

RESEARCH

Open Access



The impact of medical tourism on cervical cancer screening among immigrant women in the U.S.

Sou Hyun Jang^{1*}, Hendrika Meischke² and Linda K. Ko^{2,3}

Abstract

Background: Research on the relationship between medical tourism—traveling abroad for healthcare and cervical cancer screening is lacking. This study examines (1) the association between medical tourism and cervical cancer screening among immigrant women and (2) whether the association varies across years in the U.S.

Methods: We analyzed the New Immigrant Survey data of immigrant women aged 21–65 (n = 999). The outcome was having had a Pap smear since becoming a permanent resident, and the main predictor was medical tourism. Logistic regressions were conducted.

Results: Immigrant women who engaged in medical tourism had higher cervical cancer screening rates compared to those who did not engage in medical tourism (84.09% vs. 71.68%). This relationship was statistically significant only among women who have recently immigrated, after controlling for covariates.

Conclusions: Immigrant women who engaged in medical tourism had 2.18 higher odds of receiving a Pap smear than immigrant women who did not, after controlling for other covariates. Health educators should be aware of the practice of medical tourism and consider providing education on adherence to cancer screening guidelines and follow up abnormal results to ensure that immigrant women receive continuous cancer care.

Keywords: Cervical cancer screening, Pap smear, Immigrant women, Recent immigrants, Medical tourism, Self-sample HPV test

Background

Duration of stay in the United States (U.S.) is one of the main factors associated with immigrant women's cancer screenings. Most studies on immigrant women show that those who have lived in the U.S. longer have higher cervical cancer screening rates, compared to those who have lived in the U.S. for a shorter duration [1–6]. For example, in contrast to 83% of immigrant women who have lived in the U.S. for ten years or longer, only 73% of those who have lived in the U.S. for less than ten years have

received a Pap smear in the last two years [7]. Immigrant women who have lived in the U.S. for ten years or longer have approximately 1.4 higher odds of cervical cancer screening than those who have lived in the U.S. for less than ten years [8].

A new body of literature suggests that some immigrant groups engage in medical tourism (i.e., visiting a foreign country—usually their home country—for healthcare). Whereas medical tourism is not a new phenomenon, globalization has accelerated it worldwide [9]. Medical tourism can be divided into two types: general medical tourism and immigrant medical tourism [10]. General medical tourism refers to an individual's trip to *any* country, other than their own,

*Correspondence: souhyunjang@skku.edu

¹ Department of Sociology, Sungkyunkwan University, 25-2 Sungkyunkwan-ro, Jongno-gu, Seoul, South Korea

Full list of author information is available at the end of the article



to receive medical care. For example, this type includes citizens from the United Kingdom or the U.S. seeking medical care in Thailand, India, or Singapore because of affordability of medical care, while also visiting the country and therefore, receiving “medical” services as well as “tourism” experience [11, 12]. By contrast, immigrant medical tourism refers to immigrants’ returning to their home country to receive medical care [10]. Recent immigrants report experiencing more barriers (e.g., health beliefs, language barriers, cultural values and attitudes, and having no health insurance) to accessing healthcare in the U.S. than their non-recent immigrant counterparts [7, 13–17]. Research shows that immigrants who have recently immigrated to the U.S. are likely to maintain closer transnational ties (e.g., contact with family members and friends) with their home country than their non-recent counterparts [18, 19]. When these immigrants encounter barriers to seeking healthcare in the U.S., such as language and cultural barriers, they are more likely to return to the familiar and cost-saving healthcare system in their home country [10, 20].

Earlier studies on immigrant medical tourism in the U.S. largely focused on Mexican and Korean immigrants [10, 21–29]. Researchers have found that more than 10% of Mexican immigrants in the U.S. have undertaken in medical tours to their home country [25, 27]. Whereas Mexican immigrants who live in border states are more likely to travel to their home country to seek medical care [28], medical tourism has also been documented among those living outside of border states [21]. Factors associated with participation in medical tourism among Mexican immigrants, include affordable medical care in the home country, lack of health insurance in the U.S., and familiarity with the home country’s healthcare system [21, 22, 27, 28]. Although these are also the reasons for Korean immigrants to engage in medical tourism [10, 24, 29], their transnational ties with their home country (e.g., contacting family members and friends in the home country) are also associated with medical tourism [10].

The use of medical tourism for cancer screening is increasing among immigrants [23, 26, 30]. For example, Korean immigrants engaged in medical tourism were approximately nine times more likely to be up-to-date with colorectal cancer screening [23] and approximately five times more likely to be up-to-date with breast and cervical cancer screenings [30], compared to those who did not engage in medical tourism. However, there is insufficient research that captures the engagement in medical tourism across different racial/ethnic groups or with years lived in the U.S. This study aims to examine (1) whether medical tourism is associated with cervical cancer screening among immigrant women and (2) whether

the association between medical tourism and cervical cancer screening varies by years lived in the U.S.

Methods

Data

This study used publicly available secondary data, the New Immigrant Survey (NIS), a multi-cohort longitudinal dataset of immigrants aged over 18 years, who have been permanent residents since 2003–2004. Based on the guidance of the University of Washington Institutional Review Board (IRB), this study was exempted from review. The NIS was conducted in two rounds: 2003–2004 (round 1) and 2007–2009 (round 2). In both rounds, respondents were asked various questions, including their socio-demographic characteristics, health status, and healthcare utilization. Our study merged the data from both the rounds. We used socio-demographic characteristics from the first round because most respondents skipped these questions in the second round, as their characteristics remained unchanged. English proficiency and health insurance were also taken from the first round. The outcome and predictor variables were derived from the second round. Since the second round was conducted during 2007–2009, there was sufficient time for respondents to receive cancer screening in the U.S. after becoming a permanent resident or to travel abroad for medical care. We used the United States Preventive Services Task Force (USPSTF) recommendation for a Pap smear for cervical cancer screening every three years for women aged 21–65 years [31]; therefore, this study included immigrant women within that age bracket ($n = 999$).

Measures

The outcome variable in this study was having undergone cervical cancer screening since becoming a permanent resident. To measure this, we used the following question: “Since Round 1, have you had a Pap smear?” Responses included yes or no.

The main predictor was medical tourism. This variable was captured in the second round of the NIS with the question: “Did you visit a doctor in the U.S. or a foreign country?” Response categories included (1) having visited a doctor in the U.S., (2) having visited a doctor in a foreign country, or (3) having visited a doctor in the U.S. and a foreign country. If a respondent reported visiting a doctor in a foreign country or both in the U.S. and a foreign country, they were classified as having participated in medical tourism.

Other predictors included socio-demographic characteristics (e.g., race/ethnicity, age, and education), having health insurance, self-rated health status, diagnoses of chronic illness, and English proficiency. We also included

respondents' state of residence, and considered six states that have the highest immigrant population: California, New York, New Jersey, Texas, Florida, and Illinois [32].

A cutoff of ten years was used to categorize immigration status; this cutoff was in line with previous studies that reported that the first ten years of immigration are critical for cultural assimilation into the U.S. society and for acquiring English language proficiency [33, 34]. We subtracted the year of the survey from the beginning of the respondent's residency, and immigrants were categorized into "recent" (having lived in the U.S. for less than ten years) and "non-recent" (having lived in the U.S. for ten years or more).

Statistical analysis

All analyses were conducted using Stata 15.0. For multivariate analyses, logistic regression models were built to examine the association between medical tourism and cervical cancer screening, controlling for other covariates that have been found to be associated with cancer screening. Each logistic regression model was applied to the two groups (recent vs. non-recent immigrants). Statistical tests were considered significant at $p = 0.05$.

Results

Table 1 shows the characteristics of the survey participants by years lived in the U.S. The mean age of the sample (aged 21 to 65) was 41.55 years ($SD = 10.17$). By age, approximately 13.01% were aged 21–29, 33.43% aged 30–39, 30.83% aged 40–49, 17.82% aged 50–59, and 4.9% aged 60–65. By race and ethnicity, the largest group was Hispanic (36.94%), followed by non-Hispanic Asian and Pacific Islanders (31.83%), non-Hispanic whites (21.02%), and non-Hispanic blacks (10.21%). Considering the top five states of residence, most respondents lived in California (27.83%), followed by Texas (8.81%), Florida (8.70%), Illinois (7.19%), and New York (6.28%); among "other" states, New Jersey (9.31%) accounted for the most respondents. The majority were married (71.87%), had no college education (70.57%), and were employed (62.11%). Approximately half (48.65%) were insured and most (76.38%) reported being in good, very good, or excellent health. As many as 13.11% had one or more diagnoses of chronic illnesses, and 8.81% of respondents engaged in medical tourism after becoming permanent residents.

We observed clear differences between non-recent and recent immigrants by age, race/ethnicity, state of residence, marital status, education status, English proficiency, and health status. Most recent immigrant women were either the youngest (21–29 years old) or the oldest (50–59 and 60–65 years old) of the age groups, whereas most non-recent immigrant women were in the 30–39 and 40–49 age groups. Compared to their non-recent peers, recent

immigrants were less likely to be Hispanic, more likely to live in a state on the East coast (e.g., Illinois, New York, and New Jersey), to be married, more educated, have lower English proficiency, and have an excellent health status. Engagement in medical tourism was not statistically significant between non-recent (7.51%) and recent immigrants (9.49%).

In the bivariate analyses, age, race/ethnicity, state of residence, English proficiency, years lived in the U.S., having health insurance, having one or more diagnoses of a chronic illness, and engaging in medical tourism were significantly associated with immigrant women's cervical cancer screening rates (Table 2). Immigrants aged 30–49 were more likely to have had cervical cancer screening than immigrants aged 21–29 or 50–65. Hispanic immigrants, those who resided in California and Florida, and those who spoke English well or very well, were more likely to have had cervical cancer screening than their counterparts. Furthermore, non-recent immigrants had higher cervical cancer screening rates than recent immigrants (85.26% vs. 66.16%; $p = 0.000$). Additionally, immigrants who have undergone one or more diagnoses of chronic illnesses had higher cervical cancer screening rates than those without any diagnoses, as did those who engaged in medical tourism compared to those who did not (84.09% vs. 71.68%; $p = 0.012$).

In the multivariate model, the results showed that, after adjusting for other covariates, Hispanic ethnicity, state of residence, years lived in the U.S., having health insurance, diagnoses of chronic illness, and engagement in medical tourism were all significantly associated with cervical cancer screening rates in the entire sample (Table 3). Hispanic immigrant women showed higher odds of having undergone cervical cancer screening than non-Hispanic white women. Those who resided in Texas and other states were less likely to have had a screening than those living in California. Furthermore, immigrant women who have lived in the U.S. for ten or more years, those who have health insurance, and those with one or more diagnoses of chronic illness were more likely to receive cervical cancer screening compared to their counterparts. Additionally, immigrant women who engaged in medical tourism were more likely to have had cervical cancer screening than those who did not ($OR = 2.18$, 95% $CI = 1.11–4.26$; $p < 0.05$).

For both non-recent and recent immigrants, being Hispanic and having health insurance were positively associated with cervical cancer screening, whereas living in Texas was negatively associated. Among recent immigrants, Asian or Pacific Islanders who live in other states were less likely to receive cervical cancer screening, whereas recent immigrants with higher levels of English proficiency, one or more diagnoses, and engagement in medical tourism were more likely ($OR = 2.19$, 95% $CI = 1.03–4.56$; $p < 0.05$).

Table 1 Characteristics of survey participants by years lived in the U.S. (N, %)

| | Total (n = 999) | Non-recent (n = 346) | Recent (n = 653) | P value |
|-------------------------------|--------------------|----------------------|---------------------|---------|
| Age; Mean (SD) | 41.55 (10.17) | 41.85 (9.00) | 41.39 (10.75) | 0.032 |
| Age groups | | | | 0.000 |
| 21–29 | 130 (13.01) | 30 (8.67) | 100 (15.31) | |
| 30–39 | 334 (33.43) | 115 (33.24) | 219 (33.54) | |
| 40–49 | 308 (30.83) | 133 (38.44) | 175 (26.80) | |
| 50–59 | 178 (17.82) | 56 (16.18) | 122 (18.68) | |
| 60–65 | 49 (4.90) | 12 (3.47) | 37 (5.67) | |
| Race/ethnicity | | | | 0.000 |
| White | 210 (21.02) | 46 (13.29) | 164 (25.11) | |
| Black | 102 (10.21) | 22 (6.36) | 80 (12.25) | |
| Hispanic | 369 (36.94) | 214 (61.85) | 155 (23.74) | |
| Asian and Pacific Islanders | 318 (31.83) | 64 (18.50) | 254 (38.90) | |
| State of residence (n = 988) | | | | 0.000 |
| California | 275 (27.83) | 123 (35.86) | 152 (23.57) | |
| Florida | 86 (8.70) | 30 (8.75) | 56 (8.68) | |
| Illinois | 71 (7.19) | 17 (4.96) | 54 (8.37) | |
| New York | 62 (6.28) | 18 (5.25) | 44 (6.82) | |
| New Jersey | 92 (9.31) | 30 (8.75) | 62 (9.61) | |
| Texas | 87 (8.81) | 38 (11.80) | 49 (7.60) | |
| Other | 315 (31.88) | 87 (25.36) | 228 (33.35) | |
| Marital status | | | | 0.030 |
| Unmarried | 281 (28.13) | 112 (32.37) | 169 (25.88) | |
| Married | 718 (71.87) | 234 (67.63) | 484 (74.12) | |
| Education status | | | | 0.000 |
| Lower than BA | 705 (70.57) | 271 (78.32) | 434 (66.46) | |
| BA or higher degree | 294 (29.43) | 75 (21.68) | 219 (33.54) | |
| Employment status | | | | 0.646 |
| Unemployed | 377 (37.89) | 127 (36.92) | 250 (38.40) | |
| Employed | 618 (62.11) | 217 (63.08) | 401 (61.60) | |
| English proficiency | | | | 0.005 |
| Not well/not at all | 645 (64.56) | 203 (58.67) | 442 (67.69) | |
| Well/very well | 354 (35.44) | 143 (41.33) | 211 (32.31) | |
| Having health insurance | | | | 0.101 |
| No | 513 (51.35) | 190 (54.91) | 323 (49.46) | |
| Yes | 486 (48.65) | 156 (45.09) | 330 (50.54) | |
| Current health status | | | | 0.011 |
| Fair/poor | 236 (23.62) | 98 (28.32) | 138 (21.13) | |
| Good/very good/excellent | 763 (76.38) | 248 (71.68) | 515 (78.87) | |
| Number of diagnoses | | | | 0.089 |
| 0 | 868 (86.89) | 292 (84.39) | 576 (88.21) | |
| 1 or more | 131 (13.11) | 54 (15.61) | 77 (11.79) | |
| Engagement in medical tourism | | | | 0.293 |
| No | 911 (91.19) | 320 (92.49) | 591 (90.51) | |
| Yes | 88 (8.81) | 26 (7.51) | 62 (9.49) | |

Table 2 Bivariate relationship between the predictors and cervical cancer screening (N, %)

| | All (n = 999) | Not Screened (n = 272) | Screened (n = 727) | P value |
|-------------------------------|------------------|---------------------------|-----------------------|---------|
| Age group | | | | 0.004 |
| 21–29 | 130 (13.01) | 40 (14.71) | 90 (12.38) | |
| 30–39 | 334 (33.43) | 77 (28.31) | 257 (35.35) | |
| 40–49 | 308 (30.83) | 73 (26.84) | 235 (32.32) | |
| 50–59 | 178 (17.82) | 66 (24.26) | 112 (15.41) | |
| 60–65 | 49 (4.90) | 16 (5.88) | 33 (4.54) | |
| Race/ethnicity | | | | 0.000 |
| White | 210 (21.02) | 62 (29.52) | 148 (70.48) | |
| Black | 102 (10.21) | 43 (42.16) | 59 (57.84) | |
| Hispanic | 369 (36.94) | 46 (12.47) | 323 (87.53) | |
| Asian and Pacific Islanders | 318 (31.83) | 121 (38.05) | 197 (61.95) | |
| State of residence (n = 988) | | | | 0.002 |
| California | 275 (27.83) | 59 (22.01) | 216 (30.00) | |
| Florida | 86 (8.70) | 12 (4.48) | 74 (10.28) | |
| Illinois | 71 (7.19) | 26 (9.70) | 45 (6.25) | |
| New York | 62 (6.28) | 18 (6.72) | 44 (6.11) | |
| New Jersey | 92 (9.31) | 23 (8.58) | 69 (9.58) | |
| Texas | 87 (8.81) | 26 (9.70) | 61 (8.47) | |
| Other | 315 (31.88) | 104 (38.81) | 211 (29.31) | |
| Marital status | | | | 0.134 |
| Unmarried | 281 (28.13) | 86 (30.60) | 195 (69.40) | |
| Married | 718 (71.87) | 186 (25.91) | 532 (74.09) | |
| Education status | | | | 0.346 |
| Lower than BA | 705 (70.57) | 198 (28.09) | 507 (71.91) | |
| BA or higher degree | 294 (29.43) | 74 (25.17) | 220 (74.83) | |
| Employment status | | | | 0.666 |
| Unemployed | 377 (37.89) | 106 (28.12) | 271 (71.88) | |
| Employed | 618 (62.11) | 166 (26.86) | 452 (73.14) | |
| English proficiency | | | | 0.033 |
| Not well/not at all | 645 (64.56) | 190 (29.46) | 455 (70.54) | |
| Well/very well | 354 (35.44) | 82 (23.16) | 272 (76.84) | |
| Years lived in the U.S | | | | 0.000 |
| Less than 10 years | 653 (65.37) | 221 (33.84) | 432 (66.16) | |
| 10 years or longer | 346 (34.63) | 51 (14.74) | 295 (85.26) | |
| Having health insurance | | | | 0.000 |
| No | 513 (51.35) | 169 (32.94) | 344 (67.06) | |
| Yes | 486 (48.65) | 103 (21.19) | 383 (78.81) | |
| Current health status | | | | 0.427 |
| Fair/poor | 236 (23.62) | 69 (25.37) | 167 (22.97) | |
| Good/very good/excellent | 763 (76.38) | 203 (74.63) | 560 (77.03) | |
| Number of diagnoses | | | | 0.025 |
| 0 | 868 (86.89) | 247 (28.46) | 621 (72.54) | |
| 1 or more | 131 (13.11) | 25 (19.08) | 106 (80.92) | |
| Engagement in medical tourism | | | | 0.012 |
| No | 911 (91.19) | 258 (28.32) | 653 (71.68) | |
| Yes | 88 (8.81) | 14 (15.91) | 74 (84.09) | |

SD, standard deviation

Table 3 Multivariate Relationship between the Predictors and Cervical Cancer Screening

| | All (n = 988) | Non-recent (n = 343) | Recent (n = 645) |
|-------------------------------|---------------------|-------------------------|---------------------|
| Age groups | | | |
| 21–29 | 1 (ref) | 1 (ref) | 1 (ref) |
| 30–39 | 1.21 (0.73–1.98) | 2.67 (0.81–8.73) | 1.03 (0.59–1.78) |
| 40–49 | 1.03 (0.61–1.72) | 1.51 (0.47–4.88) | 0.95 (0.53–1.69) |
| 50–59 | 0.57 (0.32–1.01) | 0.71 (0.20–2.53) | 0.54 (0.28–1.03) |
| 60–65 | 0.72 (0.31–1.64) | 0.60 (0.09–3.71) | 0.74 (0.29–1.90) |
| Race/ethnicity | | | |
| White | 1 (ref) | 1 (ref) | 1 (ref) |
| Black | 0.67 (0.38–1.18) | 0.66 (0.17–2.54) | 0.71 (0.37–1.34) |
| Hispanic | 3.38 (2.03–5.64)*** | 3.25 (1.07–9.90)* | 3.96 (2.14–7.35)*** |
| Asian and Pacific Islanders | 0.68 (0.44–1.04) | 1.05 (0.31–3.47) | 0.61(0.38–0.98)* |
| State of residence | | | |
| California | 1 (ref) | 1 (ref) | 1 (ref) |
| Florida | 1.33 (0.63–2.82) | 4.40 (0.49–39.24) | 0.95 (0.40–2.23) |
| Illinois | 0.62(0.32–1.18) | 0.32 (0.08–1.28) | 0.69 (0.33–1.43) |
| New York | 0.72 (0.36–1.45) | 1.92 (0.33–11.01) | 0.55 (0.25–1.23) |
| New Jersey | 0.67 (0.36–1.26) | 0.34 (0.10–1.13) | 0.81 (0.39–1.68) |
| Texas | 0.43(0.23–0.709)** | 0.33 (0.11–0.98)* | 0.42 (0.19–0.92)* |
| Other | 0.63 (0.41–0.98)* | 0.84 (0.33–2.15) | 0.57 (0.34–0.96)* |
| Education status | | | |
| Less than BA | 1 (ref) | 1 (ref) | 1 (ref) |
| BA degree or higher | 1.32 (0.91–1.92) | 1.03 (0.40–2.65) | 1.35 (0.88–2.06) |
| English proficiency | | | |
| Not well | 1 (ref) | 1 (ref) | 1 (ref) |
| Very well | 1.54 (1.06–2.25) | 0.83 (0.36–1.88) | 1.78 (1.15–2.76)** |
| Years lived in the U.S | | | |
| Less than 10 years | 0.53 (0.35–0.79)* | – | – |
| 10 years or longer | 1 (ref) | – | – |
| Having health insurance | | | |
| No | 1 (ref) | 1 (ref) | 1 (ref) |
| Yes | 2.16 (1.55–2.01)*** | 3.44 (1.53–7.70)** | 1.95 (1.34–2.84)*** |
| Number of diagnoses | | | |
| 0 | 1 (ref) | 1 (ref) | 1 (ref) |
| 1 or more | 2.08 (1.22–3.54)** | 1.06 (0.39–2.88) | 2.62(1.39–4.94)** |
| Engagement in medical tourism | | | |
| No | 1 (ref) | 1 (ref) | 1 (ref) |
| Yes | 2.18 (1.11–4.26)* | 2.78 (0.57–13.45) | 2.19 (1.03–4.56)* |
| Intercept | 2.34 (1.10–4.96)* | 1.82 (0.35–9.45) | 1.40 (0.68–2.88) |
| Pseudo R ² | 0.1531 | 0.1499 | 0.1284 |

OR, odds ratio; 95% CI, confidence interval

****p* < .001; ***p* < .01; **p* < .05

Discussion

This study found that immigrant women who engaged in medical tourism had 2.18 higher odds of receiving a Pap smear than immigrant women who did not, after controlling for other covariates. While there was no significant difference in engagement in medical tourism between the

non-recent and recent groups, a report of being recent immigrants was significantly associated with cervical cancer screening.

Recent immigrants may encounter more language and cultural barriers to navigate the U.S. healthcare system and may prefer procedures/screenings (including

cervical cancer screenings) in other countries. Moreover, the impact of having health insurance on cervical cancer screening was much lower for recent immigrants than non-recent immigrants (OR = 1.95 vs. 3.44, respectively). One possible reason is that recent immigrants, who still have close ties with their home country, face barriers associated with being uninsured in the U.S., and thus return to their home country for cancer screening. Whereas medical tourism could help recent immigrants receive medical care in their home country when encountering barriers in the U.S., these individuals could benefit from health education on how to plan medical tourism for cervical cancer screening and be prepared for follow-up treatments, if the results are positive.

Studies have found that reports of chronic illnesses, such as hypertension, diabetes, and obesity, have a negative relationship with being up-to-date with cervical cancer screening among women in general [35–37], including immigrant women [38]. In contrast to earlier studies, our study found a positive relationship between having one or more chronic illnesses and cervical cancer screening. One possible explanation is that immigrant women with chronic illnesses may have a higher tendency to be more interested in their health or to visit the doctor more often as “the principal caregivers themselves” [39], which may positively influence their preventive behavior (cervical cancer screening). Future studies should further investigate why immigrant women with chronic illness report a higher rate of receiving a Pap smear and whether the type of chronic illness matters [36].

Previous studies found limited English proficiency to be one of the biggest obstacles encountered by immigrant women in receiving cervical cancer screening [14, 40, 41]. However, our findings indicate a significant association between English proficiency and cervical cancer screening only among recent immigrants. Studies have shown that immigrants' English proficiency gradually increases, particularly over the first ten years [33, 34]; thus, immigrants who reported longer residence in the U.S. could have become more assimilated to the country, thereby lowering the language barriers involved in receiving cervical cancer screenings.

Whereas medical tourism could be beneficial in the short term, immigrant women may need to be educated on how to navigate the healthcare system in the U.S. and enroll in private or public insurance systems. Linking immigrants to community health centers could also be an option for those who cannot participate in the insurance system or those who are underinsured. Cervical cancer screening strategies, such as HPV self-sampling, which is more affordable and transferrable within the U.S. than medical tourism, may be more appealing to immigrant women, as it minimizes the

interaction with the healthcare system [42, 43]. Similar to other cancer screening procedures, the introduction of HPV self-sampling may necessitate health education and discussion about a follow-up of abnormal results and subsequent cancer treatment in the U.S. [42].

This study has several limitations that could be addressed by future studies. First, it was not feasible to determine the foreign country in which the respondents had consulted a doctor. However, the answers still enabled us to determine whether they received care in the U.S. or a foreign country. Second, while it would be interesting to compare the cost of cancer screening and the national healthcare system between the U.S. and immigrants' home countries, we did not include the respondents' home countries in the analysis because of the small number of home countries in our sample. Third, the NIS includes only legal immigrants, who are permanent residents. Undocumented immigrants may face more barriers to receiving care (e.g., ineligibility to apply for federal health programs), and immigration-related challenges (e.g., fear of deportation) when receiving cancer screenings at a clinic or hospital. Future studies should investigate the factors associated with cancer screening among immigrants based on legal residency status. Lastly, there may have been changes in immigration and healthcare policies (e.g., Affordable Care Act) since the second round of NIS data. Thus, future rounds of data should help assess the impact of these policies on medical tourism and cervical cancer screening.

Nonetheless, this study has several strengths, such as a relatively large sample size, inclusion of all races and ethnicities, and the use of years lived in the U.S. to categorize immigrant women into recent and non-recent immigration groups. The latter enabled us to examine the association between medical tourism and cancer screening rates among immigrants after becoming permanent residents in the U.S.

This study is the first to examine medical tourism, years in the U.S., and cervical cancer screening across multiple racial/ethnic immigrant groups. Women with a recent immigrant status may be traveling abroad for cervical cancer screening. As medical tourism requires planning and could affect adherence to cancer screening guidelines and follow-up of abnormal results [10, 23, 30], more health education may be necessary to ensure that immigrant women receive continuous cancer care.

Acknowledgements

None.

Authors' contributions

SHJ, HM, and LKK designed the study. SHJ analyzed the data and wrote the first draft of the manuscript. All authors discussed the results and commented on the manuscript. All authors read and approved the final manuscript.

Funding

This work was supported by the National Institutes of Health (NIH)/National Cancer Institute (NCI) [5T32 CA 92408-18] and by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea [NRF-2021S1A5A2A5899].

Availability of data and materials

The data is available at <https://nis.princeton.edu/>.

Declarations

Ethics approval and consent to participate

This study analyzed secondary data (The New Immigrant Survey, NIS), which was available to the public. Based on the guidance from the University of Washington, an IRB review was exempt for this study.

Consent for publication

Not applicable.

Competing interests

The authors have no conflicts of interest to report.

Author details

¹Department of Sociology, Sungkyunkwan University, 25-2 Sungkyunkwan-ro, Jongno-gu, Seoul, South Korea. ²Department of Health Systems and Population Health, Hans Rosling Center for Population Health, University of Washington, 3980 15th Avenue NE, 4th Floor, UW Mailbox, Seattle, WA 351621, USA. ³Division of Public Health Sciences, Fred Hutchinson Cancer Research Center, 1100 Fairview Ave N., Mail Stop M3-B232, Seattle, WA, USA.

Received: 6 September 2021 Accepted: 1 December 2021

Published online: 15 December 2021

References

- Juon HS, Seo YJ, Kim MT. Breast and cervical cancer screening among Korean American elderly women. *Eur J Oncol Nurs*. 2000;6:228–35.
- Lebrun LA. Effects of length of stay and language proficiency on health care experiences among immigrants in Canada and the United States. *Soc Sci Med*. 2012;74:1062–72.
- McDonald JT, Neily J. Race, immigrant status, and cancer among women in the United States. *J Immigr Minor Health*. 2011;13:27–35.
- Miranda PY, Yao N, Snipes SA, BeLue R, Lengerich E, Hillemeier MM. Citizenship, length of stay, and screening for breast, cervical, and colorectal cancer in women, 2000–2010. *Cancer Causes Control*. 2017;28:589–98.
- Shoemaker ML, White MC. Breast and cervical cancer screening among Asian subgroups in the USA: estimates from the National Health Interview Survey, 2008, 2010, and 2013. *Cancer Causes Control*. 2016;27:825–9.
- Tsui J, Saraiya M, Thompson T, Dey A, Richardson L. Cervical cancer screening among foreign-born women by birthplace and duration in the United States. *J Womens Health*. 2007;16:1447–57.
- Carrasquillo O, Pati S. The role of health insurance on Pap smear and mammography utilization by immigrants living in the United States. *Prev Med*. 2004;39:943–50.
- Cofie LE, Hirth JM, Wong R. Chronic comorbidities and cervical cancer screening and adherence among US-born and foreign-born women. *Cancer Causes Control*. 2018;29:1105–13.
- Son J. Assimilation and health service utilization of Korean immigrant women. *Qual Health Res*. 2013;23(11):1528–40.
- Jang SH. Medical Transnationalism: Korean immigrants' medical tourism to South Korea. Lanham: Rowman & Littlefield; 2018.
- Connell J. Medical tourism. Wallingford: Cabi; 2011.
- Connell J. Contemporary medical tourism: conceptualisation, culture and commodification. *Tour Manag*. 2013;34:1–3.
- Borrayo EA, Jenkins SR. Feeling frugal: socioeconomic status, acculturation, and cultural health beliefs among women of Mexican descent. *Cultur Divers Ethnic Minor Psychol*. 2003;9:197–206.
- Jacobs EA, Karavolos K, Rathouz PJ, Ferris TG, Powell LH. Limited English proficiency and breast and cervical cancer screening in a multiethnic population. *Am J Public Health*. 2005;95:1410–6.
- Pourat N, Kagawa-Singer M, Breen N, Sripiatana A. Access versus acculturation: Identifying modifiable factors to promote cancer screening among Asian American women. *Med Care*. 2010;48:1088–96.
- Sentell T, Braun KL, Davis J, Davis T. Health literacy and meeting breast and cervical cancer screening guidelines among Asians and whites in California. Springerplus. 2015;19:432.
- Suarez L. Pap smear and mammogram screening in Mexican-American women: the effects of acculturation. *Am J Public Health*. 1994;84:742–6.
- Hiebert D, Ley D. Transnationalism in Vancouver. In: Satzewich V, Wong L, editors. Transnational identities and practices in Canada. Vancouver: UBC Press; 2006. p. 71–90.
- Noh S, Kwak MJ, Han JH. Transnational interactions among Korean immigrants in Toronto: family ties and socioeconomic, cultural, and political participation. In: Min PG, editor. Koreans in North America: their experiences in the twenty-first century. Lanham: Rowman & Littlefield; 2012. p. 121–34.
- Jang SH. First-generation Korean immigrants' barriers to healthcare and their coping strategies in the US. *Soc Sci Med*. 2016;168:93–100.
- Horton S, Cole S. Medical returns: seeking health care in Mexico. *Soc Sci Med*. 2011;72(11):1846–52.
- Landeck M, Garza C. Utilization of physician health care services in Mexico by US Hispanic border residents. *Health Mark Q*. 2002;20(1):3–16.
- Ko LK, Taylor VM, Yoon J, Copeland WK, Hwang JH, Lee EJ, Inadomi J. The impact of medical tourism on colorectal screening among Korean Americans: a community-based cross-sectional study. *BMC Cancer*. 2016;16:931.
- Lee JY, Kearns RA, Friesen W. Seeking affective health care: Korean immigrants' use of homeland medical services. *Health Place*. 2010;16(1):108–15.
- Macias EP, Morales LS. Crossing the border for health care. *J Health Care Poor Underserved*. 2001;12(1):77–87.
- Oh K, Jun J, Zhou Q, Kreps G. Korean American women's perceptions about physical examinations and cancer screening services offered in Korea: the influences of medical tourism on Korean Americans. *J Community Health*. 2014;39:221–9.
- Thompson WW. Cross-border health care utilization and practices of Mexican-Americans in the Lower Rio Grande Valley. *Border Health J*. 1993;9(2):1–9.
- Wallace SP, Mendez-Luck C, Castañeda X. Heading south: why Mexican immigrants in California seek health services in Mexico. *Med Care*. 2009;47(6):662.
- Wang L, Kwak MJ. Immigration, barriers to healthcare and transnational ties: a case study of South Korean immigrants in Toronto. *Canada Soc Sci Med*. 2015;133:340–8.
- Jang SH, Lee EJ, Lim JA, Vu T, Taylor VM, Ko LK. The role of medical tourism in cancer screening among Korean immigrant women. *Health Behav Policy Rev*. 2019;6(5):522–33.
- Moyer VA. US Preventive Task Force. Screening for cervical cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2012;156:880–91.
- Migration Policy Institute. U.S. immigrant population by state and county. [Internet] 2020. [cited June 1 21]. <https://www.migrationpolicy.org/programs/data-hub/charts/us-immigrant-population-state-and-county>.
- Rong XL, Preissle J. Educating immigrant students in the 21st century: what educators need to know. Thousand Oaks: Corwin Press; 2008.
- Yao N, Hillemeier MM. Disparities in mammography rate among immigrant and native-born women in the US: progress and challenges. *J Immigr Minor Health*. 2014;16:613–21.
- Aldrich T, Hackley B. The impact of obesity on gynecologic cancer screening: an integrative literature review. *J Midwifery Wom Heal*. 2010;55(4):344–56.
- Liu BY, O'Malley J, Mori M, Fagnan LJ, Lieberman D, Morris CD, Buckley DI, Heintzman JD, Carney PA. The association of type and number of chronic diseases with breast, cervical, and colorectal cancer screening. *J Am Board Fam Med*. 2014;27(5):669–81.
- Zhao G, Ford ES, Ahluwalia IB, Li C, Mokdad AH. Prevalence and trends of receipt of cancer screenings among US women with diagnosed diabetes. *J Gen Intern Med*. 2009;24(2):270–5.

38. Luque JS, Tarasenko YN, Li H, Davila CB, Knight RN, Alcantar RE. Utilization of cervical cancer screening among Hispanic immigrant women in coastal South Carolina. *J Racial Ethn Health*. 2018;5(3):588–97.
39. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness. *JAMA*. 2002;288(14):1775–9.
40. Hiatt RA, Pasick RJ, Stewart S, Bloom J, Davis P, Gardiner P, Johnston M, Luce J, Schorr K, Brunner W, Stroud F. Community-based cancer screening for underserved women: design and baseline findings from the Breast and Cervical Cancer Intervention Study. *Prev Med*. 2001;33:190–203.
41. Ramirez AG, Suarez L, Laufman L, Barroso C, Chalela P. Hispanic women's breast and cervical cancer knowledge, attitudes, and screening behaviors. *Am J Health Promot*. 2000;14:292–300.
42. Montealegre JR, Mullen PD, Jibaja-Weiss ML, Mendez MMV, Scheurer ME. Feasibility of cervical cancer screening utilizing self-sample human papillomavirus testing among Mexican immigrant women in Harris County, Texas: a pilot study. *J Immigr Minor Health*. 2015;17:704–12.
43. Sewali B, Okuyemi KS, Askhir A, Belinson J, Vogel RI, Joseph A, Ghebre RG. Cervical cancer screening with clinic-based Pap test versus home HPV test among Somali immigrant women in Minnesota: a pilot randomized controlled trial. *Cancer Med*. 2015;4:620–31.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

