogeneity was suggested by Larsen (2000) et al. $OR_{median} = exp\left\{\sqrt{2\psi}\phi^{-1}(\frac{3}{4})\right\}$

unwanted fertility by means of abortion. Religion is also significant, with higher odds for non-believers and women believing in other religions, relative to Muslim women[11].

Contraceptive use is, not surprisingly, significant: the odds of experiencing at least one abortion for women who used only modern methods of family planning are only 70% of the corresponding odds for other women. At the same time women who never used any contraceptive method have an even lower odds ratio (OR=0.51).

Table 5. Model 1: Coefficients from multilevel model examining the odds of experiencing at least one abortion

Fixed part	*Coef.*	*OR*	*S.E.*	*Sig.*	*95% CI*
Women's characteristics					
Age	0.164	1.179	0.077	0.012	(1.037;1.34)
Age (squared term)	-0.002	0.998	0.001	0.040	(0.996;1)
Education junior high school (ref. Primary or No education)	0.638	1.892	0.405	0.003	(1.244;2.879)
Education high school /university (ref. Primary or No educ.)	0.283	1.327	0.282	0.183	(0.875;2.012)
Religion: Christian (ref. Muslim)	0.215	1.240	0.273	0.328	(0.806;1.908)
Religion: Other (ref. Muslim)	1.068	2.909	0.934	0.001	(1.55;5.458)
Religion: None (ref. Muslim)	0.726	2.066	0.751	0.046	(1.013;4.215)
Age at first intercourse	-0.101	0.904	0.022	0.000	(0.862;0.948)
Use of contraception: Never	-0.672	0.511	0.126	0.007	(0.315;0.829)
Use of contraception: Only modern contraception	-0.333	0.716	0.109	0.029	(0.531;0.966)
Communities' characteristics					
Total fertility rate	-1.046	0.351	0.154	0.017	(0.149;0.831)
Total fertility rate (squared term)	0.156	1.169	0.071	0.010	(1.038;1.317)
% family migrants	-0.020	0.981	0.006	0.003	(0.968;0.993)
Constant	-1.035	0.355	0.455	0.419	(0.029;4.365)
Random part					
ψ	0.207				
OR_{median}		1.543			
ρ	0.591				
Log likelihood	-758.1				
Number of level 1 units	1,563				
Number of level 2 units	22				

Likelihood-ratio test of ρ =0: chibar2(01) = 18.73 Prob >= chibar2 = 0.000

The effect of age at first intercourse is also substantial: an increase of 10 years in the beginning of sexual activity amounts to an odds ratio of 0.37.

Total fertility rate in the country of origin is statistically significant and the highest incidence of abortion is more likely for countries with lowest levels of total fertility rate.

The introduction of a community variable shows that the incidence of family migration is negatively associated with the incidence of abortion. For example an increase of 20% in the incidence of family migration among a community amounts to an odds ratio of 0.67. This finding is consistent with previous studies that emphasized the impact of female migration models on fertility (Farina and Ortensi, 2011).

Model 2 accounts for abortion in Italy. According to the multilevel model without the inclusion of individual and community variables, for different women i and i' in the same community j the intracommunity correlation is 0.1: a slightly lower level than that observed in the previous model.

[11]Other religion i.e. not Muslims nor Christians

After controlling for variables significantly associated with the dependent variable, the residual intraclass correlation reduces by 39% and the median odds ratio is 1.4, a lower value than the odds ratios for variables included in the model.

Table 6. Model 2: Coefficients from multilevel model examining the odds of experiencing at least one abortion in Italy

Fixed part	*Coef.*	*OR*	*S.E.*	*Sig.*	*95% CI*
Women's characteristics					
Women had at least one abortion abroad	2.296	9.930	1.783	0.000	(6.983;14.119)
Women never used contraception	-0.710	0.492	0.143	0.014	(0.278; 0.869)
Women used only modern contraception	-0.479	0.619	0.112	0.008	(0.435; 0.882)
Year of arrival in Italy	0.001	1.001	0.000	0.006	(1.000; 1.001)
Age at arrival in Italy	-0.064	0.938	0.012	0.000	(0.915; 0.961)
Age at arrival in Italy (squared term)	0.000	1.000	0.000	0.000	(1.000; 1.000)
Constant	-2.048	0.129	0.059	0.000	(0.052; 0.317)
Random part					
ψ	0.123		0.094		
OR_{median}		1.4			
ρ	0.036				
Log likelihood	-540.392				
Number of level 1 units	1,579				
Number of level 2 units	22				

Likelihood-ratio test of ρ =0: chibar2(01) = 3.02 Prob >= chibar2 = 0.041

Controlling for significant variables included in the model, previous experience of abortion abroad is the main predictor of experiencing an induced abortion in Italy (OR = 9.93). Age at arrival is also consistently associated with abortion: women with higher age at arrival have lower odds of voluntary termination of a pregnancy. Again, exclusive users of modern contraception are less likely to experience abortion in Italy (OR = 0.62) while the odds for women who never used contraception is even lower (OR = 0.49). No community-level variable is significant.

Table 7. Predicted mean population average and posterior mean for subjects in the sample according to model 1 and model 2

Country of origin	***Posterior mean probabilities for subjects in the sample according to model 1***	***Posterior mean probabilities for subjects in the sample according to model 2***	***Predicted population average (marginal probability) according to model 1***	***Predicted population average (marginal probability) according to model 2***
Albania	.224	.123	.244	.162
Romania	.426	.247	.367	.234
Ukraine	.487	.201	.404	.253
Moldova	.298	.110	.381	.152
Bangladesh	.094	.065	.104	.067
Sri Lanka	.286	.164	.307	.151
China	.537	.253	.389	.226
Philippines	.132	.092	.227	.096
India	.138	.077	.195	.075
Pakistan	.063	.058	.067	.066
Côte d'Ivoire	.318	.198	.222	.194
Burkina Faso	.182	.100	.228	.090
Egypt	.086	.082	.061	.079
Ethiopia	.217	.099	.248	.133
Ghana	.286	.245	.193	.173
Morocco	.092	.078	.111	.097
Nigeria	.490	.259	.354	.268
Senegal	.116	.079	.134	.086
Somalia	.307	.193	.394	.163
Eritrea	.254	.221	.268	.197
Ecuador	.228	.147	.303	.116
Peru	.277	.171	.285	.156
Total	***.261***	***.151***	***.235***	***.145***

Predicted probabilities[13] according to model 1 show that, holding covariates constant, the highest probabilities of abortion are estimated for women from Ukraine, Somalia and China while the highest probabilities of experiencing at least one abortion in Italy are predicted for women from Nigeria, Ukraine and Romania.

Posterior mean probabilities for subjects in the sample highlight the fact that a higher incidence of specific characteristics related to abortion results in even higher mean probabilities estimates for some nationalities such as China, Nigeria, Ukraine and Romania.

4. Discussion

The findings from this analysis indicate that lifetime occurrence of abortion is related to individual factors such as education or religion and to community factors as the level of fertility in the country of origin and the most common migration model in each community.

The impact of education on abortion is usually found significant in all studies but it largely depends on the general level of education in each country. The positive relationship found between education and abortion could be ascribed to the intention on the part of educated women to complete their education and invest in their human capital before starting a family (Bankole et al., 1999). More highly educated women might also be more likely even to consider the possibility of abortion than other women with an unintended pregnancy, being less bound by personal, social or religious barriers such as partner's objections or community values. It is worth noting also that the perceived cost of having a child, in terms of employment and career development opportunities, is also likely to be higher for women with higher levels of education.

Religion plays a role that needs to be interpreted in two ways. At a personal level, Muslim women are less likely than other women to experience abortion, a fact that could be linked to the greater power of traditional values or to a stronger religious affiliation[14]. At the macro level religion could also be a proxy for existing barriers to abortion in the countries of origin. As regards the nationalities included in our sample, there is no Muslim country where abortion is permitted without restriction, whereas several appear among countries where abortion is prohibited (e.g. Egypt, Senegal or Somalia) or subjected to strong restrictions (Singh et al., 2009).

The use of contraception is also a crucial variable, as the lifetime use of exclusively modern contraception has an undeniable protective effect on the risk of abortion. The widespread

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[13]Predicted population-averaged probabilities $\bar{\pi}(x_{ij}) = \int \widehat{Pr}(y_{ij} = 1|x_{2j},..,x_{nj},\zeta_j)\phi(\zeta_j;0,\hat{\psi})d\zeta_j$ were obtained using gllapred procedure in STATA (Rabe-Hesketh and Skrondal, 2012) specifying options "mu" (for the mean response, here a probability) and "marginal" (for integrating over the random-intercept distribution). Posterior mean probabilities for women in the sample $\bar{\bar{\pi}}_j(x_{ij}) \equiv \int \widehat{Pr}(y_{ij} = 1|x_{2j},..,x_{nj},\zeta_j)\ Posterior(\zeta_j|y_{1j},\dots,y_{nj},X_j)d\zeta_j$ were obtained using gllapred specifying the mu option.

14 The information available deal only with the religious belief without any information about involvement in terms of affiliation and frequency of attendance at services

combination of modern and traditional contraception appears to be a key explanation for the high incidence of abortion among immigrants, even in a context of high fertility control. Migration in itself could also cause a discontinuity in the use of contraception, or difficulties in finding the same method used in the country of origin, leading to a temporary use of less safe or of traditional methods.

It is also very interesting to note that women who never used any family planning method are less likely to resort to abortion. In this case too a double interpretation is possible. Never-users of family planning may avoid using contraception because they want large families. Conversely, if the reason that they do not use contraception is ethical or religious, they will probably not even consider the possibility of terminating an unwanted pregnancy.

An increase of 10 years in the age at first intercourse correspond to an odds ratio of having experienced an abortion of 0.365. The social control of sexuality (e.g. with strong religious or moral opposition, in the family or in society, to premarital sex) provides an important protection against abortion especially in communities where the proportion of childless women at first contraceptive use is low.

Community effects are also significant, as is the correlation with national low total fertility rate. The relation with the TFR can be interpreted in two ways: women coming from countries with high fertility may have a higher desire for larger families and therefore have a lower need to limit family size. On the other hand countries where the total fertility rate is low are more represented among those where abortion is not subject to restrictions. Most of them are Eastern European countries where abortion has historically been very widespread, to the extent of being a main form of birth control[15]

The indirect role of abortion in the country of origin is also confirmed by the fact that the highest lifetime probabilities of abortion estimated from the model are consistent with the corresponding rates of abortion in the countries of origin, when available (Sedgh G. et al., 2012).

A high incidence of the family migration model in a community is a protective factor. An unintended pregnancy can result in the failure of the migration project for female-breadwinner migrants due to the difficulty, shared with Italian women, of combining motherhood and paid work, including the risk of losing the job because of the pregnancy. Conversely, for women who migrated in the role of caregivers, maternity is usually postponed before migration and is followed by a process of catching-up after moving. Previous studies showed that family migrants occasionally resort to abortion in higher numbers, probably to avoid financial difficulties for the family (Farina and Ortensi, 2011).

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15 Some researcher talk about “Abortion culture” a term used to characterize the nature of birth regulating behavior in the formerly socialist countries of Central and Eastern Europe up to the end of the 1980s (Stloukal 1999).

Results from the model about abortion in Italy are even more interesting.

Here the role of contraception is the same as observed in the previous model.

Age at arrival has a negative correlation with the risk of abortion[16]: the higher the age at arrival the less the number of fertile years spent in emigration. Moreover, especially for family migrants, the need to catch up on postponed fertility is likely to prevail over the need to limit fertility and over the risk of unwanted pregnancies.

But the most interesting finding is the role of previous experiences of abortion in the country of origin: as model 2 shows, women who had at least one abortion abroad have nearly 10 times the odds of having an abortion in Italy. The high incidence of abortion among immigrant women observed in Italy cannot therefore be related simply to hardship occurred in emigration such as financial difficulties or unemployment. Nor can it be related simply to other difficulties such as that of reconciling maternity and work, lack of family support or to discontinuity in the use of contraception, nor to the widespread existence in some communities of sexual exploitation (which is the most popular explanation of the high abortion rate observed for immigrants in Italy) (Farina, 2012). These conditions can surely play an important role as shown in section 3, but the phenomenon is clearly strongly related to previous experience of abortion in the country of origin. Women from countries where abortion is widespread (e.g. Eastern Europe and China) tend to export this mode of fertility control in emigration.

The increase in the numbers of abortions observed in Italy in recent years may therefore be related to one change - perhaps the major change - observed in the female migrant population in the last decade: the beginning of new flows of workers, most of them from countries characterized by low fertility and high incidence of abortion.

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[16]An increase of 5 years in the age at arrival confers an odds ratio of 0.725 of having an abortion in Italy while an increase of 10 years confers an odds ratio of 0.526.

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