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Cervical and breast cancer screening participation and utilization of maternal health services among immigrant women in Southern Italy

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Abstract

Objectives

Among ten of the main issues regarding women's health cancer screening and maternal health are included, and migrants often tend to be the most vulnerable population groups, especially women.

To explore breast and cervical cancer screening participation and to acquire information regarding access to healthcare services during pregnancy, childbirth and the postpartum period among age eligible immigrant women in Southern Italy.

Methods

A structured questionnaire was used to collect data from each participant**.** Women aged 25-64 years who had never experienced hysterectomy and women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer were considered eligible for evaluation of cervical and breast screening participation, respectively. Moreover, women who had delivered at least once in Italy were enrolled to describe antenatal care services use.

Results

On study population of 464 women, 39.1% and 45.6% had had cervical or breast screening, respectively. About one third of immigrant women (32.3%) have experienced a Pap-test for screening purposes within three years from interview. Among those who had had a mammogram, less than one quarter (20.8%) had their mammography within the recommended time interval of two years. About 80% of the respondents did not report difficulties of access and use of prenatal and postpartum services.

Conclusion

This study provides currently unavailable information about adherence to cancer screening and maternal and child health that could encourage future research to develop and test culturally appropriate, women-centered strategies for promoting timely and regular cancer screening among immigrant women in Italy.

Key words:

Cancer screening, immigrant, Italy, maternal health, women.

Strengths and limitations of this study

- The high participation rate (92.3%) is extremely satisfactory and restricts one major potential source of bias in the results.
- Immigrants who did not speak Italian or who had low literacy levels have not been excluded from the study, helped by linguistic and cultural mediators.
- The sample may not be representative of all immigrants within the region, but only of those connected to NPOs and with a regular stay permit.
- There may be an effect of recall bias on self reported information about CS screening practices.

Cancer screening participation and utilization of maternal health services among immigrant women in Southern Italy

Background

Estimates from the United Nations show that women make up approximately half of the world's one billion migrants.[1] The effects of migration on women's health are varied and hard to predict and may be determined by a number of factors: the conditions under which the migration occurred; how well a particular individual has integrated in the host society, the social status of the individual in the host country, and the health conditions that are existent in the host country.

Cancer screening and maternal health have been included among the ten main issues pertinent to women's health, whether it be in immigrants or native inhabitants.[2] Studies have indicated that migrants tend to be the most vulnerable population groups when it comes to healthcare, more so in the case of women.[3]

Two of the most common cancers affecting women are breast and cervical cancers. Detecting both these cancers early is key to keeping women alive and healthy. Increased health risks have been noted immigrants and ethnic minorities who also may receive less healthcare than the native population,[4,5] whilst at the same time numerous studies have documented lower participation in cancer screening programs among various migrant groups.[6-8] Furthermore ethnic minority women residing in Western countries are more likely to be diagnosed with advanced-stage disease and hence have higher mortality rates,[9] often as a result of lower utilization of timely cancer screening services.[10-12]

Over the course of the last century there have been many tremendous improvements in pregnancy and childbirth care, but the benefits of these have not extended everywhere and to everyone. Compared with the native population, maternal health has also been suggested to be worse among migrant women,[13] with many studies, including social, economic, behavioral, and environmental factors in their findings.[14-17]

The aims of this study were to explore breast and cervical cancer screening participation and to acquire information regarding access to healthcare services during pregnancy, childbirth and the postpartum period among age eligible immigrant women in Southern Italy.

Methods

The survey was conducted from May 2012 until April 2013. The study population consisted of a specific subset of immigrants. For this study, immigrants were defined as those from low or middle-income countries according to the classification of the World Bank based on per capita GDP.[18] Tourists were excluded.

Details regarding sampling of individuals for this study have been described elsewhere.[19] In addition, women aged 25-64 years who had never experienced hysterectomy and women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer were considered eligible for evaluation of cervical and breast screening participation, respectively. Moreover, women who had delivered at least once in Italy were enrolled to describe antenatal care services use.

Before interview, the research team presented the aims of the study, emphasized the anonymity of the responses and acquired informed written consent. All questionnaires were administered by physicians who had been previously trained, standardized and evaluated in interview methods. On average, the interview lasted ten minutes, and, if necessary, a cultural mediator supported the interviewers with information and translation of the different views and concepts relevant to an individual's cultural background.

Survey instrument

A structured questionnaire was used to collect data from each participant**.** Socio-demographics included information on gender, age, marital and legal status, education level, religion, nationality, working activity, duration of residence in Italy. The questions on lifestyle and health status included information on physical activity, smoking habits, alcohol consumption, chronic and infectious diseases. The questions on participation in

screening programs included breast and cervical CS practices. In Italy, organized nationwide CS programs include personal invitations for a Pap-test sent to women aged 25-64 years every three years and for mammography screening to women aged 50-69 years every two years. Uptake of cervical CS was determined by asking 'Have you ever undergone Pap test for control without any symptoms?'. Women who answered affirmatively were asked 'When was the last time you underwent Pap test?'. Women who had undergone Pap test within the previous three years were considered as 'uptake', as corresponds to women who comply with the recommended screening period. Uptake of breast CS was determined by asking, 'Have you ever undergone a mammography for control without any symptoms?'. Women who answered affirmatively were asked a second question, 'When was the last time you had a mammography?'. Women who reported that they had undergone their most recent mammography within the previous two years were considered as 'uptake', as corresponds to women who comply with the recommended screening period.

The questionnaire also contained items on services utilization during pregnancy and childbirth. Access to antenatal and postnatal care was assessed by number and timing of examination, such as time of first pregnancy appointment, number of prenatal visits and ecographies, antenatal care by health-care professionals including general practitioner (GP), gynecologist, nurse, midwife/obstetrician, or other care providers, prenatal screening and diagnostic testing (i.e. maternal serum markers such as beta human chorionic gonadotropin, pregnancy-associated plasma protein A, amniocentesis, etc.), smoking habits during pregnancy, counseling on infant feeding and postpartum contraceptive methods, reasons of access to maternal and newborn healthcare services (family planning centers and child care service centers). All information was self-reported.

The study protocol was ratified by the Institutional Ethical Committee ('Mater Domini' Hospital of Catanzaro, Italy) (20/04/2012).

Statistical analysis

Descriptive statistics were presented to give an overview of the study participants. Bivariate analysis was done to find the potential relationship between the explanatory variables and the outcome variable.

Multivariate stepwise logistic regression analysis was performed. One model was developed including those variables potentially associated with having received cervical CS through Pap smear in the previous three years (Model 1) (0 = no, 1 = yes). Model building strategy and particularly ways to include independent variables in the model (ordinal or categorical) took into account how each of these ways better fitted the data at the bivariate analysis and we chose that way in the multivariate analysis. In the model the explanatory variables included were the following: age (continuous), marital status (1 = married, 2 = other), children (1 = no, 2 = yes), education level (ordinal: 1 = ≤ 7 yy, 2 = 8-13 yy, 3 = university degree), employment status (four categories: 1 = unemployed, 2 = housekeeper, caregiver, 3 = manual worker; 4 = sedentary workers) included as a dummy variable with the unemployed being the reference category, nationality (four categories: 1 = European, 2 = African, 3 = Asiatic and Oceanic, 4 = South American) included as a dummy variable with the European being the reference category, length of stay in Italy (ordinal: 1 = 1-2 yy, 2 = 3-5 yy, 3 = 6-8 yy, 4 = ≥ 9 yy), self-reported legal status (1 = regular, 2 = irregular), chronic diseases (1 = no, 2 = yes), physical activity (1 = no, 2 = yes), current smoker (1 = no, 2 = yes), alcohol consumption in the previous 30 days (1 = no, 2 = yes). The significance level for variables entering the logistic regression models was set at 0.2 and for removal from the model at 0.4. Adjusted odds ratio (ORs) and 95% confidence intervals (CIs) were calculated. The data were analyzed using the Stata software program, version 11.2.[20]

Results

The participants were between the ages of 18 and 70 (mean 40.1 y) and only 13.7% had obtained university degree. More than half (55.9%) of women were

housekeepers or caregivers. A low percentage (11.1%) declared to be irregular. 164 (32.6%) had been living in Italy for 9 years or more. Paid employment was the most common reason for migration (65.8%) among participants. Most women were from Europe (46.5%) and main country of origin was Ukraine (25.8%). Only 14.7% were current smokers. The vast majority of women (70.6%) reported no alcohol drinking in the previous 30 days. About 48% of the respondents were affected by chronic diseases.

Of the 503 immigrant women who were approached for the study, 492 met at least one of the inclusion criterion and 464 were enrolled, giving a participation rate of 94.3%.

Table 1 shows results on CS practices. Rates of CS were low for cervical as well as breast cancer. On eligible study population, 39.1% and 45.6% had had cervical or breast CS, respectively. About one third of immigrant women (32.3%) have experienced a Pap-test for screening purposes within three years from interview. Among those who had had a mammogram, less than one quarter (20.8%) had their mammography within the recommended time interval of two years. Among eligible immigrants, pap smear in the previous three years was significantly more likely in South American (OR=8.36; 95% CI 1.99-35.06; p=0.004) and Asian (OR=0.41; 95% CI 0.22-0.76; p=0.005) female immigrants with greater duration of residence in Italy (OR=1.60; 95% CI 1.29-1.97; p<0.001) (Table 2).

Table 3 shows main pregnancy, prenatal and post-birth care characteristics of the eligible population. The number of immigrant women who delivered in Italy at least once was 123. About 80% of the respondents did not report difficulties of access and use of prenatal and postpartum services. In terms of prenatal care, 70.9% of immigrant women had their first pregnancy appointment within 12 weeks of pregnancy and 84.2% had two or more prenatal visits. Only 12.9% of mothers underwent fewer than two prenatal ultrasound checks. More than half (56.3%) of pregnant women were not submitted to prenatal diagnostic testing (maternal serum markers such as beta human chorionic

gonadotropin, pregnancy-associated plasma protein A, amniocentesis). Only about a third (27%) of respondents participated to prepartum course/prenatal class, although Italian National Health Service guarantees free access to this healthcare service. The vast majority (79.7%) were nonsmokers before pregnancy. With regard to postpartum care, 79.8% of the respondents reported a visit within 12 months from delivery. 85 (69.6%) mothers chose breastfeeding only and less than half (45.9%) of participants received counseling on postpartum contraceptive methods. More than half (54.5%) used family planning centers; the vast majority (86%) of mothers selected pediatrician like their child's physician, whereas the remaining part of the sample preferred specialist or a maternal healthcare centre physician or none at all. Moreover, among immigrant women with children living in Italy, 207 (96.7%) chose to immunize their children with infants' mandatory and recommended vaccinations included in the national programs.

Discussion

The present study sought to describe cancer screening (CS) practices and antenatal care services use among a sample of age eligible immigrant women in the South of Italy.

The existence of a notable difference in preventive practice utilization and motherhood protection according to immigration status has been reported in previous studies.[21-24] Immigrant women may not be accustomed to having regular health check-ups in their home countries and may be less familiar with the opportunity of routine screening to detect health problems before the onset of symptoms.[25] These shortcomings may reduce the women's ability to maintain their health in specific periods during the lifetime (e.g. during pregnancy) and to participate in preventive care.

In our immigrants sample, adherence to screening recommended practices is discernibly much lower than those reported in several studies[4,26] and than those of the Italian native populations.[27] Indeed, the percentage of Italian women who underwent routine cervical and breast CS were 77% and 71%, respectively.[27] It is obvious that the

populations could be different with respect to cultural and socioeconomic factors, but the participation is slightly lower for immigrants than for native regional populations. In Italy there is a geographical difference in CS coverage, with the highest percentage of women who actually participate in them being in the north of the country and the lowest in the south.[28] Low coverage for CS in our sample may be also related to the only recently organized screening program in Southern regions. In our area of study, among native citizens, CS for early detection of breast and cervical cancers has reached less than half of the target population: regional figures have shown that cervical and breast CS rates had decreased to 34.5% and 49.9%, respectively.

Only less than one-third of the sample had received CS at the recommended time intervals, and for this reason efforts should be made to emphasize that it is not enough to get screened once or sporadically.

The duration of residence in the host country may be a significant predictor of whether an individual migrant adheres to the CS program.[29] The results of our study indicate that being a recent immigrant is a barrier to receiving cervical CS. Certainly women that have spent more time in Italy may be more likely to be proficient in the Italian language, and therefore feel more confident approaching the Italian health-care system. Hence it would be prudent to provide immigrants with culturally sensitive and specific information to overcome any barriers. Organized screening programs may help to reduce ‘‘ethnic’’ disparities by offering a systematic (and free) examination to all the women of the target age groups, and by using specific strategies to reach the most underserved women. The importance of invitation letters has been mentioned,[30,31] and one way of overcoming a language barrier is to send the letter written in the language of the individual migrant as well as that of the country in which they reside.

Our study showed that South American immigrant women had a lower rate of Pap testing when compared with European immigrant women. The Pap smear is a more personal and invasive procedure that may pose particular cultural barriers and thus can

hinder these women from obtaining the appropriate services.[32] Culturally tailored messages are important to promote screening in specific ethnic groups to enable the identification of the target group with these messages. The message must reflect the same values and beliefs of the target group, and it should accommodate literacy levels to ensure comprehension. Working closely with the target group is also crucial to ensure screening participation. It would be important for program developers to contact ethnic group gatekeepers, such as key religious or community leaders.

Immigrant women in our study have experienced an acceptable level of care during pregnancy and childbirth. Indeed, every woman living in Italy, either Italian or foreign, is entitled to motherhood protection, and has the right to participate in a specific programme of care during pregnancy and up to one month after delivery. The provided activities are free and include obstetrical examinations, echographies, instrumental check-ups and tests, childbirth preparation course assistance during labour and childbirth, etc.. In the present study, immigrants were sampled through the third sector and non-profit organizations (NPOs) who work to facilitate immigrants access to healthcare, representing a culturally appropriate channel to increase access, particularly during pregnancy. We also found that education and advice for breastfeeding and newborn care could be improved in our sample.

In general, one way of reducing barriers for participation would be for health-care professionals to introduce immigrant women to preventive care. In particular, GPs could play an important role in this respect, especially when one takes into account that a survey conducted among immigrant populations in the same area showed that 85% of the sample had access to a GP at least once, indicating that immigrants in our area of study had adequate access to primary care.[19] As a result, the acculturation process into the health-care system could be shortened.

Strength and limitations of the study

The strengths of the study lie in the enrollment technique and the high participation rate. The questionnaires were completed by a physician who was not involved in the provision of health care, and helped by a linguistic and cultural mediator. This probably made participants feel safe enough to report all aspects of the preventive health care they received. Furthermore, since linguistic and cultural mediators were available, immigrants who did not speak Italian or who had low literacy levels have not been excluded from the study. The almost 92.3% participation rate is extremely satisfactory and restricts one major potential source of bias in the results. Participation rate remains an important indicator of survey quality, and we believe that the time and effort spent by survey researchers to improve it and the extreme importance of the topic surveyed has made this possible.

Our findings are subject to some limitations. First, we used a convenience sampling method, and this factor limits the generalizability of the results. Furthermore, we chose locations of focus due to logistical constraints, and, therefore, the study sample was composed of people connected to NPOs that assist migrant population and also mediated healthcare encounters. Therefore the views expressed may be different from migrants who have no such connection to those organizations. We found that the vast majority of participants had a regular residence permit and, consequently, health insurance coverage, and we acknowledge that irregular immigrants have been underrepresented. Therefore, the sample may not be representative of all immigrants within the region, but only of those connected to NPOs and with a regular stay permit.

Moreover, the cross-sectional design of our study could not capture temporal changes in the ability of immigrants to use and access health services. There may be an effect of recall bias on self reported information about CS screening practices: patients frequently tend to over-report their use of Pap test or mammogram and underreport the time lapse since their last screening. We have attempted to minimize these biases by

conducting the survey with the use of access measures that are less subjective and measure patient experience, not simply satisfaction.

Conclusion

Even with these potential limitations, this study provides currently unavailable information about adherence to CS and maternal and child health that could encourage future research to develop and test culturally appropriate, women-centered strategies for promoting timely and regular CS among immigrant women in Italy.

List of abbreviations

CS: cancer screening; GP: general practitioner; OR: odds ratio; CI: confidence interval; NPO: non-profit organization.

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Authors' contributions

AB participated in the conception and design of the study, collected the data, contributed to the data analysis and its interpretation, and wrote the first draft of the article. CGAN, EL and CP collected the data, and contributed to the data analysis and interpretation. MP designed the study, was responsible for the data analysis and interpretation, and wrote the article. AB and MP are guarantors for the study.

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Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Data sharing statement

Survey data was not included in the present article and are available from the authors.

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Table 1. Cervical and breast cancers screening practice

Cancer screening services	No.	Percent
Cervix[†]		
Having received cervical cancer screening through Pap smear (419)		
No	247	59
Yes, for control	164	39.1
Yes, I had problems	8	1.9
Time since last pap test, years (418)		
≤ 3	135	32.3
> 3 or never	283	67.7
Breast[#]		
Having received breast cancer screening through mammography (125)		
No	61	48.8
Yes, for control	57	45.6
Yes, I had problems	7	5.6
Time since last mammogram, years (125)		
≤ 2	26	20.8
> 2 or never	99	79.2

[†] All sexually active women aged 25-64 years and having an intact uterus were eligible

[#] Women aged 50-69 years were eligible

Table 2. Multiple logistic regression analysis between several variables and Pap smear in the previous three years

Variable	OR	SE	95% CI	P value
Model Outcome: Pap smear in the previous three years				
Log-likelihood = --228.62, χ2 = 48.79, P value < 0.0001,				
No. of obs. = 402				
Length of stay in Italy, ordinal	1.60	0.17	1.29-1.97	<0.001
Nationality				
European*	1.00	-	-	-
South American	8.36	6.12	1.99-35.06	0.004
Asian	0.41	0.13	0.22-0.76	0.005
Chronic diseases	1.40	0.33	0.88-2.22	0.152
Employment status				
Unemployed*	1.00	-	-	-
Housekeeper, caregiver	0.75	0.18	0.47-1.21	0.244
Manual workers	0.59	0.36	0.18-1.94	0.382
Alcohol consumption in the previous 30 days	0.76	0.20	0.45-1.28	0.302
Not married	0.79	0.19	0.50-1.27	0.336

* reference category

Table 3. Pregnancy, prenatal and post-birth care characteristics of the eligible women

Characteristic	N (%)
Pregnancies in Italy (123)	
1	90 (73.2)
2	24 (19.5)
≥3	9 (7.3)
Smoking status (123)	
Nonsmoker	98 (79.7)
Smoker before pregnancy	14 (11.4)
Smoker	11 (8.9)
Prepartum course partecipation (122)	
No	89 (73)
Yes	33 (27)
Visit after delivery (within 12 months) (119)	
Yes	95 (79.8)
No	24 (20.2)
Counseling on postpartum contraceptive methods (122)	
No	66 (54.1)
Yes	56 (45.9)
Infant feeding (122)	
Breastfeeding only	85 (69.6)
Breastfeeding and bottle-feeding	24 (19.7)
Bottle-feeding only	13 (10.7)
Utilization of family planning clinic (121)	
Yes	66 (54.5)
No	55 (45.5)

The number of participants responding to the questions is indicated in brackets

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item N°	Recommendation	Page
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7,8
Bias	9	Describe any efforts to address potential sources of bias	13
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	9
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9,10
		(b) Indicate number of participants with missing data for each variable of interest	21,23

Outcome data	15*	Report numbers of outcome events or summary measures	9,10; 21-23
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9,10; 21-23
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	10-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Cervical and breast cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

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Cervical and breast cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

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Abstract

Objectives

Women make up approximately half of the world's one billion migrants. Immigrant women tend to be one of the most vulnerable population groups with respect to healthcare. Cancer screening (CS) and maternal and reproductive health have been included among the ten main issues pertinent to women's health.

To explore breast and cervical CS participation and to acquire information regarding access to healthcare services during pregnancy, childbirth and the postpartum period among age eligible immigrant women in Southern Italy.

Methods

A structured questionnaire was used to collect data from each participant**.** Women aged 25-64 years who had not had a hysterectomy and women aged 50-69 years were considered eligible for evaluation of cervical and breast CS participation, respectively. Moreover, women who had delivered at least once in Italy were enrolled to describe antenatal care services use. All women were recruited through the third-sector and non-profit organizations (NPOs).

Results

Rate of cervical CS among the 419 eligible women was low (39.1%), but the vast majority had had a Pap-test for screening purposes (82.3%) within a three year period from interview. Regarding breast CS practices, 45.6% had had a mammography for control purposes. Among these, less than half (26, 45.6%) had their mammography within the recommended time interval of two years. About 80% of the respondents did not report difficulties of access and use of prenatal and postpartum services.

Conclusion

This study provides currently unavailable information about adherence to CS and maternal and child health that could encourage future research to develop and test

culturally appropriate, women-centered strategies for promoting timely and regular CS among immigrant women in Italy.

Key words:

Cancer screening, immigrant, Italy, maternal health, women.

Strengths and limitations of this study

- The high participation rate (92.3%) is extremely satisfactory and restricts one major potential source of bias in the results.
- Immigrants who did not speak Italian or who had low literacy levels have not been excluded from the study, helped by linguistic and cultural mediators.
- The sample may not be representative of all immigrants within the region, but only of those connected to non-profit organizations and with a regular stay permit.
- There may be an effect of recall bias on self reported information about cancer screening practices.

Cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

Background

Estimates from the United Nations show that women make up approximately half of the world's one billion migrants.[1] The effects of migration on women's health are varied and hard to predict and may be determined by a number of factors: the conditions under which the migration occurred; how well a particular individual has integrated in the host society, the social status of the individual in the host country, and the health conditions that are existent in the host country. Studies have indicated that women who migrate tend to be one of the most vulnerable population groups with respect to healthcare.[2,3] In particular, women who do not speak the host country language and do not have a job are less likely to benefit from the health system of the host nation.[4] These women are usually dependent on men and are unaware of the available health services. Governments should ensure that appropriate health services are provided that adequately address all aspects of women's health, particularly cancer screening (CS) and maternal and reproductive health. These basic health care services have been included among the ten main issues pertinent to women's health, whether it be in immigrants or native inhabitants,[5] and they ought to be available to everyone in society in accordance with social equality.

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death among females worldwide, breast cancer incidence rate can be several times higher in more developed countries compared with less developed countries. Cervical cancer is the second most commonly diagnosed cancer and third leading cause of cancer death among females in less developed countries. In several Western countries, cervical cancer rates have decreased by as much as 65% over the past 40 years thanks to screening programs.[6]

Detecting both these cancers early is key to keeping women alive and healthy. Increased health risks have been noted among immigrants and ethnic minorities who also may receive less healthcare than the native population,[7,8] whilst at the same time numerous studies have documented lower participation in CS programs among various migrant groups.[9-11] Furthermore ethnic minority women residing in Western countries are more likely to be diagnosed with advanced-stage disease and hence have higher mortality rates,[12] often as a result of lower utilization of timely CS services.[13-15]

Over the course of the last century there have been many tremendous improvements in maternal and neonatal outcomes in terms of pregnancy-related complications, maternal and infant mortality rates.[16] But the benefits of these have not extended everywhere and to everyone, since significant disparities by race and ethnicity persist. Studies on the determinants of maternal health care delivery suggest that social, economic, behavioral, and environmental factors explain the worse health status among migrants[17-20] in terms of preterm delivery, congenital anomalies, low birth weight, fetal growth restriction, and infant mortality[21-23] when compared with the native population.[24] In Italy, both native and foreign women, have the right to participate free of charge in a specific programme of care during pregnancy and up to one month following delivery.

The aims of this survey were to explore breast and cervical CS participation and to acquire information regarding access to healthcare services during pregnancy, childbirth and the postpartum period among age eligible immigrant women in Southern Italy.

Methods

Study population

The survey was conducted from May 2012 until April 2013. The study population consisted of a specific subset of immigrants. For this study, immigrants were defined as those from low or middle-income countries according to the classification of the World Bank based on per capita GDP.[25] Tourists were excluded.

Details regarding sampling of individuals for this study have been described elsewhere.[26] Briefly, since probability or random sampling can not be carried out on immigrants, a convenience sampling method was applied. Women aged 18 or more living in Italy for at least 12 months were recruited through the third-sector and non-profit organizations (NPOs) that provide support to immigrants and work to facilitate their access to healthcare.

In Italy, organized nationwide CS programs include personal invitations for a Pap-test sent to women aged 25-64 years every three years and for mammography screening to women aged 50-69 years every two years. Therefore, sexually active women aged 25-64 years who had not had a hysterectomy and women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer were considered eligible for evaluation of cervical and breast CS participation, respectively. Moreover, women who had delivered at least once in Italy were enrolled to describe antenatal and perinatal care services use.

Survey instrument

Written consent was acquired prior to interview. A structured questionnaire (available as supplementary file) was used to collect data from each participant**.** Questionnaires were administered by physicians competent in interview methods, with help, when necessary, from a cultural mediator. The interviews lasted ten minutes on average.

A pilot study was undertaken. Validation of the survey instrument was performed through the assessment of internal and test-retest (external) reliability in addition to face and content validity. Test-retest reliability was checked in the pilot study through an additional interview of 50 women within a time interval of 20 days from the first administration of the questionnaire. Face and content validity were examined in order to assess the clarity of the wording of the items which in turn generated new items.

Modifications were made according to the comments recorded by the women in order to clarify the content of the questionnaire and to simplify its wording.

Outcomes and covariates

Socio-demographics included information on gender, age, marital and legal status, education level, religion, nationality, working activity, duration of residence in Italy. The questions on lifestyle and health status included information on physical activity, smoking habits, alcohol consumption, chronic and infectious diseases. The questions on participation in screening programs included breast and cervical CS practices. Uptake of cervical CS was determined by asking 'Have you ever undergone Pap test for control without any symptoms?'. Women who answered affirmatively were asked 'When was the last time you underwent Pap test?'. Women who had undergone a Pap test within the previous three years were considered as 'uptake', corresponding to women who comply with the recommended screening period. Uptake of breast CS was determined by asking, 'Have you ever undergone a mammography for control without any symptoms?'. Women who answered affirmatively were asked a second question, 'When was the last time you had a mammography?'. Women who reported that they had undergone their most recent mammography within the previous two years were considered as 'uptake', corresponding to women who comply with the recommended screening period.

The questionnaire also contained items on services utilization during pregnancy and childbirth. Access to antenatal and postnatal care was assessed by number and timing of examination, such as time of first pregnancy appointment, number of prenatal visits and ecographies, antenatal care by health-care professionals including general practitioner (GP), gynecologist, nurse, midwife/obstetrician, or other care providers, prenatal screening and diagnostic testing (i.e. maternal serum markers such as beta human chorionic gonadotropin, pregnancy-associated plasma protein A, amniocentesis, etc.), smoking habits during pregnancy, counseling on infant feeding and postpartum

contraceptive methods, reasons for access to maternal and newborn healthcare services (family planning centers and child care service centers). All information was self-reported.

The study protocol was ratified by the Institutional Ethical Committee ('Mater Domini' Hospital of Catanzaro, Italy) (20/04/2012).

Statistical analysis

Descriptive statistics were presented to give an overview of the study participants.

Multivariate stepwise logistic regression analysis was performed. One model was developed in which were included those variables potentially associated with having received cervical CS through Pap smear in the previous three years (Model 1) (0 = no, 1 = yes). Women that had had a pap smear not for screening purposes were included in the "no" option of the outcome variable. The model building strategy consisted of the following steps: 1) bivariate analysis was performed for each of the potential explanatory variables to find out which coding (categorical, ordinal, continuous) better fitted the data and we chose that in the multivariate analysis; 2) stepwise logistic regression with backward elimination was performed setting the significance level for variables entering the model at 0.2 and for removal from the model at 0.4. Adjusted odds ratio (ORs) and 95% confidence intervals (CIs) were calculated; 3) on the basis of the results of the bivariate analysis, the coding of the explanatory variables included in the model was the following: age (continuous), marital status (1 = married, 2 = other), children (1 = no, 2 = yes), education level (ordinal: 1 = ≤ 7 yrs, 2 = 8-13 yrs, 3 = university degree), employment status (four categories: 1 = unemployed, 2 = housekeeper, caregiver, 3 = manual worker; 4 = sedentary workers) included as a dummy variable with the unemployed being the reference category, nationality (four categories: 1 = European, 2 = African, 3 = Asian, 4 = South American) included as a dummy variable with the European being the reference category, length of stay in Italy (ordinal: 1 = 1-2 yrs, 2 = 3-

5 yrs, 3 = 6-8 yrs, 4 = ≥ 9 yrs), self-reported legal status (1 = regular, 2 = irregular), chronic diseases (1 = no, 2 = yes), physical activity (1 = no, 2 = yes), current smoker (1 = no, 2 = yes), alcohol consumption in the previous 30 days (1 = no, 2 = yes). The data were analyzed using the Stata software program, version 11.2.[27]

Results

Of the 503 immigrant women who were approached for the study, 492 met at least one of the inclusion criteria and 464 were enrolled, giving a participation rate of 94.3%. The participants were between the ages of 18 and 70 years (mean 40.1 yrs) and only 13.7% had obtained university degree. More than half (55.9%) of women were housekeepers or caregivers. A low percentage (11.1%) declared to be irregular. 164 (32.6%) had been living in Italy for 9 years or more. Paid employment was the most common reason for migration (65.8%) among participants. Most women were from Europe (46.5%) and the main country of origin was Ukraine (25.8%). Only 14.7% were current smokers. The vast majority of women (70.6%) reported no alcohol drinking in the previous 30 days. About 48% of the respondents were affected by chronic diseases.

Three different sub-groups were included in the final sample: sexually active women between 25-64 years of age without hysterectomy that were eligible for participation in cervical CS (419); women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer that were eligible for participation in breast CS (125); and women of any age who had delivered at least once in Italy that were eligible to access antenatal and perinatal care services (123). Seven women were part of the three sub-groups.

The mean age of the population eligible for cervical CS was 41.1 years with an age range between 25 and 64 years. More than half (58.1%) were married and 247 (58.9%) had completed high school. About 60% were housekeepers or caregivers. Rate of cervical CS among the 419 eligible women was low (39.1%), but the vast majority had had a Pap-test for screening purposes (82.3%) within a three year period from interview

(Table 1). Having had a routine pap smear in the previous three years was significantly more likely in South American women (OR=8.36; 95% CI 1.99-35.06; p=0.004) compared with European female immigrants with longer duration of residence in Italy (OR=1.60; 95% CI 1.29-1.97; p<0.001) whereas a lower probability of cervical CS participation was found in Asian females (OR=0.41; 95% CI 0.22-0.76; p=0.005) compared with European women (Table 2).

Among the 125 women considered eligible for breast CS, 43.2% were married and 71 (56.4%) had completed high school. More than three quarter (85.7%) were practicing Christians religion and 65.1% were from Europe. More than half (51.6%) had been living in Italy for 9 years or more and the vast majority (86.5%) had a regular residence permit. Regarding breast CS practices, 45.6% had had a mammography for control purposes. Among these, less than half (26, 45.6%) had their mammography within the recommended time interval of two years (Table 1).

Table 3 shows main pregnancy, prenatal and post-birth care characteristics of the eligible population. The number of immigrant women who delivered in Italy at least once was 123. The mean age of the population eligible was 34.9 years with an age range between 19 and 54 years. About 80% of the respondents did not report difficulties of access and use of prenatal and postpartum services. In terms of prenatal care, 70.9% of immigrant women had their first pregnancy appointment within 12 weeks of pregnancy and 84.2% had two or more prenatal visits. Only 12.9% of mothers underwent fewer than two prenatal ultrasound checks. More than half (56.3%) of pregnant women were not submitted to prenatal diagnostic testing (maternal serum markers such as beta human chorionic gonadotropin, pregnancy-associated plasma protein A, amniocentesis) (data not shown). Only about a third (27%) of respondents participated in prepartum course/prenatal class, although Italian National Health Service guarantees free access to this healthcare service. The vast majority (86%) of mothers chose a pediatrician such as their child's physician as caregiver, whereas the remaining part of the sample preferred a

specialist or a maternal healthcare centre physician or none at all. Moreover, among immigrant women with children living in Italy (122), 115 (94.3%) chose to immunize their children with mandatory and recommended vaccinations for infants included in the national programs.

Discussion

The present study sought to describe CS practices, antenatal and perinatal care services use among a sample of age eligible immigrant women in the South of Italy.

The existence of a notable difference in preventive practice utilization and motherhood protection according to immigration status has been reported in previous studies.[21, 28-30] Immigrant women may not be accustomed to having regular health check-ups in their home countries and may be less familiar with the opportunity of routine screening to detect health problems before the onset of symptoms.[31] These shortcomings may reduce the women's ability to maintain their health in specific periods during their lifetime (e.g. during pregnancy) and to participate in preventive care.

In our immigrant sample, adherence to screening recommended practices is discernibly much lower than those reported in several studies[6,32] and lower than those of the Italian native populations.[33] Indeed, the percentage of Italian women who underwent routine cervical and breast CS were 77% and 71%, respectively.[33] It is possible that the differences between our sample population and other samples studies could be due to differences in cultural and socioeconomic factors. Furthermore, one must consider that in Italy there is a geographical difference in CS coverage, with the highest percentage of women who actually participate in them being in the north of the country and the lowest in the south.[34] One reason for the low coverage for CS in our sample may be due to the fact that in the regions in the South of the country, a screening program has only recently been organized. In fact in our area of study, among native citizens, CS for early detection of breast and cervical cancers has reached less than half of the target population: regional figures have shown that cervical and breast CS rates had decreased to 58.3%[35] and

49.7%[36], respectively. Although these are much lower than the national figures, nonetheless, they are still higher than those of the immigrant women in our sample.

Only less than half of the sample had received breast CS at the recommended time intervals, and for this reason efforts should be made to emphasize that it is not enough to get screened once or sporadically.

The duration of residence in the host country may be a significant predictor of whether an individual migrant adheres to the CS program.[37] The results of our study indicate that being a recent immigrant is a barrier to receiving cervical CS. Certainly women that have spent more time in Italy may be more likely to be proficient in the Italian language, and therefore feel more confident approaching the Italian health-care system. Hence it would be prudent to provide immigrants with culturally sensitive and specific information to overcome any barriers. Organized screening programs may help to reduce ‘‘ethnic’’ disparities by offering a systematic (and free) examination to all the women of the target age groups, and by using specific strategies to reach the most underserved women. The importance of invitation letters has been mentioned,[38,39] and one way of overcoming a language barrier is to send the letter written in the language of the individual migrant as well as that of the country in which they reside.

Our study showed that Asian immigrant women had a lower rate of Pap testing when compared with European immigrant women. The Pap smear is a more personal and invasive procedure that may pose particular cultural barriers and thus can hinder these women from obtaining the appropriate services.[40] Culturally tailored messages are important to promote screening in specific ethnic groups to enable the identification of the target group with these messages. The message must reflect the same values and beliefs of the target group, and it should accommodate literacy levels to ensure comprehension. Working closely with the target group is also crucial to ensure screening participation. It would be important for program developers to contact ethnic group gatekeepers, such as key religious or community leaders.

Immigrant women in our study have experienced an acceptable level of care during pregnancy and childbirth. We also found that education and advice for breastfeeding and newborn care could be improved in our sample.

In general, one way of reducing barriers for participation would be for health-care professionals to introduce immigrant women to preventive care. In particular, GPs could play an important role in this respect, especially when one takes into account that a survey conducted among immigrant populations in the same area showed that 85% of the sample had access to a GP at least once, indicating that immigrants in our area of study had adequate access to primary care.[26] As a result, the acculturation process into the health-care system could be shortened.

Strength and limitations of the study

The strengths of the study lie in the enrolment technique and the high participation rate. A physician not involved in providing health care to the migrants was chosen to complete the questionnaire as it was our belief that this would make the participants more confident in reporting all aspects of health care they had received. Furthermore, the physician was supported by linguistic and cultural mediators to help those who could not speak Italian or with low literacy skills. Moreover, the 92.3% participation rate is very satisfactory, reducing a major source of bias, and we believe this is related to the great efforts of the survey researchers in promoting migrant involvement in the study.

Our findings are subject to some limitations. First, we used a convenience sampling method, and this factor limits the generalizability of the results. Furthermore, we chose locations of focus due to logistical constraints, and, therefore, the study sample was composed of people connected to NPOs that assist migrant population and also mediated healthcare encounters. Therefore the views expressed may be different from migrants who have no such connection to those organizations. Furthermore, a large proportion of our migrant participants had a regular residence permit which carries with it

health insurance cover, which again is not the case with irregular immigrants. Therefore, the sample may not be representative of all immigrants within the region, but only of those connected to NPOs and with a regular stay permit.

Moreover, the cross-sectional design of our study could not capture temporal changes in the ability of immigrants to use and access health services. There may be an effect of recall bias on self reported information about CS practices: patients frequently tend to over-report their use of Pap test or mammogram and underreport the time lapse since their last screening. We have attempted to minimize these biases by conducting the survey with the use of access measures that are less subjective and measure patient experience, not simply satisfaction. Moreover, there may be women who were pregnant in Italy some years ago and, unintentionally, gave incorrect information due to poor or incomplete memory recall. However, given that the mean age of women in this subgroup is 34.9 years, it is likely that the mean time from pregnancy would have been within an acceptable time range thus minimizing recall bias.

Conclusion

Even with these potential limitations, this study provides currently unavailable information about preventive care utilization among immigrant women in Italy that could encourage future research to develop and test culturally appropriate, women-centered strategies for promoting timely and regular CS and to better understand the factors that predict maternal and child health services utilization and identify potential targets for intervention among immigrant women.

List of abbreviations

CS: cancer screening; GP: general practitioner; OR: odds ratio; CI: confidence interval; NPO: non-profit organization.

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Authors' contributions

AB participated in the conception and design of the study, collected the data, contributed to the data analysis and its interpretation, and wrote the first draft of the article. CGAN, EL and CP collected the data, and contributed to the data analysis and interpretation. MP designed the study, was responsible for the data analysis and interpretation, and wrote the article. AB and MP are guarantors for the study.

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Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Data sharing statement

Survey data was not included in the present article and are available from the authors.

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513 **Table 1. Cervical and breast cancer screening practices among immigrant women**

Cancer screening services	No.	Percent
Cervix[†] (419)		
Having received cervical cancer screening through Pap smear (419)		
No	247	59
Yes, for control	164	39.1
Yes, I had problems	8	1.9
Time since last pap test, years (164)		
≤ 3	135	82.3
> 3	29	17.7
Breast[#] (125)		
Having received breast cancer screening through mammography (125)		
No	61	48.8
Yes, for control	57	45.6
Yes, I had problems	7	5.6
Time since last mammography, years (57)		
≤ 2	26	45.6
> 2	31	54.4

514 [†] All sexually active women aged 25-64 years and having an intact uterus were eligible

515 [#] Women aged 50-69 years were eligible

Table 2. Stepwise multiple logistic regression analysis between variables potentially associated with having received a Pap smear in the previous three years

Variable	OR	SE	95% CI	P value
Model Outcome: Pap smear for screening purposes in the previous three years *Log-likelihood = -228.62, $\chi 2$ = 48.79, P value < 0.0001, No. of obs. = 402*[§]				
Length of stay in Italy, ordinal	1.60	0.17	1.29-1.97	<0.001
Nationality				
European*	1.00	-	-	-
South American	8.36	6.12	1.99-35.06	0.004
Asian	0.41	0.13	0.22-0.76	0.005
Chronic diseases	1.40	0.33	0.88-2.22	0.152
Employment status				
Unemployed*	1.00	-	-	-
Housekeeper, caregiver	0.75	0.18	0.47-1.21	0.244
Manual workers	0.59	0.36	0.18-1.94	0.382
Alcohol consumption in the previous 30 days	0.76	0.20	0.45-1.28	0.302
Not married	0.79	0.19	0.50-1.27	0.336
African	-			
Physical activity	-			
Age	-			
Current smoker	-			
Children	-			
Self-reported legal status	-			
Sedentary workers	-			

	Education level	-

518 * reference category

519 § the observations do not sum to N (419) due to missing values

520 – excluded by the stepwise model building strategy

Table 3. Pregnancy, antenatal and perinatal care characteristics of the eligible women and comparison with Italian population

Characteristic	N (%)	Mean±SD	Italian population (%)[41]
Age, years		34.9±8.9	32
Pregnancies in Italy (123)			
1	90 (73.2)		(53.9)
≥2	33 (26.8)		(46.1)
Smoking status (123)			
Nonsmoker	98 (79.7)		(68.1)
Smoker before pregnancy	14 (11.4)		(24.4)
Smoker	11 (8.9)		(7.5)
Prepartum course partecipation (122)			
No	89 (73)		(60.5)
Yes	33 (27)		(39.5)
Visit after delivery (within 12 months) (119)			
Yes	95 (79.8)		/
No	24 (20.2)		/
Counseling on postpartum contraceptive methods (122)			
No	66 (54.1)		(40.9)
Yes	56 (45.9)		(59.1)
Infant feeding (122)			
Breastfeeding only	85 (69.6)		(88.5)
Breastfeeding and bottle-feeding	24 (19.7)		
Bottle-feeding only	13 (10.7)		(11.5)
Utilization of family planning clinic (121)			

Characteristic	N (%)	Mean±SD	Italian population (%)[41]
Yes	66 (54.5)		(27.9)
No	55 (45.5)		(72.1)

The number of participants responding to the questions is indicated in brackets

UNIVERSITY OF CATANZARO "MAGNA GRÆCIA"
DEPARTMENT OF HEALTH SCIENCES
MEDICAL SCHOOL
CHAIR OF HYGIENE

CERVICAL AND BREAST CANCER SCREENING PARTICIPATION AND UTILIZATION OF MATERNAL HEALTH SERVICES AMONG IMMIGRANT WOMEN IN SOUTHERN ITALY

Questionnaire used in the survey

Date of interview ___/___/_____ **No.** _____

A) Demographic characteristics

A.1. How old were you on your last birthday? *(years)* _____

A.2. What is your marital status? ☐ Single ☐ Married with husband in Italy ☐ Married without husband in Italy ☐ Divorced ☐ Widowed ☐ Other (*please, specify* _____)

A.3.1.Do you have any children? ☐ No (→**A.4.**) ☐ Yes (*n°* ____) **A.3.2. Are they living in Italy?** ☐ No ☐ Yes (*n°* _____)

A.3.3. How old were they on their last birthday? What is their sex?

I.____ years	M	F	VI.____ years	M	F
II.____ years	M	F	VII.____ years	M	F
III.____ years	M	F	VIII.____ years	M	F
IV.____ years	M	F	IX.____ years	M	F
V.____ years	M	F	X.____ years	M	F

A.4. What is the highest level of education that you have completed? *(years)*

☐ < 5 ☐ 5 – 7 ☐ 8 – 12 ☐ ≥13, without university degree ☐ ≥13, with university degree (*please, specify* _____)

A.5. What is your occupation? ☐ None ☐ Student ☐ Housewife ☐ Housekeeper, caregiver ☐ Peddler ☐ Farmer ☐ Manual worker ☐ Professional employed ☐ Other (*spec.* _____)

A.6. What is your religion? ☐ None ☐ Catholic Christian ☐ Orthodox Christian ☐ Jewish ☐ Islamic ☐ Buddhist ☐ Hindu ☐ Other (*spec.* _____)

A.7. What is your country of origin? _____

A.8. From what country did you arrive in Italy? ☐ Country of origin ☐ Other country (*please, specify* _____)

A.9. How long have you lived in Italy? *(years)* _____ (*if less than 1 year, end interview.*)

A.10. What is your legal immigration status? ☐ Regular ☐ Irregular ☐ Asylum seeker

B) General health conditions

B.1. Do you suffer from any of the following chronic diseases? *(please, if yes, specify one or more of the following diseases)*

☐ No/I don't know
☐ Cardiovascular diseases (eg. hypertension, hypercholesterolemia, etc.) _____
☐ Respiratory diseases (eg. asthma, chronic obstructive pulmonary disease, etc.) _____
☐ Gastrointestinal diseases (eg. gastroenteritis, esophagitis, celiac disease, etc.) _____
☐ Musculoskeletal diseases (eg. osteoarthritis, osteoporosis, carpal tunnel syndrome, etc.)_____
☐ Oral diseases (dental caries, gingivitis, stomatitis, malocclusion, etc.)_____
☐ Genitourinary diseases (calculi, erectile dysfunction, prostatitis, etc.)_____
☐ Psychiatric disorders (depression, schizophrenia, eating disorders)_____
☐ Metabolic diseases (eg. chronic renal failure, liver cirrhosis, diabetes, thyroid disease, etc.) _____
☐ Autoimmune disorders (eg. SLE, psoriasis, inflammatory bowel diseases, ecc.) _____
☐ Other *(please, specify* _____)

B.2. Are you affected by any of the following infectious diseases? ☐ No/I don't know ☐ HIV ☐ Hepatitis B

☐ Hepatitis C ☐ Tuberculosis ☐ Parasitosis (es. malaria, toxoplasmosis, giardia, schistosomiasis, taenia, ecc.)

☐ STD (eg. syphilis, gonorrhea, HSV, etc.) ☐ Other *(please, specify* _____)

C) Health risk habits

C.1. Tobacco use

C.1.1 Have you smoked at least 100 cigarettes in your entire life? ☐ No (→**C.2.1.**) ☐ Yes

C.1.2. Do you now smoke cigarettes: ☐ Some days (*specify n °* ☐) ☐ Every day (*specify n°* ☐) ☐ Never (→**C.2.1.**)

C.1.3. During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking? ☐ No ☐ Yes

C.2. Alcohol consumption

C.2.1. During the past 30 days, did you have at least one drink of any alcoholic beverage such as beer, wine or liquor? ☐ No (→**D.1.**) ☐ Yes

C.2.2. During the past 30 days, how many days per month did you have at least one drink of any alcoholic beverage? ☐

C.2.3. During the past 30 days, on the days when you drank, approximately how many drinks did you drink on average?

Wine ☐ Beer ☐ Liquor ☐

D) Prevention and screening

D.1. Immunization

D.1.1. Which of the following vaccinations have you had? *(more than one option allowed)*

☐ Diphtheria ☐ Tetanus ☐ Pertussis ☐ Polio

☐ Hepatitis B ☐ Mumps ☐ Rubella ☐ Measles

☐ Chicken pox ☐ Haemophilus B ☐ Pneumococcal ☐ Meningococcal

☐ Influenza ☐ None/I don't know ☐ Other (*please, specify* _____)

(*If participant answered* Yes *to the question* **A.3.2.** *skip to question* **D.1.2.**. *If participant answered* No *to the question* **A.3.2.** *skip to question* **D.2.1.**.)

D.1.2. Have your children received vaccinations included in the national programs? ☐ No ☐ I don't remember ☐ Yes (→**D.1.4.**)

D.1.3. Why have they not received children's vaccinations? *(more than one option allowed)*

☐ I was not aware of their availability ☐ Vaccinations are not useful ☐ Vaccinations are dangerous

☐ Religious reasons ☐ Lack of time ☐ Other (*please, specify* _____)

D.1.4. Do you remember which of the following vaccinations your children have had?

☐ Mandatory vaccinations (diphtheria, tetanus, polio, hepatitis B) ☐ Pertussis ☐ Measles, mumps and rubella

☐ Chicken pox ☐ Haemophilus B ☐ Pneumococcal ☐ Meningococcal

☐ Influenza ☐ None/I don't know ☐ Other (*please, specify* _____)

D.2. Screening

D.2.1. Have you ever had Pap test?

☐ No ☐ Yes, for control ☐ Yes, for problems

D.2.2. When was the last time you had a Pap test? *(years)*

☐ <1 yr ago ☐ 1-2 yrs ago ☐ 2-3 yrs ago ☐ 3-5 yrs ago ☐ ≥5 yrs ago

D.2.3. Have you had a hysterectomy? ☐ No ☐ Yes

D.2.4. Have you ever had a mammography?

☐ No ☐ Yes, for control ☐ Yes, for problems

D.2.5. When was the last time you had a mammography? *(years)*

☐ <1 yr ago ☐ 1-2 yrs ago ☐ 2-3 yrs ago ☐ 3-5 yrs ago ☐ ≥5 yrs ago

E) Utilization of maternal health services

(*If participant answered* Yes *to question* **A.3.1.** *skip to question* ***E.1.***. *If participant answered* No *to question* **A.4.1.** *end interview.*)

E.1. How many times have you given birth since you've been in Italy? ☐ None ☐ (*spec. n°*) ☐

E.2. How many times have you had a miscarriage? ☐ None ☐ I don't remember ☐ (*spec. n°*) ☐

E.3. How many times have you had an abortion? ☐ None ☐ I don't remember ☐ (*spec. n°*) ☐

(*If participant answered* None *to question* ***E.1.*** *end interview. Otherwise, complete interview with all following questions referred to last pregnancy.*)

E.4. . Who was mainly monitoring your pregnancy/ies? ☐ None ☐ General practitioner

☐ Gynecologist ☐ Midwife ☐ Other (*please, specify* _____)

E.5. How many prenatal visits did you attend during each pregnancy?

☐ None ☐ 1 ☐ >1 (*spec. n°*) ☐

E.6. When did you receive your first pregnancy appointment? ☐ I don't remember ☐ (*please, specify weeks of pregnancy*) ☐

E.7.1. How many prenatal ultrasound checks did you have during your pregnancy? (*spec. n°*) ☐

E.7.2. Do you remember in which weeks of pregnancy you had these prenatal ultrasound checks? *(more than one option allowed)* ☐ None

☐ <8 ☐ 8-12 ☐ 13-16 ☐ 17-20 ☐ 21-24 ☐ 25-28 ☐ 29-32 ☐ ≥33

E.8. Did you know that prenatal visits and ultrasound checks are free? ☐ No ☐ Yes

E.9. Did you have any prenatal diagnostic testing? (*max. 4 options*) ☐ No ☐ Yes, maternal serum markers

☐ Yes, chorionic villus sampling ☐ Yes, amniocentesis ☐ Yes, nuchal translucency ☐ Other (*please, specify* _____)

E.10. Have you ever participated in a prepartum course/prenatal class? ☐ No ☐ Yes

E.11. Overall, do you believe you have had difficulties of access to and use of prenatal services during your pregnancy? (*max. 3 options*) ☐ No

☐ Yes, I don't know system's organization ☐ Yes, for language barriers ☐ Yes, for long waiting times for access to health-care services

☐ Yes, lack of time ☐ Yes, for my poor socioeconomic situation ☐ Other (*please, specify* _____)

E.12. Did you ever smoke during pregnancy? ☐ No, I don't smoke ☐ No, I stopped

☐ Yes, I continued to smoke the same number of cigarettes ☐ Yes, but I decreased the number of cigarettes

E.13. Did you have a postnatal visit within 12 months after delivery? ☐ No ☐ Yes

E.14. What was your chosen infant feeding method? ☐ Breastfeeding only (→**E.17.**) ☐ Bottle-feeding only

☐ Breastfeeding and other (water, tisane, or other infusion) ☐ Breastfeeding and bottle-feeding

E.15. Who advised you regarding the formula milk? ☐ Nobody, I decided ☐ Pediatrician

☐ Family/Friends ☐ Physician of hospital ward ☐ Other (*please, specify* _____)

E.16. What is the reason for the formula milk? (*max. 3 options*) ☐ I don't have enough milk ☐ I stopped breastfeeding

☐ The baby was not gains weight ☐ The baby couldn't latch on well

☐ I had painful nipples, and/or mastitis ☐ I had acute health problems ☐ My child had acute health problems

☐ I had to resume work shortly ☐ I had to moved my child abroad ☐ I was tired

☐ I took some drugs (*please, specify* _____) ☐ Other (*please, specify* _____)

E.17. Who gave you information about infant feeding? ☐ None ☐ I know

☐ Midwife of hospital ward ☐ Midwife of family planning center ☐ Pediatrician ☐ Family/Friends

☐ Other (*please, specify* _____)

E.18. Do you believe it is possible to get pregnant during the period of breastfeeding?

☐ No, it's not possible ☐ I don't know ☐ Yes, it's possible

E.19. Who counseled you on postpartum contraceptive methods?

☐ None (→**E.21.**) ☐ Family/Friends ☐ General practitioner

☐ Specialist ☐ Midwife of family planning center ☐ Other (*please, specify* _____)

E.20. Do you believe this counseling has been sufficient?

☐ Yes, I believe it has ☐ No, I would like to know more

E.21. At the resumption of sexual relations, are you thinking of using contraception?

☐ No ☐ I don't know yet ☐ Yes (*please, specify* _____)

E.22. Do you know a family planning center?

☐ No (→**E.24.**) ☐ Yes, but I never used it ☐ Yes, I have used it (→ **E.24.**)

E.23. Why have you never used a family planning center? (*please, specify one or more reason*) _____

_____

E.24. Are you accessing any healthcare services since discharge? ☐ No (→**E.26.**) ☐ Yes

E.25. Please, specify one or more of following healthcare services:

☐ Pediatric planning center ☐ Family planning center ☐ Advice center ☐ Specialist clinic

☐ Emergency Department ☐ Hospital ☐ Other (*please, specify* _____)

E.26. Whom have you selected as the child's physician? ☐ None ☐ Specialist

☐ Physician of family planning center ☐ Physician of hospital ward ☐ Pediatrician ☐ Other (*please, specify* _____)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item N°	Recommendation	Page
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7,8
Bias	9	Describe any efforts to address potential sources of bias	13
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	9
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9,10
		(b) Indicate number of participants with missing data for each variable of interest	21,23

Outcome data	15*	Report numbers of outcome events or summary measures	9,10; 21-23
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9,10; 21-23
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	10-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Cervical and breast cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

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Cervical and breast cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

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Abstract

Objectives

Women make up approximately half of the world's one billion migrants. Immigrant women tend to be one of the most vulnerable population groups with respect to healthcare. Cancer screening (CS) and maternal and reproductive health have been included among the ten main issues pertinent to women's health.

The aim of this study is to explore breast and cervical CS participation and to acquire information regarding access to healthcare services during pregnancy, childbirth and the postpartum period among age eligible immigrant women in Southern Italy.

Methods

A structured questionnaire was used to collect data from each participant**.** Women aged 25-64 years who had not had a hysterectomy and women aged 50-69 years without history of breast cancer were considered eligible for evaluation of cervical and breast CS participation, respectively. Moreover, women who had delivered at least once in Italy were enrolled to describe antenatal and post-partum care services use. All women were recruited through the third-sector and non-profit organizations (NPOs).

Results

Rate of cervical CS among the 419 eligible women was low (39.1%), and about one third had had a Pap-test for screening purposes within a three year period from interview (32.8%). Regarding breast CS practices, of the 125 eligible women 45.6% had had a mammography for control purposes, and less than one quarter (26, 20.8%) had their mammography within the recommended time interval of two years. About 80% of the respondents did not report difficulties of access and use of antenatal and postpartum services.

Conclusion

This study provides currently unavailable information about adherence to CS and maternal and child health that could encourage future research to develop and test

culturally appropriate, women-centered strategies for promoting timely and regular CS among immigrant women in Italy.

Key words:

Cancer screening, immigrant, Italy, maternal health, women.

Strengths and limitations of this study

- The high participation rate (92.3%) is extremely satisfactory and restricts one major potential source of bias in the results.
- Immigrants who did not speak Italian or who had low literacy levels have not been excluded from the study, helped by linguistic and cultural mediators.
- The sample may not be representative of all immigrants within the region, but only of those connected to non-profit organizations and with a regular stay permit.
- There may be an effect of recall bias on self reported information about cancer screening practices.

Cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

Background

Estimates from the United Nations show that women make up approximately half of the world's one billion migrants.[1] The effects of migration on women's health are varied and hard to predict and may be determined by a number of factors: the conditions under which the migration occurred; how well a particular individual has integrated in the host society, the social status of the individual in the host country, and the health conditions that are existent in the host country. Studies have indicated that women who migrate tend to be one of the most vulnerable population groups with respect to healthcare.[2,3] In particular, women who do not speak the host country language and do not have a job are less likely to benefit from the health system of the host nation.[4] These women are usually dependent on men and are unaware of the available health services. Governments should ensure that appropriate health services are provided that adequately address all aspects of women's health, particularly cancer screening (CS) and maternal and reproductive health. These basic health care services have been included among the ten main issues pertinent to women's health, whether it be in immigrants or native inhabitants,[5] and they ought to be available to everyone in society in accordance with social equality.

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death among females worldwide. Previous research has shown that immigrant status is associated with breast cancer risk through changes in reproductive factors (e.g., higher age at first live birth, lower breast feeding rates) and lifestyle factors (e.g., diet) but could also indicate variations in other environmental exposures.[6-8] Cervical cancer is the second most commonly diagnosed cancer and although in several western countries its burden has decreased by as much as 65% over the past 40 years thanks to screening

programs,[9] it is still the third leading cause of cancer death in less developed countries, and an important healthcare issue among migrant women.

Detecting both these cancers early is key to keeping women alive and healthy. Increased health risks have been noted among immigrants and ethnic minorities who also may receive less healthcare than the native population,[10,11] whilst at the same time numerous studies have documented lower participation in CS programs among various migrant groups.[12-14] Furthermore ethnic minority women residing in Western countries are more likely to be diagnosed with advanced-stage disease and hence have higher mortality rates,[15] often as a result of lower utilization of timely CS services.[16-18]

Over the course of the last century there have been many tremendous improvements in maternal and neonatal outcomes in terms of pregnancy-related complications, maternal and infant mortality rates.[19] But the benefits of these have not extended everywhere and to everyone, since significant disparities by race and ethnicity persist. Studies on the determinants of maternal health care delivery suggest that social, economic, behavioral, and environmental factors explain the worse health status among migrants[20-23] in terms of preterm delivery, congenital anomalies, low birth weight, fetal growth restriction, and infant mortality[24-26] when compared with the native population.[27] In Italy, both native and foreign women, have the right to participate free of charge in a specific programme of care during pregnancy and up to one month following delivery.

The aims of this survey were to explore breast and cervical CS participation and to acquire information regarding access to healthcare services during pregnancy, childbirth and the postpartum period among age eligible immigrant women in Southern Italy.

Methods

Study population

The survey was conducted from May 2012 until April 2013. The study population consisted of a specific subset of immigrants. For this study, immigrants were

defined as those from low or middle-income countries according to the classification of the World Bank based on per capita GDP.[28] Tourists were excluded.

Details regarding sampling of individuals for this study have been described elsewhere.[29] Briefly, since probability or random sampling can not be carried out on immigrants, a convenience sampling method was applied. Women aged 18 or more living in Italy for at least 12 months were recruited through the third-sector and non-profit organizations (NPOs) that provide support to immigrants and work to facilitate their access to healthcare.

In Italy, organized nationwide CS programs include personal invitations for a Pap-test sent to women aged 25-64 years every three years and for mammography screening to women aged 50-69 years every two years. Therefore, sexually active women aged 25-64 years who had not had a hysterectomy and women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer were considered eligible for evaluation of cervical and breast CS participation, respectively. Moreover, women who had delivered at least once in Italy were enrolled to describe antenatal and post-partum care services use.

Survey instrument

Written consent was acquired prior to interview. A structured questionnaire (available as supplementary file) was used to collect data from each participant**.** Questionnaires were administered by physicians competent in interview methods, with help, when necessary, from a cultural mediator. The interviews lasted ten minutes on average.

A pilot study was undertaken. Validation of the survey instrument was performed through the assessment of internal and test-retest (external) reliability in addition to face and content validity. Test-retest reliability was checked in the pilot study through an additional interview of 50 women within a time interval of 20 days from the first administration of the questionnaire. Face and content validity were examined in order to

assess the clarity of the wording of the items which in turn generated new items. Modifications were made according to the comments recorded by the women in order to clarify the content of the questionnaire and to simplify its wording.

Outcomes and covariates

Socio-demographics included information on gender, age, marital and legal status, education level, religion, nationality, working activity, duration of residence in Italy. The questions on lifestyle and health status included information on physical activity, smoking habits, alcohol consumption, chronic and infectious diseases. The questions on participation in screening programs included breast and cervical CS practices. Uptake of cervical CS was determined by asking 'Have you ever undergone Pap test for control without any symptoms?'. Women who answered affirmatively were asked 'When was the last time you underwent Pap test?'. Women who had undergone a Pap test within the previous three years were considered as 'uptake', corresponding to women who comply with the recommended screening period. Uptake of breast CS was determined by asking, 'Have you ever undergone a mammography for control without any symptoms?'. Women who answered affirmatively were asked a second question, 'When was the last time you had a mammography?'. Women who reported that they had undergone their most recent mammography within the previous two years were considered as 'uptake', corresponding to women who comply with the recommended screening period.

The questionnaire also contained items on services utilization during pregnancy and childbirth. Access to antenatal and postnatal care was assessed by number and timing of examination, such as time of first pregnancy appointment, number of prenatal visits and ecographies, antenatal care by health-care professionals including general practitioner (GP), gynecologist, nurse, midwife/obstetrician, or other care providers, prenatal screening and diagnostic testing (i.e. maternal serum markers such as beta human chorionic gonadotropin, pregnancy-associated plasma protein A, amniocentesis, etc.),

smoking habits during pregnancy, counseling on infant feeding and postpartum contraceptive methods, reasons for access to maternal and newborn healthcare services (family planning centers and child care service centers). All information was self-reported.

The study protocol was ratified by the Institutional Ethical Committee ('Mater Domini' Hospital of Catanzaro, Italy) (20/04/2012).

Statistical analysis

Descriptive analyses were used to describe demographic characteristics and lifestyle habits of the immigrant women. Data were summarized into frequencies and percentages. Univariate analysis was conducted by using chi-square or Fisher exact tests to assess relationships between cervical and breast CS behavior and the respective eligible study sub-groups.

Multivariate logistic regression analysis was performed. One model was developed in which were included those variables potentially associated with having received cervical CS through Pap smear in the previous three years (Model 1) (0 = no, 1 = yes). Women that had had a pap smear not for screening purposes were included in the "no" option of the outcome variable. The model building strategy consisted of the following steps: 1) bivariate analysis was performed for each of the potential explanatory variables to find out which coding (categorical, ordinal, continuous) better fitted the data and we chose that in the multivariate analysis; 2) stepwise logistic regression with backward elimination was performed setting the significance level for variables entering the model at 0.2 and for removal from the model at 0.4. Adjusted odds ratio (ORs) and 95% confidence intervals (CIs) were calculated; 3) on the basis of the results of the bivariate analysis, the coding of the explanatory variables included in the model was the following: age (continuous), marital status (1 = married, 2 = other), children (1 = no, 2 = yes), education level (ordinal: 1 = ≤ 7 yrs, 2 = 8-13 yrs, 3 = university degree), employment status (four categories: 1 = unemployed, 2 = housekeeper, caregiver, 3 =

manual worker; 4 = sedentary workers) included as a dummy variable with the unemployed being the reference category, nationality (four categories: 1 = European, 2 = African, 3 = Asian, 4 = South American) included as a dummy variable with the European being the reference category, length of stay in Italy (ordinal: 1 = 1-2 yrs, 2 = 3-5 yrs, 3 = 6-8 yrs, 4 = ≥ 9 yrs), self-reported legal status (1 = regular, 2 = irregular), chronic diseases (1 = no, 2 = yes), physical activity (1 = no, 2 = yes), current smoker (1 = no, 2 = yes), alcohol consumption in the previous 30 days (1 = no, 2 = yes). The data were analyzed using the Stata software program, version 11.2.[30]

Results

Of the 503 immigrant women who were approached for the study, 492 met at least one of the inclusion criteria and 464 were enrolled, giving a participation rate of 94.3%. The main characteristics of the study population were reported in Table 1. The participants were between the ages of 18 and 70 years (mean 40.1 yrs) and only 14.6% had obtained university degree. More than half (58.8%) of women were housekeepers or caregivers. A low percentage (9.9%) declared to be irregular. 164 (34.5%) had been living in Italy for 9 years or more. Paid employment was the most common reason for migration (65.8%) among participants. Most women were from Europe (46.3%) and the main country of origin was Ukraine (25.8%). Only 19.3% were current smokers. The vast majority of women (71.3%) reported no alcohol drinking in the previous 30 days. About 49% of the respondents were affected by chronic diseases.

Three different sub-groups were included in the final sample: sexually active women between 25-64 years of age without hysterectomy that were eligible for participation in cervical CS (419); women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer that were eligible for participation in breast CS (125); and women of any age who had delivered at least once in Italy that were eligible to access antenatal and post-partum care services (123). Seven women were part of the three sub-groups.

The mean age of the population eligible for cervical CS was 41.1 years with an age range between 25 and 64 years. More than half (58.1%) were married and 247 (58.9%) had completed high school. About 60% were housekeepers or caregivers. Rate of cervical CS among the 419 eligible women was low (39.1%), and about one third had had a Pap-test for screening purposes (32.8%) within a three year period from interview (Table 2). Having had a routine pap smear in the previous three years was significantly more likely in women with longer duration of residence in Italy (OR=1.60; 95% CI 1.29-1.97; p<0.001) and in South American women (OR=8.36; 95% CI 1.99-35.06; p=0.004) compared with European female immigrants, whereas a lower probability of cervical CS participation was found in Asian females (OR=0.41; 95% CI 0.22-0.76; p=0.005) compared with European female immigrants (Table 3).

Among the 125 women considered eligible for breast CS, 43.2% were married and 71 (56.4%) had completed high school. More than three quarter (85.7%) were practicing Christians religion and 65.1% were from Europe. More than half (51.6%) had been living in Italy for 9 years or more and the vast majority (86.5%) had a regular residence permit. Regarding breast CS practices, of the 125 eligible women 45.6% had had a mammography for control purposes, but less than one quarter (26, 20.8%) had their mammography within the recommended time interval of two years (Table 2). Results from univariate analysis do not show a statistically significant difference in breast CS adherence with respect to all the selected characteristics apart from duration of stay in Italy, ranging from 15.8% among those women having resided in the country for ≤2 years to 58.5% among women with a length of stay ≥9 years, and among those who self-reported an irregular legal status (17.7%) versus a regular status (50%) (Table 1).

Table 4 shows main pregnancy, antenatal and post-birth care characteristics of the eligible population. The number of immigrant women who delivered in Italy at least once was 123. The mean age of the population eligible was 34.9 years with an age range between 19 and 54 years. About 80% of the respondents did not report difficulties of

access and use of prenatal and postpartum services. In terms of prenatal care, 70.9% of immigrant women had their first pregnancy appointment within 12 weeks of pregnancy and 84.2% had two or more prenatal visits. Only 12.9% of mothers underwent fewer than two prenatal ultrasound checks. More than half (56.3%) of pregnant women were not submitted to prenatal diagnostic testing (maternal serum markers such as beta human chorionic gonadotropin, pregnancy-associated plasma protein A, amniocentesis) (data not shown). Only about a third (27%) of respondents participated in prepartum course/prenatal class, although Italian National Health Service guarantees free access to this healthcare service. The vast majority (86%) of mothers chose a pediatrician such as their child's physician as caregiver, whereas the remaining part of the sample preferred a specialist or a maternal healthcare centre physician or none at all. Moreover, among immigrant women with children living in Italy (122), 115 (94.3%) chose to immunize their children with mandatory and recommended vaccinations for infants included in the national programs.

Discussion

The present study sought to describe CS practices, antenatal and postpartum care services use among a sample of age eligible immigrant women in the South of Italy.

The existence of a notable difference in preventive practice utilization and motherhood protection according to immigration status has been reported in previous studies.[24, 31-33] Immigrant women may not be accustomed to having regular health check-ups in their home countries and may be less familiar with the opportunity of routine screening to detect health problems before the onset of symptoms.[34] These shortcomings may reduce the women's ability to maintain their health in specific periods during their lifetime (e.g. during pregnancy) and to participate in preventive care.

In our immigrant sample, adherence to cervical (32.8%) and breast (20.8%) CS recommended practices is discernibly much lower than those reported in several studies[9,35] and lower than those of the Italian native populations.[36] Indeed, the percentage

of Italian women who underwent routine cervical and breast CS were 77% and 71%, respectively.[36] It is possible that the differences between our sample population and other samples studies could be due to differences in cultural and socioeconomic factors. Furthermore, one must consider that in Italy there is a geographical difference in CS coverage, with the highest percentage of women who actually participate in them being in the north of the country and the lowest in the south.[37] One reason for the low coverage for CS in our sample may be due to the fact that in the regions in the South of the country, a screening program has only recently been organized. In fact in our area of study, among native citizens, CS for early detection of breast and cervical cancers has reached less than half of the target population: regional figures have shown that cervical and breast CS rates had decreased to 58.3%[38] and 49.7%[39], respectively. Although these are much lower than the national figures, nonetheless, they are still higher than those of the immigrant women in our sample.

Only less than half of the sample had received breast CS at the recommended time intervals, and for this reason efforts should be made to emphasize that it is not enough to get screened once or sporadically.

The duration of residence in the host country may be a significant predictor of whether an individual migrant adheres to the CS program.[40] The results of our study indicate that being a recent immigrant is a barrier to receiving cervical CS. Certainly women that have spent more time in Italy may be more likely to be integrated into the screening program and proficient in the Italian language, and therefore feel more confident approaching the Italian health-care system. Hence it would be prudent to provide immigrants with culturally sensitive and specific information to overcome any barriers. Organized screening programs may help to reduce ‘‘ethnic’’ disparities by offering a systematic (and free) examination to all the women of the target age groups, and by using specific strategies to reach the most underserved women. Longer duration of stay in Italy could also reflect probability of receiving a personal invitation. The

importance of invitation letters has been mentioned,[41,42] and one way of overcoming a language barrier is to send the letter written in the language of the individual migrant as well as that of the country in which they reside.

Our study showed that Asian immigrant women had a lower rate of Pap testing when compared with European immigrant women. The Pap smear is a more personal and invasive procedure that may pose particular cultural barriers and thus can hinder these women from obtaining the appropriate services.[43] Culturally tailored messages are important to promote screening in specific ethnic groups to enable the identification of the target group with these messages. The message must reflect the same values and beliefs of the target group, and it should accommodate literacy levels to ensure comprehension. Working closely with the target group is also crucial to ensure screening participation. It would be important for program developers to contact ethnic group gatekeepers, such as key religious or community leaders.

Immigrant women in our study have experienced an acceptable level of care during pregnancy and childbirth. We also found that education and advice for breastfeeding and newborn care could be improved in our sample.

In general, one way of reducing barriers for participation would be for health-care professionals to introduce immigrant women to preventive care. In particular, GPs could play an important role in this respect, especially when one takes into account that a survey conducted among immigrant populations in the same area showed that 85% of the sample had access to a GP at least once, indicating that immigrants in our area of study had adequate access to primary care.[29] As a result, the acculturation process into the health-care system could be shortened.

Strength and limitations of the study

The strengths of the study lie in the enrolment technique and the high participation rate. A physician not involved in providing health care to the migrants was chosen to complete the questionnaire as it was our belief that this would make the

participants more confident in reporting all aspects of health care they had received. Furthermore, the physician was supported by linguistic and cultural mediators to help those who could not speak Italian or with low literacy skills. Moreover, the 92.3% participation rate is very satisfactory, reducing a major source of bias, and we believe this is related to the great efforts of the survey researchers in promoting migrant involvement in the study.

Our findings are subject to some limitations. First, we used a convenience sampling method, and this factor limits the generalizability of the results. Furthermore, we chose locations of focus due to logistical constraints, and, therefore, the study sample was composed of people connected to NPOs that assist migrant population and also mediated healthcare encounters. Therefore the views expressed may be different from migrants who have no such connection to those organizations. Furthermore, a large proportion of our migrant participants had a regular residence permit which carries with it health insurance cover, which again is not the case with irregular immigrants. Therefore, the sample may not be representative of all immigrants within the region, but only of those connected to NPOs and with a regular stay permit.

Moreover, the cross-sectional design of our study could not capture temporal changes in the ability of immigrants to use and access health services. There may be an effect of recall bias on self reported information about CS practices: patients frequently tend to over-report their use of Pap test or mammogram and underreport the time lapse since their last screening. We have attempted to minimize these biases by conducting the survey with the use of access measures that are less subjective and measure patient experience, not simply satisfaction. Moreover, there may be women who were pregnant in Italy some years ago and, unintentionally, gave incorrect information due to poor or incomplete memory recall. However, given that the mean age of women in this subgroup is 34.9 years, it is likely that the mean time from pregnancy would have been within an acceptable time range thus minimizing recall bias.

Conclusion

Even with these potential limitations, this study provides currently unavailable information about preventive care utilization among immigrant women in Italy that could encourage future research to develop and test culturally appropriate, women-centered strategies for promoting timely and regular CS and to better understand the factors that predict maternal and child health services utilization and identify potential targets for intervention among immigrant women.

List of abbreviations

CS: cancer screening; GP: general practitioner; OR: odds ratio; CI: confidence interval; NPO: non-profit organization.

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Authors' contributions

AB, CGAN, EL and CP collected the data, and contributed to the data analysis and interpretation. AB and MP designed the study, were responsible for the data analysis and interpretation, and wrote the article. AB and MP are guarantors for the study.

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Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Data sharing statement

Survey data was not included in the present article and are available from the authors.

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Table 1. Cervical and breast cancer screening (CS) practices according to selected characteristics of immigrant women

Characteristic	Total (464)		Cervical CS (419)		Breast CS (125)	
	No.	%	No.	%	No.	%
Age, years						
18-30	92	19.8	28	33.3	-	-
31-40	141	30.4	42	33.1	-	-
41-50	117	25.2	53	46.9	7	58.3
≥51	114	24.6	41	43.2	50	44.2
			Trend χ^2=6.64, 3 df, p=0.084		Trend χ^2=0.86, 1 df, p=0.353	
Education level, years						
≤7	121	26.1	48	42.9	13	48.2
8-13	275	59.3	86	34.8	29	41.4
>13, with university degree	68	14.6	30	50	15	53.6
			χ^2=5.56, 2 df, p=0.062		χ^2=1.28, 2 df, p=0.528	
*Marital status**						
Married	260	56.3	99	40.7	25	46.3

Other	202	43.7	54	36.6	31	44.3
			χ^2=0.74, 1 df, p=0.389		χ^2=0.05, 1 df, p=0.823	
Children						
No	115	24.8	30	30.6	7	41.2
Yes	349	75.2	134	41.7	50	46.3
			χ^2=3.91, 1 df, p=0.048		χ^2=0.16, 1 df, p=0.694	
Employment status						
Unemployed	147	31.7	55	42.6	14	46.7
Housekeeper, caregiver	273	58.8	90	35.3	40	47.1
Manual worker	24	5.2	8	50	1	14.3
Sedentary worker	20	4.3	11	57.9	2	66.7
			χ^2=5.84, 3 df, p=0.120		Fisher's exact=3.36, p=0.339	
Nationality						
European	215	46.3	76	38.6	35	43.2
African	138	29.8	55	44.7	9	47.4
Asian	98	21.1	23	26.7	12	50

American	13	2.8	10	76.9	1	100
			χ^2=14.97, 3 df, p=0.002		Fisher's exact=1.59, p=0.661	
Self-reported legal status						
Regular	418	90.1	154	41.1	54	50
Irregular	46	9.9	10	22.7	3	17.7
			χ^2=5.56, 1 df, p=0.018		Fisher's exact=6.20, p=0.013	
Length of stay in Italy, years						
1-2	83	17.9	16	21.6	3	15.8
3-5	124	26.7	24	22.2	6	30
6-8	97	20.9	45	47.4	10	47.6
≥9	160	34.5	79	55.6	38	58.5
			Trend χ^2=41.33, 3 df, p<0.001		Trend χ^2=13.03, 3 df, p=0.005	
*Physical activity**						
No	157	34.9	57	41	18	40.9
Yes	293	65.1	102	38.2	39	48.2
			χ^2=0.30, 1 df, p=0.583		χ^2=0.60, 1 df, p=0.438	

*Alcohol consumption in the previous 30 days**						
No	321	71.3	113	39.2	38	46.9
Yes	129	28.7	46	39	19	43.2
			χ^2=0.00, 1 df, p=0.962		χ^2=0.16, 1 df, p=0.689	
*Current smoker**						
No	363	80.7	127	39.2	45	47.4
Yes	87	19.3	32	39	12	40
			χ^2=0.00, 1 df, p=0.977		χ^2=0.50, 1 df, p=0.480	
*Chronic diseases**						
No	227	50.8	64	31.8	12	41.4
Yes	220	49.2	94	46.5	45	46.9
			χ^2=9.13, 1 df, p=0.003		χ^2=0.27, 1 df, p=0.603	

*Total may not be equal to *n* because of missing values.

534 **Table 2. Cervical and breast cancers screening practice**

Cancer screening services	No.	Percent
Cervix[†]		
Having received cervical cancer screening through Pap smear (419)		
No	247	59
Yes, for control	164	39.1
Yes, I had problems	8	1.9
Time since last pap test, years (419)		
≤ 3	135	32.8
> 3 or never	283	67.5
Breast[#]		
Having received breast cancer screening through mammography (125)		
No	61	48.8
Yes, for control	57	45.6
Yes, I had problems	7	5.6
Time since last mammogram, years (125)		
≤ 2	26	20.8
> 2 or never	99	79.2

535 [†] All sexually active women aged 25-64 years and having an intact uterus were eligible

536 [#] Women aged 50-69 years were eligible

Table 3. Multiple logistic regression analysis between variables potentially associated with having received a Pap smear in the previous three years

Variable	OR	SE	95% CI	P value
Model Outcome: Pap smear for screening purposes in the previous three years *Log-likelihood = -227.53, χ2 = 50.97, P value < 0.0001, No. of obs. = 402*[8]				
Length of stay in Italy, ordinal	1.64	0.21	1.28-2.1	<0.001
Nationality				
European*	1.00	-	-	-
South American	7.87	6.14	1.7-36.32	0.008
Asian	0.35	0.13	0.17-0.72	0.004
African	0.74	0.27	0.36-1.51	0.411
Employment status				
Unemployed*	1.00	-	-	-
Housekeeper, caregiver	0.7	0.19	0.4-1.2	0.198
Manual workers	0.58	0.36	0.17-1.95	0.374
Sedentary workers	0.85	0.53	0.25-2.87	0.798
Chronic diseases	1.37	0.34	0.84-2.21	0.204
Not married	0.73	0.19	0.44-1.22	0.228
Alcohol consumption in the previous 30 days	0.75	0.22	0.42-1.32	0.312
Physical activity	0.83	0.21	0.5-1.36	0.457
Current smoker	0.83	0.26	0.45-1.55	0.564
Children	0.83	0.26	0.45-1.53	0.555
Age	1.07	0.14	0.83-1.39	0.601
Self-reported legal status	1.18	0.52	0.5-2.79	0.704

	Education level	0.97	0.2	0.67-1.46	0.867

* reference category

§ the observations do not sum to N (419) due to missing values

Table 4. Pregnancy, antenatal and post-partum care characteristics of the eligible women and comparison with Italian population

Characteristic	N (%)	Mean±SD	Italian population (%)[41]
Age, years		34.9±8.9	32
Pregnancies in Italy (123)			
1	90 (73.2)		(53.9)
≥2	33 (26.8)		(46.1)
Smoking status (123)			
Nonsmoker	98 (79.7)		(68.1)
Smoker before pregnancy	14 (11.4)		(24.4)
Smoker	11 (8.9)		(7.5)
Prepartum course partecipation (122)			
No	89 (73)		(60.5)
Yes	33 (27)		(39.5)
Visit after delivery (within 12 months) (119)			
Yes	95 (79.8)		/
No	24 (20.2)		/
Counseling on postpartum contraceptive methods (122)			
No	66 (54.1)		(40.9)
Yes	56 (45.9)		(59.1)
Infant feeding (122)			
Breastfeeding only	85 (69.6)		(88.5)
Breastfeeding and bottle-feeding	24 (19.7)		
Bottle-feeding only	13 (10.7)		(11.5)
Utilization of family planning clinic (121)			
Yes	66 (54.5)		(27.9)

Characteristic	N (%)	Mean±SD	Italian population (%)[41]
No	55 (45.5)		(72.1)

543 The number of participants responding to the questions is indicated in brackets

UNIVERSITY OF CATANZARO "MAGNA GRÆCIA"
DEPARTMENT OF HEALTH SCIENCES
MEDICAL SCHOOL
CHAIR OF HYGIENE

CERVICAL AND BREAST CANCER SCREENING PARTICIPATION AND UTILIZATION OF MATERNAL HEALTH SERVICES AMONG IMMIGRANT WOMEN IN SOUTHERN ITALY

Questionnaire used in the survey

Date of interview ___/___/_____ **No.** _____

A) Demographic characteristics

A.1. How old were you on your last birthday? *(years)* _____

A.2. What is your marital status? ☐ Single ☐ Married with husband in Italy ☐ Married without husband in Italy ☐ Divorced ☐ Widowed ☐ Other (*please, specify* _____)

A.3.1.Do you have any children? ☐ No (→**A.4.**) ☐ Yes (*n°* ____) **A.3.2. Are they living in Italy?** ☐ No ☐ Yes (*n°* _____)

A.3.3. How old were they on their last birthday? What is their sex?

I.____ years	M	F	VI.____ years	M	F
II.____ years	M	F	VII.____ years	M	F
III.____ years	M	F	VIII.____ years	M	F
IV.____ years	M	F	IX.____ years	M	F
V.____ years	M	F	X.____ years	M	F

A.4. What is the highest level of education that you have completed? *(years)*

☐ < 5 ☐ 5 – 7 ☐ 8 – 12 ☐ ≥13, without university degree ☐ ≥13, with university degree (*please, specify* _____)

A.5. What is your occupation? ☐ None ☐ Student ☐ Housewife ☐ Housekeeper, caregiver ☐ Peddler ☐ Farmer ☐ Manual worker ☐ Professional employed ☐ Other (*spec.* _____)

A.6. What is your religion? ☐ None ☐ Catholic Christian ☐ Orthodox Christian ☐ Jewish ☐ Islamic ☐ Buddhist ☐ Hindu ☐ Other (*spec.* _____)

A.7. What is your country of origin? _____

A.8. From what country did you arrive in Italy? ☐ Country of origin ☐ Other country (*please, specify* _____)

A.9. How long have you lived in Italy? *(years)* _____ (*if less than 1 year, end interview.*)

A.10. What is your legal immigration status? ☐ Regular ☐ Irregular ☐ Asylum seeker

B) General health conditions

B.1. Do you suffer from any of the following chronic diseases? *(please, if yes, specify one or more of the following diseases)*

☐ No/I don't know
☐ Cardiovascular diseases (eg. hypertension, hypercholesterolemia, etc.) _____
☐ Respiratory diseases (eg. asthma, chronic obstructive pulmonary disease, etc.) _____
☐ Gastrointestinal diseases (eg. gastroenteritis, esophagitis, celiac disease, etc.) _____
☐ Musculoskeletal diseases (eg. osteoarthritis, osteoporosis, carpal tunnel syndrome, etc.)_____
☐ Oral diseases (dental caries, gingivitis, stomatitis, malocclusion, etc.)_____
☐ Genitourinary diseases (calculi, erectile dysfunction, prostatitis, etc.)_____
☐ Psychiatric disorders (depression, schizophrenia, eating disorders)_____
☐ Metabolic diseases (eg. chronic renal failure, liver cirrhosis, diabetes, thyroid disease, etc.) _____
☐ Autoimmune disorders (eg. SLE, psoriasis, inflammatory bowel diseases, ecc.) _____
☐ Other *(please, specify* _____)

B.2. Are you affected by any of the following infectious diseases? ☐ No/I don't know ☐ HIV ☐ Hepatitis B

☐ Hepatitis C ☐ Tuberculosis ☐ Parasitosis (es. malaria, toxoplasmosis, giardia, schistosomiasis, taenia, ecc.)

☐ STD (eg. syphilis, gonorrhea, HSV, etc.) ☐ Other *(please, specify* _____)

C) Health risk habits

C.1. Tobacco use

C.1.1 Have you smoked at least 100 cigarettes in your entire life? ☐ No (→**C.2.1.**) ☐ Yes

C.1.2. Do you now smoke cigarettes: ☐ Some days (*specify n °* ☐☐) ☐ Every day (*specify n°* ☐☐) ☐ Never (→**C.2.1.**)

C.1.3. During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking? ☐ No ☐ Yes

C.2. Alcohol consumption

C.2.1. During the past 30 days, did you have at least one drink of any alcoholic beverage such as beer, wine or liquor? ☐ No (→**D.1.**) ☐ Yes

C.2.2. During the past 30 days, how many days per month did you have at least one drink of any alcoholic beverage? ☐☐

C.2.3. During the past 30 days, on the days when you drank, approximately how many drinks did you drink on average?

Wine ☐☐ Beer ☐☐ Liquor ☐☐

D) Prevention and screening

D.1. Immunization

D.1.1. Which of the following vaccinations have you had? *(more than one option allowed)*

☐ Diphtheria ☐ Tetanus ☐ Pertussis ☐ Polio

☐ Hepatitis B ☐ Mumps ☐ Rubella ☐ Measles

☐ Chicken pox ☐ Haemophilus B ☐ Pneumococcal ☐ Meningococcal

☐ Influenza ☐ None/I don't know ☐ Other (*please, specify* _____)

(*If participant answered* Yes *to the question* **A.3.2.** *skip to question* **D.1.2.**. *If participant answered* No *to the question* **A.3.2.** *skip to question* **D.2.1.**.)

D.1.2. Have your children received vaccinations included in the national programs? ☐ No ☐ I don't remember ☐ Yes (→**D.1.4.**)

D.1.3. Why have they not received children's vaccinations? *(more than one option allowed)*

☐ I was not aware of their availability ☐ Vaccinations are not useful ☐ Vaccinations are dangerous

☐ Religious reasons ☐ Lack of time ☐ Other (*please, specify* _____)

D.1.4. Do you remember which of the following vaccinations your children have had?

☐ Mandatory vaccinations (diphtheria, tetanus, polio, hepatitis B) ☐ Pertussis ☐ Measles, mumps and rubella

☐ Chicken pox ☐ Haemophilus B ☐ Pneumococcal ☐ Meningococcal

☐ Influenza ☐ None/I don't know ☐ Other (*please, specify* _____)

D.2. Screening

D.2.1. Have you ever had Pap test?

☐ No ☐ Yes, for control ☐ Yes, for problems

D.2.2. When was the last time you had a Pap test? *(years)*

☐ <1 yr ago ☐ 1-2 yrs ago ☐ 2-3 yrs ago ☐ 3-5 yrs ago ☐ ≥5 yrs ago

D.2.3. Have you had a hysterectomy? ☐ No ☐ Yes

D.2.4. Have you ever had a mammography?

☐ No ☐ Yes, for control ☐ Yes, for problems

D.2.5. When was the last time you had a mammography? *(years)*

☐ <1 yr ago ☐ 1-2 yrs ago ☐ 2-3 yrs ago ☐ 3-5 yrs ago ☐ ≥5 yrs ago

E) Utilization of maternal health services

(*If participant answered* Yes *to question* **A.3.1.** *skip to question* ***E.1.***. *If participant answered* No *to question* **A.4.1.** *end interview.*)

E.1. How many times have you given birth since you've been in Italy? ☐ None ☐ (*spec. n°*) ☐☐

E.2. How many times have you had a miscarriage? ☐ None ☐ I don't remember ☐ (*spec. n°*) ☐☐

E.3. How many times have you had an abortion? ☐ None ☐ I don't remember ☐ (*spec. n°*) ☐☐

(*If participant answered* None *to question* ***E.1.*** *end interview. Otherwise, complete interview with all following questions referred to last pregnancy.*)

E.4. . Who was mainly monitoring your pregnancy/ies? ☐ None ☐ General practitioner

☐ Gynecologist ☐ Midwife ☐ Other (*please, specify* _____)

E.5. How many prenatal visits did you attend during each pregnancy?

☐ None ☐ 1 ☐ >1 (*spec. n°*) ☐

E.6. When did you receive your first pregnancy appointment? ☐ I don't remember ☐ (*please, specify weeks of pregnancy*) ☐

E.7.1. How many prenatal ultrasound checks did you have during your pregnancy? (*spec. n°*) ☐

E.7.2. Do you remember in which weeks of pregnancy you had these prenatal ultrasound checks? *(more than one option allowed)* ☐ None

☐ <8 ☐ 8-12 ☐ 13-16 ☐ 17-20 ☐ 21-24 ☐ 25-28 ☐ 29-32 ☐ ≥33

E.8. Did you know that prenatal visits and ultrasound checks are free? ☐ No ☐ Yes

E.9. Did you have any prenatal diagnostic testing? (*max. 4 options*) ☐ No ☐ Yes, maternal serum markers

☐ Yes, chorionic villus sampling ☐ Yes, amniocentesis ☐ Yes, nuchal translucency ☐ Other (*please, specify* _____)

E.10. Have you ever participated in a prepartum course/prenatal class? ☐ No ☐ Yes

E.11. Overall, do you believe you have had difficulties of access to and use of prenatal services during your pregnancy? (*max. 3 options*) ☐ No

☐ Yes, I don't know system's organization ☐ Yes, for language barriers ☐ Yes, for long waiting times for access to health-care services

☐ Yes, lack of time ☐ Yes, for my poor socioeconomic situation ☐ Other (*please, specify* _____)

E.12. Did you ever smoke during pregnancy? ☐ No, I don't smoke ☐ No, I stopped

☐ Yes, I continued to smoke the same number of cigarettes ☐ Yes, but I decreased the number of cigarettes

E.13. Did you have a postnatal visit within 12 months after delivery? ☐ No ☐ Yes

E.14. What was your chosen infant feeding method? ☐ Breastfeeding only (→**E.17.**) ☐ Bottle-feeding only

☐ Breastfeeding and other (water, tisane, or other infusion) ☐ Breastfeeding and bottle-feeding

E.15. Who advised you regarding the formula milk? ☐ Nobody, I decided ☐ Pediatrician

☐ Family/Friends ☐ Physician of hospital ward ☐ Other (*please, specify* _____)

E.16. What is the reason for the formula milk? (*max. 3 options*) ☐ I don't have enough milk ☐ I stopped breastfeeding

☐ The baby was not gains weight ☐ The baby couldn't latch on well

☐ I had painful nipples, and/or mastitis ☐ I had acute health problems ☐ My child had acute health problems

☐ I had to resume work shortly ☐ I had to moved my child abroad ☐ I was tired

☐ I took some drugs (*please, specify* _____) ☐ Other (*please, specify* _____)

E.17. Who gave you information about infant feeding? ☐ None ☐ I know

☐ Midwife of hospital ward ☐ Midwife of family planning center ☐ Pediatrician ☐ Family/Friends

☐ Other (*please, specify* _____)

E.18. Do you believe it is possible to get pregnant during the period of breastfeeding?

☐ No, it's not possible ☐ I don't know ☐ Yes, it's possible

E.19. Who counseled you on postpartum contraceptive methods?

☐ None (→**E.21.**) ☐ Family/Friends ☐ General practitioner

☐ Specialist ☐ Midwife of family planning center ☐ Other (*please, specify* _____)

E.20. Do you believe this counseling has been sufficient?

☐ Yes, I believe it has ☐ No, I would like to know more

E.21. At the resumption of sexual relations, are you thinking of using contraception?

☐ No ☐ I don't know yet ☐ Yes (*please, specify* _____)

E.22. Do you know a family planning center?

☐ No (→**E.24.**) ☐ Yes, but I never used it ☐ Yes, I have used it (→ **E.24.**)

E.23. Why have you never used a family planning center? (*please, specify one or more reason*) _____

_____

E.24. Are you accessing any healthcare services since discharge? ☐ No (→**E.26.**) ☐ Yes

E.25. Please, specify one or more of following healthcare services:

☐ Pediatric planning center ☐ Family planning center ☐ Advice center ☐ Specialist clinic

☐ Emergency Department ☐ Hospital ☐ Other (*please, specify* _____)

E.26. Whom have you selected as the child's physician? ☐ None ☐ Specialist

☐ Physician of family planning center ☐ Physician of hospital ward ☐ Pediatrician ☐ Other (*please, specify* _____)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item N°	Recommendation	Page
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7,8
Bias	9	Describe any efforts to address potential sources of bias	13
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	9
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9,10
		(b) Indicate number of participants with missing data for each variable of interest	21,23

Outcome data	15*	Report numbers of outcome events or summary measures	9,10; 21-23
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9,10; 21-23
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	10-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Cervical and breast cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

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Cervical and breast cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

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Abstract

Objectives

Women make up approximately half of the world's one billion migrants. Immigrant women tend to be one of the most vulnerable population groups with respect to healthcare. Cancer screening (CS) and maternal and reproductive health have been included among the ten main issues pertinent to women's health.

The aim of this study is to explore breast and cervical CS participation and to acquire information regarding access to healthcare services during pregnancy, childbirth and the postpartum period among age eligible immigrant women in Southern Italy.

Methods

A structured questionnaire was used to collect data from each participant**.** Women aged 25-64 years who had not had a hysterectomy and women aged 50-69 years without history of breast cancer were considered eligible for evaluation of cervical and breast CS participation, respectively. Moreover, women who had delivered at least once in Italy were enrolled to describe antenatal and post-partum care services use. All women were recruited through the third-sector and non-profit organizations (NPOs).

Results

Rate of cervical CS among the 419 eligible women was low (39.1%), and about one third had had a Pap-test for screening purposes within a three year period from interview (32.8%). Regarding breast CS practices, of the 125 eligible women 45.6% had had a mammography for control purposes, and less than one quarter (26, 20.8%) had their mammography within the recommended time interval of two years. About 80% of the respondents did not report difficulties of access and use of antenatal and postpartum services.

Conclusion

This study provides currently unavailable information about adherence to CS and maternal and child health that could encourage future research to develop and test

culturally appropriate, women-centered strategies for promoting timely and regular CS among immigrant women in Italy.

Key words:

Cancer screening, immigrant, Italy, maternal health, women.

Strengths and limitations of this study

- The high participation rate (92.3%) is extremely satisfactory and restricts one major potential source of bias in the results.
- Immigrants who did not speak Italian or who had low literacy levels have not been excluded from the study, helped by linguistic and cultural mediators.
- The sample may not be representative of all immigrants within the region, but only of those connected to non-profit organizations and with a regular stay permit.
- There may be an effect of recall bias on self reported information about cancer screening practices.

Cancer screening participation and utilization of maternal health services: a cross-sectional study among immigrant women in Southern Italy

Background

Estimates from the United Nations show that women make up approximately half of the world's one billion migrants.[1] The effects of migration on women's health are varied and hard to predict and may be determined by a number of factors: the conditions under which the migration occurred; how well a particular individual has integrated in the host society, the social status of the individual in the host country, and the health conditions that are existent in the host country. Studies have indicated that women who migrate tend to be one of the most vulnerable population groups with respect to healthcare.[2,3] In particular, women who do not speak the host country language and do not have a job are less likely to benefit from the health system of the host nation.[4] These women are usually dependent on men and are unaware of the available health services. Governments should ensure that appropriate health services are provided that adequately address all aspects of women's health, particularly cancer screening (CS) and maternal and reproductive health. These basic health care services have been included among the ten main issues pertinent to women's health, whether it be in immigrants or native inhabitants,[5] and they ought to be available to everyone in society in accordance with social equality.

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death among females worldwide. Previous research has shown that immigrant status is associated with breast cancer risk through changes in reproductive factors (e.g., higher age at first live birth, lower breast feeding rates) and lifestyle factors (e.g., diet) but could also indicate variations in other environmental exposures.[6-8] Cervical cancer is the second most commonly diagnosed cancer and although in several western countries its burden has decreased by as much as 65% over the past 40 years thanks to screening

programs,[9] it is still the third leading cause of cancer death in less developed countries, and an important healthcare issue among migrant women.

Detecting both these cancers early is key to keeping women alive and healthy. Increased health risks have been noted among immigrants and ethnic minorities who also may receive less healthcare than the native population,[10,11] whilst at the same time numerous studies have documented lower participation in CS programs among various migrant groups.[12-14] Furthermore ethnic minority women residing in Western countries are more likely to be diagnosed with advanced-stage disease and hence have higher mortality rates,[15] often as a result of lower utilization of timely CS services.[16-18]

Over the course of the last century there have been many tremendous improvements in maternal and neonatal outcomes in terms of pregnancy-related complications, maternal and infant mortality rates.[19] But the benefits of these have not extended everywhere and to everyone, since significant disparities by race and ethnicity persist. Studies on the determinants of maternal health care delivery suggest that social, economic, behavioral, and environmental factors explain the worse health status among migrants[20-23] in terms of preterm delivery, congenital anomalies, low birth weight, fetal growth restriction, and infant mortality[24-26] when compared with the native population.[27] In Italy, both native and foreign women, have the right to participate free of charge in a specific programme of care during pregnancy and up to one month following delivery.

The aims of this survey were to explore breast and cervical CS participation and to acquire information regarding access to healthcare services during pregnancy, childbirth and the postpartum period among age eligible immigrant women in Southern Italy.

Methods

Study population

The survey was conducted from May 2012 until April 2013. The study population consisted of a specific subset of immigrants. For this study, immigrants were

defined as those from low or middle-income countries according to the classification of the World Bank based on per capita GDP.[28] Tourists were excluded.

Details regarding sampling of individuals for this study have been described elsewhere.[29] Briefly, since probability or random sampling can not be carried out on immigrants, a convenience sampling method was applied. Women aged 18 or more living in Italy for at least 12 months were recruited through the third-sector and non-profit organizations (NPOs) that provide support to immigrants and work to facilitate their access to healthcare.

In Italy, organized nationwide CS programs include personal invitations for a Pap-test sent to women aged 25-64 years every three years and for mammography screening to women aged 50-69 years every two years. Therefore, sexually active women aged 25-64 years who had not had a hysterectomy and women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer were considered eligible for evaluation of cervical and breast CS participation, respectively. Moreover, women who had delivered at least once in Italy were enrolled to describe antenatal and post-partum care services use.

Survey instrument

Written consent was acquired prior to interview. A structured questionnaire (available as supplementary file) was used to collect data from each participant**.** Questionnaires were administered by physicians competent in interview methods, with help, when necessary, from a cultural mediator. The interviews lasted ten minutes on average.

A pilot study was undertaken. Validation of the survey instrument was performed through the assessment of internal and test-retest (external) reliability in addition to face and content validity. Test-retest reliability was checked in the pilot study through an additional interview of 50 women within a time interval of 20 days from the first administration of the questionnaire. Face and content validity were examined in order to

assess the clarity of the wording of the items which in turn generated new items. Modifications were made according to the comments recorded by the women in order to clarify the content of the questionnaire and to simplify its wording.

Outcomes and covariates

Socio-demographics included information on gender, age, marital and legal status, education level, religion, nationality, working activity, duration of residence in Italy. The questions on lifestyle and health status included information on physical activity, smoking habits, alcohol consumption, chronic and infectious diseases. The questions on participation in screening programs included breast and cervical CS practices. Uptake of cervical CS was determined by asking 'Have you ever undergone Pap test for control without any symptoms?'. Women who answered affirmatively were asked 'When was the last time you underwent Pap test?'. Women who had undergone a Pap test within the previous three years were considered as 'uptake', corresponding to women who comply with the recommended screening period. Uptake of breast CS was determined by asking, 'Have you ever undergone a mammography for control without any symptoms?'. Women who answered affirmatively were asked a second question, 'When was the last time you had a mammography?'. Women who reported that they had undergone their most recent mammography within the previous two years were considered as 'uptake', corresponding to women who comply with the recommended screening period.

The questionnaire also contained items on services utilization during pregnancy and childbirth. Access to antenatal and postnatal care was assessed by number and timing of examination, such as time of first pregnancy appointment, number of prenatal visits and echographies, antenatal care by health-care professionals including general practitioner (GP), gynecologist, nurse, midwife/obstetrician, or other care providers, prenatal screening and diagnostic testing (i.e. maternal serum markers such as beta human chorionic gonadotropin, pregnancy-associated plasma protein A, amniocentesis, etc.),

smoking habits during pregnancy, counseling on infant feeding and postpartum contraceptive methods, reasons for access to maternal and newborn healthcare services (family planning centers and child care service centers). All information was self-reported.

The study protocol was ratified by the Institutional Ethical Committee ('Mater Domini' Hospital of Catanzaro, Italy) (20/04/2012).

Statistical analysis

Descriptive analyses were used to describe demographic characteristics and lifestyle habits of the immigrant women. Data were summarized into frequencies and percentages. Univariate analysis was conducted by using chi-square or Fisher exact tests to assess relationships between cervical and breast CS behavior and the respective eligible study sub-groups.

Multivariate logistic regression analysis was performed. One model was developed in which were included those variables potentially associated with having received cervical CS through Pap smear in the previous three years (Model 1) (0 = no, 1 = yes). Women that had had a pap smear not for screening purposes were included in the "no" option of the outcome variable. The model building strategy consisted of the following steps: 1) bivariate analysis was performed for each of the potential explanatory variables to find out which coding (categorical, ordinal, continuous) better fitted the data and we chose that in the multivariate analysis; 2) multiple logistic regression was performed. Adjusted odds ratio (ORs) and 95% confidence intervals (CIs) were calculated; 3) on the basis of the results of the bivariate analysis, the coding of the explanatory variables included in the model was the following: age (continuous), marital status (1 = married, 2 = other), children (1 = no, 2 = yes), education level (ordinal: 1 = ≤ 7 yrs, 2 = 8-13 yrs, 3 = university degree), employment status (four categories: 1 = unemployed, 2 = housekeeper, caregiver, 3 = manual worker; 4 = sedentary workers) included as a dummy variable with the unemployed being the reference category,

nationality (four categories: 1 = European, 2 = African, 3 = Asian, 4 = South American) included as a dummy variable with the European being the reference category, length of stay in Italy (ordinal: 1 = 1-2 yrs, 2 = 3-5 yrs, 3 = 6-8 yrs, 4 = ≥ 9 yrs), self-reported legal status (1 = regular, 2 = irregular), chronic diseases (1 = no, 2 = yes), physical activity (1 = no, 2 = yes), current smoker (1 = no, 2 = yes), alcohol consumption in the previous 30 days (1 = no, 2 = yes). The data were analyzed using the Stata software program, version 11.2.[30]

Results

Of the 503 immigrant women who were approached for the study, 492 met at least one of the inclusion criteria and 464 were enrolled, giving a participation rate of 94.3%. The main characteristics of the study population were reported in Table 1. The participants were between the ages of 18 and 70 years (mean 40.1 yrs) and only 14.6% had obtained university degree. More than half (58.8%) of women were housekeepers or caregivers. A low percentage (9.9%) declared to be irregular. 164 (34.5%) had been living in Italy for 9 years or more. Paid employment was the most common reason for migration (65.8%) among participants. Most women were from Europe (46.3%) and the main country of origin was Ukraine (25.8%). Only 19.3% were current smokers. The vast majority of women (71.3%) reported no alcohol drinking in the previous 30 days. About 49% of the respondents were affected by chronic diseases.

Three different sub-groups were included in the final sample: sexually active women between 25-64 years of age without hysterectomy that were eligible for participation in cervical CS (419); women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer that were eligible for participation in breast CS (125); and women of any age who had delivered at least once in Italy that were eligible to access antenatal and post-partum care services (123). Seven women were part of the three sub-groups.

The mean age of the population eligible for cervical CS was 41.1 years with an age range between 25 and 64 years. More than half (58.1%) were married and 247 (58.9%) had completed high school. About 60% were housekeepers or caregivers. Rate of cervical CS among the 419 eligible women was low (39.1%), and about one third had had a Pap-test for screening purposes (32.8%) within a three year period from interview (Table 2). Having had a routine pap smear in the previous three years was significantly more likely in women with longer duration of residence in Italy (OR=1.60; 95% CI 1.29-1.97; p<0.001) and in South American women (OR=8.36; 95% CI 1.99-35.06; p=0.004) compared with European female immigrants, whereas a lower probability of cervical CS participation was found in Asian females (OR=0.41; 95% CI 0.22-0.76; p=0.005) compared with European female immigrants (Table 3).

Among the 125 women considered eligible for breast CS, 43.2% were married and 71 (56.4%) had completed high school. More than three quarter (85.7%) were practicing Christians religion and 65.1% were from Europe. More than half (51.6%) had been living in Italy for 9 years or more and the vast majority (86.5%) had a regular residence permit. Regarding breast CS practices, of the 125 eligible women 45.6% had had a mammography for control purposes, but less than one quarter (26, 20.8%) had their mammography within the recommended time interval of two years (Table 2). Results from univariate analysis do not show a statistically significant difference in breast CS adherence with respect to all the selected characteristics apart from duration of stay in Italy, ranging from 15.8% among those women having resided in the country for ≤2 years to 58.5% among women with a length of stay ≥9 years, and among those who self-reported an irregular legal status (17.7%) versus a regular status (50%) (Table 1).

Table 4 shows main pregnancy, antenatal and post-birth care characteristics of the eligible population. The number of immigrant women who delivered in Italy at least once was 123. The mean age of the population eligible was 34.9 years with an age range between 19 and 54 years. About 80% of the respondents did not report difficulties of

access and use of prenatal and postpartum services. In terms of prenatal care, 70.9% of immigrant women had their first pregnancy appointment within 12 weeks of pregnancy and 84.2% had two or more prenatal visits. Only 12.9% of mothers underwent fewer than two prenatal ultrasound checks. More than half (56.3%) of pregnant women were not submitted to prenatal diagnostic testing (maternal serum markers such as beta human chorionic gonadotropin, pregnancy-associated plasma protein A, amniocentesis) (data not shown). Only about a third (27%) of respondents participated in prepartum course/prenatal class, although Italian National Health Service guarantees free access to this healthcare service. The vast majority (86%) of mothers chose a pediatrician such as their child's physician as caregiver, whereas the remaining part of the sample preferred a specialist or a maternal healthcare centre physician or none at all. Moreover, among immigrant women with children living in Italy (122), 115 (94.3%) chose to immunize their children with mandatory and recommended vaccinations for infants included in the national programs.

Discussion

The present study sought to describe CS practices, antenatal and postpartum care services use among a sample of age eligible immigrant women in the South of Italy.

The existence of a notable difference in preventive practice utilization and motherhood protection according to immigration status has been reported in previous studies.[24, 31-33] Immigrant women may not be accustomed to having regular health check-ups in their home countries and may be less familiar with the opportunity of routine screening to detect health problems before the onset of symptoms.[34] These shortcomings may reduce the women's ability to maintain their health in specific periods during their lifetime (e.g. during pregnancy) and to participate in preventive care.

In our immigrant sample, adherence to cervical (32.8%) and breast (20.8%) CS recommended practices is discernibly much lower than those reported in several studies[9,35] and lower than those of the Italian native populations.[36] Indeed, the percentage

of Italian women who underwent routine cervical and breast CS were 77% and 71%, respectively.[36] It is possible that the differences between our sample population and other samples studies could be due to differences in cultural and socioeconomic factors. Furthermore, one must consider that in Italy there is a geographical difference in CS coverage, with the highest percentage of women who actually participate in them being in the north of the country and the lowest in the south.[37] One reason for the low coverage for CS in our sample may be due to the fact that in the regions in the South of the country, a screening program has only recently been organized. In fact in our area of study, among native citizens, CS for early detection of breast and cervical cancers has reached less than half of the target population: regional figures have shown that cervical and breast CS rates had decreased to 58.3%[38] and 49.7%[39], respectively. Although these are much lower than the national figures, nonetheless, they are still higher than those of the immigrant women in our sample.

Only less than a quarter of the sample had received breast CS at the recommended time intervals, and for this reason efforts should be made to emphasize that it is not enough to get screened once or sporadically.

The duration of residence in the host country may be a significant predictor of whether an individual migrant adheres to the CS program.[40] The results of our study indicate that being a recent immigrant is a barrier to receiving cervical CS. Certainly women that have spent more time in Italy may be more likely to be integrated into the screening program and proficient in the Italian language, and therefore feel more confident approaching the Italian health-care system. Hence it would be prudent to provide immigrants with culturally sensitive and specific information to overcome any barriers. Organized screening programs may help to reduce ‘‘ethnic’’ disparities by offering a systematic (and free) examination to all the women of the target age groups, and by using specific strategies to reach the most underserved women. Longer duration of stay in Italy could also reflect probability of receiving a personal invitation. The

importance of invitation letters has been mentioned,[41,42] and one way of overcoming a language barrier is to send the letter written in the language of the individual migrant as well as that of the country in which they reside.

Our study showed that Asian immigrant women had a lower rate of Pap testing when compared with European immigrant women. The Pap smear is a more personal and invasive procedure that may pose particular cultural barriers and thus can hinder these women from obtaining the appropriate services.[43] Culturally tailored messages are important to promote screening in specific ethnic groups to enable the identification of the target group with these messages. The message must reflect the same values and beliefs of the target group, and it should accommodate literacy levels to ensure comprehension. Working closely with the target group is also crucial to ensure screening participation. It would be important for program developers to contact ethnic group gatekeepers, such as key religious or community leaders.

Immigrant women in our study have experienced an acceptable level of care during pregnancy and childbirth. We also found that education and advice for breastfeeding and newborn care could be improved in our sample.

In general, one way of reducing barriers for participation would be for health-care professionals to introduce immigrant women to preventive care. In particular, GPs could play an important role in this respect, especially when one takes into account that a survey conducted among immigrant populations in the same area showed that 85% of the sample had access to a GP at least once, indicating that immigrants in our area of study had adequate access to primary care.[29] As a result, the acculturation process into the health-care system could be shortened.

Strength and limitations of the study

The strengths of the study lie in the enrolment technique and the high participation rate. A physician not involved in providing health care to the migrants was chosen to complete the questionnaire as it was our belief that this would make the

participants more confident in reporting all aspects of health care they had received. Furthermore, the physician was supported by linguistic and cultural mediators to help those who could not speak Italian or with low literacy skills. Moreover, the 94.3% participation rate is very satisfactory, reducing a major source of bias, and we believe this is related to the great efforts of the survey researchers in promoting migrant involvement in the study.

Our findings are subject to some limitations. First, we used a convenience sampling method, and this factor limits the generalizability of the results. Furthermore, we chose locations of focus due to logistical constraints, and, therefore, the study sample was composed of people connected to NPOs that assist migrant population and also mediated healthcare encounters. Therefore the views expressed may be different from migrants who have no such connection to those organizations. Furthermore, a large proportion of our migrant participants had a regular residence permit which carries with it health insurance cover, which again is not the case with irregular immigrants. Therefore, the sample may not be representative of all immigrants within the region, but only of those connected to NPOs and with a regular stay permit.

Moreover, the cross-sectional design of our study could not capture temporal changes in the ability of immigrants to use and access health services. There may be an effect of recall bias on self reported information about CS practices: patients frequently tend to over-report their use of Pap test or mammogram and underreport the time lapse since their last screening. We have attempted to minimize these biases by conducting the survey with the use of access measures that are less subjective and measure patient experience, not simply satisfaction. Moreover, there may be women who were pregnant in Italy some years ago and, unintentionally, gave incorrect information due to poor or incomplete memory recall. However, given that the mean age of women in this subgroup is 34.9 years, it is likely that the mean time from pregnancy would have been within an acceptable time range thus minimizing recall bias.

Conclusion

Even with these potential limitations, this study provides currently unavailable information about preventive care utilization among immigrant women in Italy that could encourage future research to develop and test culturally appropriate, women-centered strategies for promoting timely and regular CS and to better understand the factors that predict maternal and child health services utilization and identify potential targets for intervention among immigrant women.

List of abbreviations

CS: cancer screening; GP: general practitioner; OR: odds ratio; CI: confidence interval; NPO: non-profit organization.

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Authors' contributions

AB, CGAN, EL and CP collected the data, and contributed to the data analysis and interpretation. AB and MP designed the study, were responsible for the data analysis and interpretation, and wrote the article. AB and MP are guarantors for the study.

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Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Data sharing statement

Survey data was not included in the present article and are available from the authors.

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Table 1. Distribution of characteristics among the total study population and eligible women having undergone cervical and breast cancer screening (CS)

Characteristic	Total (464)		Cervical CS				Breast CS (125)			
			Eligible women (419)		Adherence to recommendations (164)		Eligible women (125)		Adherence to recommendations (57)	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Age, years										
18-30	92	(19.8)	84	(20)	28	(33.3)	-	-	-	-
31-40	141	(30.4)	127	(30.3)	42	(33.1)	-	-	-	-
41-50	117	(25.2)	113	(27)	53	(46.9)	12	(9.6)	7	(58.3)
≥51	114	(24.6)	95	(22.7)	41	(43.2)	113	(90.4)	50	(44.2)
					Trend χ^2=6.64, 3 df, p=0.084				Trend χ^2=0.86, 1 df, p=0.353	

Education level, years										
≤7	121	(26.1)	112	(26.8)	48	(42.9)	27	(21.6)	13	(48.2)
8-13	275	(59.3)	247	(58.9)	86	(34.8)	70	(56)	29	(41.4)
>13, with university degree	68	(14.6)	60	(14.3)	30	(50)	28	(22.4)	15	(53.6)
					χ^2=5.56, 2 df, p=0.062				χ^2=1.28, 2 df, p=0.528	
*Marital status**			418				124			
Married	260	(56.3)	243	(58.1)	99	(40.7)	54	(43.5)	25	(46.3)
Other	202	(43.7)	175	(41.9)	64	(36.6)	70	(56.5)	31	(44.3)
					χ^2=0.74, 1 df, p=0.389				χ^2=0.05, 1 df, p=0.823	
Children										
No	115	(24.8)	98	(23.4)	30	(30.6)	17	(13.6)	7	(41.2)

Yes	349	(75.2)	321	(76.6)	134	(41.7)	108	(86.4)	50	(46.3)
					χ^2=3.91, 1 df, p=0.048				χ^2=0.16, 1 df, p=0.694	
Employment status										
Unemployed	147	(31.7)	129	(30.8)	55	(42.6)	30	(24)	14	(46.7)
Housekeeper, caregiver	273	(58.8)	255	(60.9)	90	(35.3)	85	(68)	40	(47.1)
Manual worker	24	(5.2)	16	(3.8)	8	(50)	7	(5.6)	1	(14.3)
Sedentary worker	20	(4.3)	19	(4.5)	11	(57.9)	3	(2.4)	2	(66.7)
					χ^2=5.84, 3 df, p=0.120				Fisher's exact=3.36, p=0.339	
Nationality										
European	215	(46.3)	197	(47)	76	(38.6)	81	(64.8)	35	(43.2)
African	138	(29.8)	123	(29.4)	55	(44.7)	19	(15.2)	9	(47.4)

Asian	98	(21.1)	86	(20.5)	23	(26.7)	24	(19.2)	12	(50)
American	13	(2.8)	13	(3.1)	10	(76.9)	1	(0.8)	1	(100)
					χ^2=14.97, 3 df, p=0.002				Fisher's exact=1.59, p=0.661	
Self-reported legal status										
Regular	418	(90.1)	375	(89.5)	154	(41.1)	108	(86.4)	54	(50)
Irregular	46	(9.9)	44	(10.5)	10	(22.7)	17	(13.6)	3	(17.7)
					χ^2=5.56, 1 df, p=0.018				Fisher's exact=6.20, p=0.013	
Length of stay in Italy, years										
1-2	83	(17.9)	74	(17.7)	16	(21.6)	19	(15.2)	3	(15.8)
3-5	124	(26.7)	108	(25.7)	24	(22.2)	20	(16)	6	(30)

6-8	97	(20.9)	95	(22.7)	45	(47.4)	21	(16.8)	10	(47.6)
≥9	160	(34.5)	142	(33.9)	79	(55.6)	65	(28)	38	(58.5)
					Trend χ^2=41.33, 3 df, p<0.001				Trend χ^2=13.03, 3 df, p=0.005	
*Physical activity**			406							
No	157	(34.9)	139	(34.2)	57	(41)	44	(35.2)	18	(40.9)
Yes	293	(65.1)	267	(65.8)	102	(38.2)	81	(64.8)	39	(48.2)
					χ^2=0.30, 1 df, p=0.583				χ^2=0.60, 1 df, p=0.438	
*Alcohol consumption in the previous 30 days**			406							
No	321	(71.3)	288	(70.9)	113	(39.2)	81	(64.8)	38	(46.9)
Yes	129	(28.7)	118	(29.1)	46	(39)	44	(35.2)	19	(43.2)
					χ^2=0.00, 1 df, p=0.962				χ^2=0.16, 1 df, p=0.689	

*Current smoker**			406							
No	363	(80.7)	324	(79.8)	127	(39.2)	95	(76)	45	(47.4)
Yes	87	(19.3)	82	(20.2)	32	(39)	30	(24)	12	(40)
					χ^2=0.00, 1 df, p=0.977				χ^2=0.50, 1 df, p=0.480	
*Chronic diseases**			403							
No	227	(50.8)	201	(49.9)	64	(31.8)	29	(23.2)	12	(41.4)
Yes	220	(49.2)	202	(50.1)	94	(46.5)	96	(76.8)	45	(46.9)
					χ^2=9.13, 1 df, p=0.003				χ^2=0.27, 1 df, p=0.603	

*Total may not be equal to No. because of missing values

Table 2. Cervical and breast cancers screening practice

Cancer screening services	No.	Percent
Cervix[†]		
Having received cervical cancer screening through Pap smear (419)		
No	247	59
Yes, for control	164	39.1
Yes, I had problems	8	1.9
Time since last pap test, years (419)		
≤ 3	135	32.8
> 3 or never	283	67.5
Breast[#]		
Having received breast cancer screening through mammography (125)		
No	61	48.8
Yes, for control	57	45.6
Yes, I had problems	7	5.6
Time since last mammogram, years (125)		
≤ 2	26	20.8
> 2 or never	99	79.2

[†] All sexually active women aged 25-64 years and having an intact uterus were eligible

[#] Women aged 50-69 years without previous diagnosis of invasive or in situ breast cancer were eligible

Table 3. Multiple logistic regression analysis between variables potentially associated with having received a Pap smear in the previous three years

Variable	OR	SE	95% CI	P value
Model Outcome: Pap smear for screening purposes in the previous three years *Log-likelihood = -227.53, χ2 = 50.97, P value < 0.0001, No. of obs. = 402*[8]				
Length of stay in Italy, ordinal	1.64	0.21	1.28-2.1	<0.001
Nationality				
European*	1.00	-	-	-
South American	7.87	6.14	1.7-36.32	0.008
Asian	0.35	0.13	0.17-0.72	0.004
African	0.74	0.27	0.36-1.51	0.411
Employment status				
Unemployed*	1.00	-	-	-
Housekeeper, caregiver	0.7	0.19	0.4-1.2	0.198
Manual workers	0.58	0.36	0.17-1.95	0.374
Sedentary workers	0.85	0.53	0.25-2.87	0.798
Chronic diseases				
No*	1.00	-	-	-
Yes	1.37	0.34	0.84-2.21	0.204
Marital status				
Married*	1.00	-	-	-
Not married	0.73	0.19	0.44-1.22	0.228
Alcohol consumption in the previous 30 days				
No*	1.00	-	-	-

Yes	0.75	0.22	0.42-1.32	0.312
Physical activity				
No*	1.00	-	-	-
Yes	0.83	0.21	0.5-1.36	0.457
Age, continuous	1.07	0.14	0.83-1.39	0.601
Self-reported legal status				
Regular*	1.00	-	-	-
Irregular	1.18	0.52	0.5-2.79	0.704
Education level, years	0.97	0.2	0.67-1.46	0.867
≤ 7	1.03	0.42	0.46-2.31	0.944
8-13	0.65	0.22	0.33-1.25	0.195
>13, with university degree*	1.00	-	-	-

* reference category

§ the observations do not sum to No. (419) due to missing values

Table 4. Pregnancy, antenatal and post-partum care characteristics of the eligible women and comparison with Italian population

Characteristic	N (%)	Mean±SD	Italian population (%)[41]
Age, years		34.9±8.9	32
Pregnancies in Italy (123)			
1	90 (73.2)		(53.9)
≥2	33 (26.8)		(46.1)
Smoking status (123)			
Nonsmoker	98 (79.7)		(68.1)
Smoker before pregnancy	14 (11.4)		(24.4)
Smoker	11 (8.9)		(7.5)
Prepartum course partecipation (122)			
No	89 (73)		(60.5)
Yes	33 (27)		(39.5)
Visit after delivery (within 12 months) (119)			
Yes	95 (79.8)		/
No	24 (20.2)		/
Counseling on postpartum contraceptive methods (122)			
No	66 (54.1)		(40.9)
Yes	56 (45.9)		(59.1)
Infant feeding (122)			
Breastfeeding only	85 (69.6)		(88.5)
Breastfeeding and bottle-feeding	24 (19.7)		
Bottle-feeding only	13 (10.7)		(11.5)
Utilization of family planning clinic (121)			
Yes	66 (54.5)		(27.9)

Characteristic	N (%)	Mean±SD	Italian population (%)[41]
No	55 (45.5)		(72.1)

The number of participants responding to the questions is indicated in brackets

UNIVERSITY OF CATANZARO "MAGNA GRÆCIA"
DEPARTMENT OF HEALTH SCIENCES
MEDICAL SCHOOL
CHAIR OF HYGIENE

CERVICAL AND BREAST CANCER SCREENING PARTICIPATION AND UTILIZATION OF MATERNAL HEALTH SERVICES AMONG IMMIGRANT WOMEN IN SOUTHERN ITALY

Questionnaire used in the survey

Date of interview ___/___/_____ **No.** _____

A) Demographic characteristics

A.1. How old were you on your last birthday? *(years)* _____

A.2. What is your marital status? ☐ Single ☐ Married with husband in Italy ☐ Married without husband in Italy ☐ Divorced ☐ Widowed ☐ Other (*please, specify* _____)

A.3.1.Do you have any children? ☐ No (→**A.4.**) ☐ Yes (*n°* ____) **A.3.2. Are they living in Italy?** ☐ No ☐ Yes (*n°* _____)

A.3.3. How old were they on their last birthday? What is their sex?

I.____ years	M	F	VI.____ years	M	F
II.____ years	M	F	VII.____ years	M	F
III.____ years	M	F	VIII.____ years	M	F
IV.____ years	M	F	IX.____ years	M	F
V.____ years	M	F	X.____ years	M	F

A.4. What is the highest level of education that you have completed? *(years)*

☐ < 5 ☐ 5 – 7 ☐ 8 – 12 ☐ ≥13, without university degree ☐ ≥13, with university degree (*please, specify* _____)

A.5. What is your occupation? ☐ None ☐ Student ☐ Housewife ☐ Housekeeper, caregiver ☐ Peddler ☐ Farmer ☐ Manual worker ☐ Professional employed ☐ Other (*spec.* _____)

A.6. What is your religion? ☐ None ☐ Catholic Christian ☐ Orthodox Christian ☐ Jewish ☐ Islamic ☐ Buddhist ☐ Hindu ☐ Other (*spec.* _____)

A.7. What is your country of origin? _____

A.8. From what country did you arrive in Italy? ☐ Country of origin ☐ Other country (*please, specify* _____)

A.9. How long have you lived in Italy? *(years)* _____ (*if less than 1 year, end interview.*)

A.10. What is your legal immigration status? ☐ Regular ☐ Irregular ☐ Asylum seeker

B) General health conditions

B.1. Do you suffer from any of the following chronic diseases? *(please, if yes, specify one or more of the following diseases)*

☐ No/I don't know
☐ Cardiovascular diseases (eg. hypertension, hypercholesterolemia, etc.) _____
☐ Respiratory diseases (eg. asthma, chronic obstructive pulmonary disease, etc.) _____
☐ Gastrointestinal diseases (eg. gastroenteritis, esophagitis, celiac disease, etc.) _____
☐ Musculoskeletal diseases (eg. osteoarthritis, osteoporosis, carpal tunnel syndrome, etc.)_____
☐ Oral diseases (dental caries, gingivitis, stomatitis, malocclusion, etc.)_____
☐ Genitourinary diseases (calculi, erectile dysfunction, prostatitis, etc.)_____
☐ Psychiatric disorders (depression, schizophrenia, eating disorders)_____
☐ Metabolic diseases (eg. chronic renal failure, liver cirrhosis, diabetes, thyroid disease, etc.) _____
☐ Autoimmune disorders (eg. SLE, psoriasis, inflammatory bowel diseases, ecc.) _____
☐ Other *(please, specify* _____)

B.2. Are you affected by any of the following infectious diseases? ☐ No/I don't know ☐ HIV ☐ Hepatitis B

☐ Hepatitis C ☐ Tuberculosis ☐ Parasitosis (es. malaria, toxoplasmosis, giardia, schistosomiasis, taenia, ecc.)

☐ STD (eg. syphilis, gonorrhea, HSV, etc.) ☐ Other *(please, specify* _____)

C) Health risk habits

C.1. Tobacco use

C.1.1 Have you smoked at least 100 cigarettes in your entire life? ☐ No (→**C.2.1.**) ☐ Yes

C.1.2. Do you now smoke cigarettes: ☐ Some days (*specify n °* ☐☐) ☐ Every day (*specify n°* ☐☐) ☐ Never (→**C.2.1.**)

C.1.3. During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking? ☐ No ☐ Yes

C.2. Alcohol consumption

C.2.1. During the past 30 days, did you have at least one drink of any alcoholic beverage such as beer, wine or liquor? ☐ No (→**D.1.**) ☐ Yes

C.2.2. During the past 30 days, how many days per month did you have at least one drink of any alcoholic beverage? ☐☐

C.2.3. During the past 30 days, on the days when you drank, approximately how many drinks did you drink on average?

Wine ☐☐ Beer ☐☐ Liquor ☐☐

D) Prevention and screening

D.1. Immunization

D.1.1. Which of the following vaccinations have you had? *(more than one option allowed)*

☐ Diphtheria ☐ Tetanus ☐ Pertussis ☐ Polio

☐ Hepatitis B ☐ Mumps ☐ Rubella ☐ Measles

☐ Chicken pox ☐ Haemophilus B ☐ Pneumococcal ☐ Meningococcal

☐ Influenza ☐ None/I don't know ☐ Other (*please, specify* _____)

(*If participant answered* Yes *to the question* **A.3.2.** *skip to question* **D.1.2.**. *If participant answered* No *to the question* **A.3.2.** *skip to question* **D.2.1.**.)

D.1.2. Have your children received vaccinations included in the national programs? ☐ No ☐ I don't remember ☐ Yes (→**D.1.4.**)

D.1.3. Why have they not received children's vaccinations? *(more than one option allowed)*

☐ I was not aware of their availability ☐ Vaccinations are not useful ☐ Vaccinations are dangerous

☐ Religious reasons ☐ Lack of time ☐ Other (*please, specify* _____)

D.1.4. Do you remember which of the following vaccinations your children have had?

☐ Mandatory vaccinations (diphtheria, tetanus, polio, hepatitis B) ☐ Pertussis ☐ Measles, mumps and rubella

☐ Chicken pox ☐ Haemophilus B ☐ Pneumococcal ☐ Meningococcal

☐ Influenza ☐ None/I don't know ☐ Other (*please, specify* _____)

D.2. Screening

D.2.1. Have you ever had Pap test?

☐ No ☐ Yes, for control ☐ Yes, for problems

D.2.2. When was the last time you had a Pap test? *(years)*

☐ <1 yr ago ☐ 1-2 yrs ago ☐ 2-3 yrs ago ☐ 3-5 yrs ago ☐ ≥5 yrs ago

D.2.3. Have you had a hysterectomy? ☐ No ☐ Yes

D.2.4. Have you ever had a mammography?

☐ No ☐ Yes, for control ☐ Yes, for problems

D.2.5. When was the last time you had a mammography? *(years)*

☐ <1 yr ago ☐ 1-2 yrs ago ☐ 2-3 yrs ago ☐ 3-5 yrs ago ☐ ≥5 yrs ago

E) Utilization of maternal health services

(*If participant answered* Yes *to question* **A.3.1.** *skip to question* ***E.1.***. *If participant answered* No *to question* **A.4.1.** *end interview.*)

E.1. How many times have you given birth since you've been in Italy? ☐ None ☐ (*spec. n°*) ☐☐

E.2. How many times have you had a miscarriage? ☐ None ☐ I don't remember ☐ (*spec. n°*) ☐☐

E.3. How many times have you had an abortion? ☐ None ☐ I don't remember ☐ (*spec. n°*) ☐☐

(*If participant answered* None *to question* ***E.1.*** *end interview. Otherwise, complete interview with all following questions referred to last pregnancy.*)

E.4. . Who was mainly monitoring your pregnancy/ies? ☐ None ☐ General practitioner

☐ Gynecologist ☐ Midwife ☐ Other (*please, specify* _____)

E.5. How many prenatal visits did you attend during each pregnancy?

☐ None ☐ 1 ☐ >1 (*spec. n°*) ☐

E.6. When did you receive your first pregnancy appointment? ☐ I don't remember ☐ (*please, specify weeks of pregnancy*) ☐

E.7.1. How many prenatal ultrasound checks did you have during your pregnancy? (*spec. n°*) ☐

E.7.2. Do you remember in which weeks of pregnancy you had these prenatal ultrasound checks? *(more than one option allowed)* ☐ None

☐ <8 ☐ 8-12 ☐ 13-16 ☐ 17-20 ☐ 21-24 ☐ 25-28 ☐ 29-32 ☐ ≥33

E.8. Did you know that prenatal visits and ultrasound checks are free? ☐ No ☐ Yes

E.9. Did you have any prenatal diagnostic testing? (*max. 4 options*) ☐ No ☐ Yes, maternal serum markers

☐ Yes, chorionic villus sampling ☐ Yes, amniocentesis ☐ Yes, nuchal translucency ☐ Other (*please, specify* _____)

E.10. Have you ever participated in a prepartum course/prenatal class? ☐ No ☐ Yes

E.11. Overall, do you believe you have had difficulties of access to and use of prenatal services during your pregnancy? (*max. 3 options*) ☐ No

☐ Yes, I don't know system's organization ☐ Yes, for language barriers ☐ Yes, for long waiting times for access to health-care services

☐ Yes, lack of time ☐ Yes, for my poor socioeconomic situation ☐ Other (*please, specify* _____)

E.12. Did you ever smoke during pregnancy? ☐ No, I don't smoke ☐ No, I stopped

☐ Yes, I continued to smoke the same number of cigarettes ☐ Yes, but I decreased the number of cigarettes

E.13. Did you have a postnatal visit within 12 months after delivery? ☐ No ☐ Yes

E.14. What was your chosen infant feeding method? ☐ Breastfeeding only (→**E.17.**) ☐ Bottle-feeding only

☐ Breastfeeding and other (water, tisane, or other infusion) ☐ Breastfeeding and bottle-feeding

E.15. Who advised you regarding the formula milk? ☐ Nobody, I decided ☐ Pediatrician

☐ Family/Friends ☐ Physician of hospital ward ☐ Other (*please, specify* _____)

E.16. What is the reason for the formula milk? (*max. 3 options*) ☐ I don't have enough milk ☐ I stopped breastfeeding

☐ The baby was not gains weight ☐ The baby couldn't latch on well

☐ I had painful nipples, and/or mastitis ☐ I had acute health problems ☐ My child had acute health problems

☐ I had to resume work shortly ☐ I had to moved my child abroad ☐ I was tired

☐ I took some drugs (*please, specify* _____) ☐ Other (*please, specify* _____)

E.17. Who gave you information about infant feeding? ☐ None ☐ I know

☐ Midwife of hospital ward ☐ Midwife of family planning center ☐ Pediatrician ☐ Family/Friends

☐ Other (*please, specify* _____)

E.18. Do you believe it is possible to get pregnant during the period of breastfeeding?

☐ No, it's not possible ☐ I don't know ☐ Yes, it's possible

E.19. Who counseled you on postpartum contraceptive methods?

☐ None (→**E.21.**) ☐ Family/Friends ☐ General practitioner

☐ Specialist ☐ Midwife of family planning center ☐ Other (*please, specify* _____)

E.20. Do you believe this counseling has been sufficient?

☐ Yes, I believe it has ☐ No, I would like to know more

E.21. At the resumption of sexual relations, are you thinking of using contraception?

☐ No ☐ I don't know yet ☐ Yes (*please, specify* _____)

E.22. Do you know a family planning center?

☐ No (→**E.24.**) ☐ Yes, but I never used it ☐ Yes, I have used it (→ **E.24.**)

E.23. Why have you never used a family planning center? (*please, specify one or more reason*) _____

_____

E.24. Are you accessing any healthcare services since discharge? ☐ No (→**E.26.**) ☐ Yes

E.25. Please, specify one or more of following healthcare services:

☐ Pediatric planning center ☐ Family planning center ☐ Advice center ☐ Specialist clinic

☐ Emergency Department ☐ Hospital ☐ Other (*please, specify* _____)

E.26. Whom have you selected as the child's physician? ☐ None ☐ Specialist

☐ Physician of family planning center ☐ Physician of hospital ward ☐ Pediatrician ☐ Other (*please, specify* _____)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item N°	Recommendation	Page
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7,8
Bias	9	Describe any efforts to address potential sources of bias	13
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	9
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9,10
		(b) Indicate number of participants with missing data for each variable of interest	21,23

Outcome data	15*	Report numbers of outcome events or summary measures	9,10; 21-23
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9,10; 21-23
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	10-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.