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Factors Influencing Health Service Utilization Among Asian Immigrant Nail Salon Workers in the Greater New York City Area

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Abstract

Most nail salon workers in the greater New York City area are Asian immigrant women. They are exposed daily to potentially toxic chemicals and hazards in their workplace, making them more vulnerable for possible health problems. The study's primary purpose was to identify factors influencing past year healthcare utilization among Asian immigrant women working in nail salons. A cross-sectional study was conducted based on a modification of Andersen's behavioral model of healthcare utilization in which 148 Korean and Chinese immigrant women currently working in nail salons were surveyed. The questionnaire included: (1) individual health determinants, (2) health service utilization in the past year, and (3) work environment, work-related health concerns, and work-related health problems. Descriptive statistics and multivariate logistic regression models assessed factors related to past year healthcare utilization. Women who had health insurance ($p < .01$), a usual source of care ($p < .01$), low educational attainment ($p < .05$), and more work-related health symptoms ($p < .05$) were more likely to visit a primary care provider. Women who had health insurance ($p < .01$), a usual source of care ($p < .05$), and low educational attainment ($p < .05$), were also more likely to visit a woman's health provider. Korean (rather than Chinese) women ($p < .05$) and women who perceived themselves to be in fair/poor health ($p < .05$) were more likely to see a traditional provider of Eastern medicine. Asian immigrant women who work in nail salons have workplace health and safety concerns. They generally use Western rather than traditional medicine, with different factors related to these two types of medicine.

Keywords Nail salon workers · Asian people/cultures · Healthcare utilization · Immigrants/migrants

Background

The nail salon industry is growing rapidly in the United States (U.S.) as reflected in the numerous nail salons that have emerged in response to growing consumer demand. Just within the past 20 years, there has been a 345% increase in the number of registered manicurists in the U.S., with over 350,000 licensed nail salon workers and an estimated 58,000 nail salons nationwide as of 2015 [1]. More than 80% of the nail salons in the Greater New York City (NYC) area (New York and New Jersey region) are run by Korean or Chinese owners and the majority of nail salon workers are female Asian immigrants who are of child-bearing age [2, 3]. Asian immigrant women in the U.S. are attracted to a career in nail salons because the training required to become a licensed professional is minimal and inexpensive, and they can work with limited English proficiency. With low barriers to workplace entry, they can start working right away and earn money for their families.

The health and safety concerns among nail salon workers in the U.S. recently received considerable public attention due to a series of reports in the New York Times [4]. Published in May of 2015, the reports revealed that unlicensed illegal immigrants, including those who were pregnant, were being exploited by their owners, working in a toxic environment that put their health at risk. Every day, these workers were exposed to toxic chemicals including carcinogens, reproductive and developmental toxicants, respiratory irritants, and allergens often found in common nail products [5, 6]. The many nail salon workers who are of child-bearing age are at a higher risk for reproductive harm, such as

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miscarriage, infertility, gestational diabetes, placenta previa, and delivery of low-birth-weight infants [7]. The three main ingredients found in most nail products are formaldehyde, toluene, and dibutyl phthalate, collectively known as "the toxic trio," and they have been linked to numerous health issues, such as asthma, cancer, and birth defects [2]. Moreover, of the estimated 10,000 chemicals found in nail products, only 10% of them have been tested for safety [8]. Importantly, while they may be safe at the level of exposure for average Americans, the intensity of exposure for nail salon workers is 1200 times higher in view of an unventilated work environment and the long hours of consistent exposure to the toxic air. Unfortunately, the U.S. Food and Drug Administration (FDA) does not have the power to regulate ingredient formulations found in cosmetic products, and almost every product enters the market without being tested for safety by either the manufacturers or the FDA [2].

Despite occupational health and safety concerns surrounding nail salon workers, very little is known about their health-related issues. Few studies address their long-term exposure to toxic chemicals and how potentially hazardous ingredients may cause adverse health problems in this population [2, 9]. Safety information about nail products and instructions for safety equipment (masks, gloves, goggles) to reduce their exposure to chemicals are not well translated to the workers' native languages, such as Korean or Vietnamese [2]. Such barriers place these immigrant workers in a vulnerable position in which they lack culturally sensitive and language appropriate resources, depriving them of safety equipment or occupational protections while working with cosmetic products [1]. A California study reported that persons who work in nail salons often suffer from acute health symptoms, such as skin irritation, headache, and muscle pain, and many have, in fact, articulated their concerns regarding the hazardous work environment that negatively impacts their health [5]. For example, a survey of Vietnamese nail salon workers in California reported that 80% of respondents expressed health concerns and 62% of them suffered from health problems [10].

In addition, like others with low socioeconomic status, immigrants—such as Asian nail salon workers in the U.S.— are vulnerable to social marginalization, lack of societal resources, immigration stress, and poor access to healthcare services in the host country, potentially resulting in serious health consequences [11–13]. Moreover, several studies have reported that Asian immigrant women in the U.S. tend to delay and underutilize professional healthcare services and depend more on informal health services [14–16]. Such behavioral patterns are related to their individual characteristics, such as low income, employment status, lack of health insurance, and limited English proficiency [14]. When immigrant workers do seek health care services, they often face challenges, such as long waiting periods at clinics or difficulty communicating with doctors who do not speak their language [17].

Notably, occupation or employment status in the U.S. has a great influence on income and work-related health insurance [2]. Workers in the service arena are less likely to have health insurance, and occupational disparities could influence access to care and healthcare utilization [18, 19]. Typically, nail salons are run by small businesses that do not provide health insurance to their employees and pay a low salary due to the competitive nail salon business in the Greater NYC area [2]. A licensed nail technician earns about $19,220 annually, considerably below the 2015 median American household income of $56,516 [1]. Being at a disadvantage both financially and culturally, and often undocumented, many workers experience the stress of being a foreigner, further leading to the underutilization of healthcare services and improper care and treatment of serious health problems. Thus, Asian immigrant women working in nail salons in the U.S. not only face sociocultural barriers, but also compromised occupational safety and healthcare access.

Despite the health-related vulnerability of Asian immigrant women in the U.S. working in nail salons, to the best of our knowledge, no study has investigated health concerns, health problems, and health seeking behaviors of Asian immigrant women working in the nail salons in the Greater NYC area. Therefore, the primary purpose of this study was to explore factors influencing health seeking behaviors and healthcare utilization among Asian immigrant women working in the nail salons in the Greater NYC area. The specific aims were to: (1) identify their health and safety concerns related to the work environment; (2) assess the extent to which they use healthcare services; and (3) explore the contribution of predisposing, enabling, need, and occupational factors on their healthcare utilization.

Conceptual Framework

Andersen's behavioral model of health services utilization was expanded to describe Asian immigrant nail salon workers' health seeking behaviors and healthcare utilization. This model is the most well-known and widely used theory focusing on access to, and utilization of hospital, dental, and medical care among diverse populations [20]. In Andersen's model, health services used by the individual are directly influenced by various types of individual determinants of utilization and also influenced by characteristics of the environment, such as societal determinants, health policy, and the health service system [20–22]. The model assumes that the use of health services is the result of a complex, interrelated set of factors. Considering accessing health services as a type of individual behavior, health service utilization is very dependent on individual determinants: predisposing,

enabling, and need factors [22]. According to Andersen [22] these three factors are independent and are direct influences on health service utilization. That is, people's use of health services is a function of their predispositions that enable or impede use, which is ultimately based on their need for care [22].

Andersen's behavioral model has been adapted and tested with vulnerable populations, including minorities, immigrants, children/adolescents, and the homeless, all subpopulations that have experienced greater difficulty accessing services due to social, political, or environmental circumstances [23]. Given that vulnerable populations have factors that are specific to their circumstances; the behavioral model can be easily tailored and expanded to address specific vulnerable populations by adding relevant domains [23, 24]. As can be seen in Fig. 1 in the theoretical framework for the current study, occupational factors were added to Andersen's model in order to more fully explain the antecedents and intervening factors that may affect Asian immigrant nail salon workers' health seeking behaviors and health service utilization.

Methods

Study Design

Based on an adaptation of Andersen's model, a cross-sectional study was conducted to investigate the health and safety concerns of a population of female Korean and Chinese immigrants working in nail salons in the Greater NYC area.

Participants

Women were eligible for inclusion in the study if they (a) self-identified as Korean or Chinese immigrants, (b) were between the ages of 18 and 45 years, (c) were currently working in nail salons in the Greater NYC area, and (d) were able to give written informed consent (English, Korean, or Chinese) and willing to participate in the

Fig. 1 Conceptual model. Revised from Andersen's behavioral model of health services utilization

study. U.S. born Korean- or Chinese-American women were excluded for the purpose of the study.

Study Recruitment and Procedures

Study participants were recruited in the Greater NYC area via on- and off-line advertisement. The principal investigator (PI) contacted the Chinese Nail Salon Association of East America Inc. and the Korean Nail Association to advertise the study and for recruitment purposes. The research team attended these organizations' regular meetings, events, and training sessions. In addition, recruitment flyers were displayed in several Asian grocery markets and ethnic churches in the area. Online advertisement was displayed at several Korean and Chinese community websites and the Korean Nail Salon Association's website. An advertisement text message via WeChat (popular social media app within Chinese community) was sent to the listserv of the members of the Chinese Nail Salon Association by the vice president of the organization. Bilingual Korean or Chinese research team members assisted in contacting and recruiting subjects for study participation. Data were collected between March and July, 2017.

Only those women who contacted the research team via in-person, e-mail, and telephone were considered for participation, and initial screening for eligibility was conducted. If eligible, the research team explained the purpose and significance of the study. Potential participants were told that their involvement in the study concerned completing a survey and that participation was totally voluntary. Survey responses were collected either in-person or online (using Survey Monkey). Based on a participant's preference, the PI scheduled the date and time for completing the in-person survey, or the online survey link was sent by email. For the in-person survey, participants completed the survey in their preferred location, such as at nail salons, cafés, their homes, churches, or at Korean or Chinese Nail Salon Association meetings or events. Participants completed the Korean or Chinese version of the informed consent, as applicable, prior to the survey. After completion of the consent process, the PI provided the participant with a copy of the written and signed consent before she began completing the survey. For the online survey, the PI collected the participant's e-mail address and sent an electronic consent form and an electronic link to the survey. Participants were asked to sign the online informed consent before initiating the online survey. After completing the 20–30 min survey, all participants received $10 for their time. The study was approved by the Institutional Review Board at the Hunter College Human Research Protection Program Office.
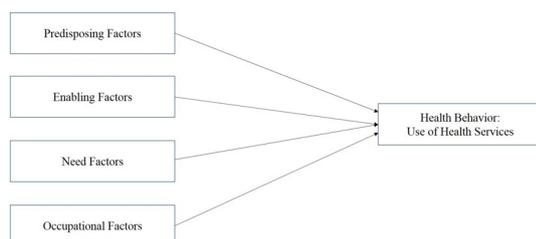
Survey Measures

The survey was developed based on Andersen's behavioral model of health services utilization and adapted from previous Vietnamese studies [1, 22]. It was divided into three sections. The first section contained demographic questions related to individual health determinants (predisposing factors, enabling factors, and need factors) and current health practice. The second section contained questions about historic and current healthcare utilization, including preventive health services. The third section contained questions related to the work environment, health concerns, and work-related health problems. The survey was originally developed in English; all questionnaires were translated into Korean and Chinese by a professional translation service and then revised for cultural clarity by the team members.

Data Analysis

The statistical software, SPSS version 22.0 (SPSS Inc., Chicago, IL, USA) was used for the analysis. Demographics, health service utilization, work environment, and health-related symptoms were summarized and examined using descriptive statistics. Logistic regression analyses were conducted to determine salient predictors of three dichotomous dependent variables (a past year visit with a primary care provider, a women's health provider, and a traditional provider, respectively) and to explore the contribution of predisposing, enabling, need, and occupational factors to healthcare utilization. For the current analysis, predisposing factors included: age; marital status (married/widowed/divorced vs. never married); education (high school or more vs. less than high school); annual income ($20,000 or more vs. less than $20,000); years lived in the U.S.; family size; ethnicity (Chinese or Korean); and speaking Korean or Chinese at home (no or yes). Enabling factors included English proficiency (some or good vs. not at all); having a usual source of care (no or yes); and having health insurance (no or yes). For the current analyses, need factors included perceived health status (good/excellent vs. poor/fair); and having a chronic disease (no or yes). Occupational factors included work experience (in years); work hours per week; having a work-related health concern (no or yes); number of work-related symptoms (out of 15 common symptoms for nail salon workers); number of manicure and pedicure tables in the nail salon; and use of personal protective devices (i.e., masks, gloves, personal ventilator) (no or yes).

Each of the three multivariate logistic regression analyses was conducted in several stages. First, descriptive analysis and bivariate correlations were used to assess the underlying structure of the variables and to detect multicollinearity. Bivariate analyses were then performed to determine whether or not the dependent variable could be predicted significantly by each independent variable considered individually. All variables that predicted the dependent variable at the 0.15 level or less in the bivariate analyses were then entered into a multivariate logistic regression model. Backward elimination was used to determine the group of statistically significant predictor variables (at the 0.05 level or less) that would be retained in the multivariate model.

Results

A total of 148 Asian immigrant women, 64 Korean (43.2%) and 84 Chinese (56.8%), who were currently working in nail salons in the Greater NYC area completed the survey. Table 1 summarizes their health service utilization in the past 12 months as well as their sociodemographic and occupational characteristics. Respondents were 36.2 years old, on average (SD 7.59; range 20–45) with residence in the U.S. of about 11.03 years (SD 6.22, range 1–28). The majority (77%) of respondents indicated that they were currently or previously married, and about three quarters (77%) obtained at least a high school diploma. Two-thirds (67.1%) reported at least $20,000 in annual household income, with an average of 3.34 people per household. Almost all respondents (93.9%) preferred to speak Korean or Chinese at home, with 31.8% reporting that they were not able to speak English at all. Three quarters (75%) of respondents had some form of health insurance (Medicaid or private insurance), although the Chinese women were significantly more likely to have this insurance than the Korean women (86.9 vs. 59.4%, respectively, $p < .001$). Three quarters of the sample also (76.4%) had a usual source of care. About half (50.7%) rated their health as good or excellent, with only a small proportion of the sample (8.1%) reporting chronic health conditions.

Safety and Health Concerns Related to the Work Environment

About two-thirds (64.2%) were full-time employees, and as can be seen in Table 1, they had an average of 7.68 years of work experience in nail salons (SD 5.78; range 1–30). Respondents worked approximately 35.98 h per week (SD 14.06; Range 8–66). The average number of manicure and pedicure tables in the nail salon in which they worked was 15.78 (SD 7.36; range 4–46), indicating variation in the size of their workplaces. Almost half (45.9%) expressed health-related concerns about working in nail salons. In fact, three-quarters (75.7%) had at least one of fifteen common nail salon work-related health symptoms (nasopharynx irritation, skin irritation, eye irritation, allergies, emotional stress, pain, musculoskeletal problem, headaches, nausea, coughing, shortness of breath, chest tightness, difficulty breathing,

Table 1 Socio-demographic characteristics and health service utilization (N = 148)

Variables	Mean (SD)	n (%)
Health service utilization in the past 12 months		
Total number of visits	2.92 (3.26)	
Primary provider visit		107 (72.3)
Women's health visit		76 (51.4)
Traditional provider visit		32 (21.6)
Predisposing factors		
Age (years)	36.2 (7.59)	
Marital status		
Never married		34 (23)
Ever married (married/widowed/divorced)		114 (77)
Education		
Less than high school		34 (23)
High school or more		114 (77)
Annual household income (n = 146)		
Less than $20,000		48 (32.9)
$20,000 or more		98 (67.1)
Years lived in the US	11.03 (6.22)	
Family size	3.34 (1.29)	
Ethnicity		
Chinese		84 (56.8)
Korean		64 (43.2)
Speaking Korean or Chinese at home		139 (93.9)
Enabling factors		
English proficiency		
Not at all		47 (31.8)
Some or good		101 (68.2)
Having usual source of care		113 (76.4)
Having health insurance		111 (75)
Need factors		
Perceived health status		
Poor or fair		73 (49.3)
Good or excellent		75 (50.7)
Having chronic disease		12 (8.1)
Occupational factors		
Work experience (years)	7.68 (5.78)	
Work hours per week	35.98 (14.06)	
Having a work-related health concern		68 (45.9)
Number of work-related symptoms (out of 15)	3.61 (3.60)	
Number of tables in the nail salon	15.78 (7.36)	
PPD use		117 (79.1)

SD standard deviation, *PPD* personal protective devices

asthma, miscarriage/preterm birth). On average, respondents had 3.61 of these work-related symptoms (SD 3.6; range 0–15). The majority of respondents (79.1%) indicated that they used personal protective devices (PPDs) at work (i.e., mask, gloves, or personal ventilation). However, the frequency of PPD use during work hours varied depending on the type of device (55.4% always used masks, 41.9% always used gloves, and 39.2% always used personal ventilation).

Health Service Utilization

Respondents' average number of healthcare visits in the past 12 months was 2.92 (SD 3.26; range 0–24), and 84.5% (N = 125) of the study sample utilized more than one type of health service in this time period (including a primary care provider, women's health, emergency department (ED) or urgent care facility, hospital, and/or traditional provider of

Eastern medicine). The majority (72.3%) had visited a primary care provider's office, and about half (51.4%) utilized women's health services. Notably, almost 70% (69.6%) of the sample reported that they had seen a Korean or Chinese doctor for a primary care or women's health visit. Small proportions of the study sample reported visiting an ED or urgent care facility (9.5%) and 4.7% reported admission to a hospital in the past 12 months. About 1 in 5 (21.6%) reported that they had visited traditional providers of Eastern medicine or acupuncture therapy in the past year. Overall, 77.02% of the nail salon workers utilized Western medicine in the form of primary care providers and/or women's health services.

Among those who accessed Western medical providers for primary care or women's health services in the past 12 months (N = 114), less than one-quarter reported their concurrent use of traditional medicine (22.8%). Almost 60% of the total study sample (59.4%) utilized *only* Western medicine in the past year, while 4.1% used *only* traditional medicine during that time frame. Regarding their typical and past use of healthcare, about two-thirds (64.2%) reported receiving an annual or regular physical exam. While more than half (60.4%) of the women aged 40 or older reported

ever having a mammogram, only about half of the sample reported that they had ever had a Pap smear test (50.7%) or clinical breast exam (47.3%).

Predicting Health Service Utilization-Bivariate Analyses

Primary Care Provider's Visit

We examined the factors that differentiated the 72.3% of the women who visited a primary care provider in the last year from those who did not (Table 2). The women were significantly more likely to visit a primary care provider in the last year if they: (1) were ever married; (2) received less than a high school education; (3) had a large family size; (4) were Chinese; (5) had poor English proficiency; (6) had a usual source of care; (7) had health insurance; (8) had more work-related symptoms; and (9) used PPDs (p < .15).

Women's Health Provider's Visit

We also investigated the factors that differentiated the 51.4% of women who visited a women's health provider in the last

Table 2 Bivariate logistic regression analyses predicting a past year primary care provider visit (N = 148)

Variables	Primary care provider visit			
	B (SE)	p	OR	95% CI
Predisposing factors				
Age	0.029 (0.024)	0.232	1.029	0.982–1.079
Marital status (ever married)	0.983 (0.411)	0.017	2.672	1.193–5.983
Education (high school or more)	−2.881 (1.034)	0.005	0.056	0.007–0.425
Annual income ($20,000 or more)	−0.074 (0.394)	0.851	0.929	0.429–2.001
Years lived in the US	−0.004 (0.030)	0.887	0.996	0.939–1.056
Family size	0.419 (0.149)	0.005	1.520	1.135–2.036
Ethnicity (Korean)	−1.294 (0.387)	0.001	0.274	0.128–0.585
Speaking Korean or Chinese at home	0.791 (0.698)	0.257	2.205	0.562–8.658
Enabling factors				
English proficiency (some/good)	−0.672 (0.428)	0.116	0.511	0.221–1.182
Usual source of care	2.511 (0.449)	0.000	12.321	5.108–29.719
Health insurance	2.323 (0.434)	0.000	10.208	4.363–23.882
Need factors				
Perceived health status (good/excellent)	−0.030 (0.367)	0.935	0.970	0.472–1.994
Chronic disease	0.698 (0.797)	0.381	2.010	0.421–9.595
Occupational factors				
Work experience (years)	−0.044 (0.031)	0.164	0.957	0.900–1.018
Work hours per week	0.004 (0.013)	0.732	1.004	0.979–1.031
Having a work-related health concern	−0.158 (0.368)	0.669	0.854	0.415–1.757
Number of work-related symptoms	0.089 (0.056)	0.114	1.093	0.979–1.221
Number of tables	−0.023 (0.025)	0.352	0.977	0.931–1.026
PPD use	0.831 (0.424)	0.050	2.296	1.001–5.266

B beta, *SE* standard error, *p* p value, *OR* odds ratios, *CI* confidence interval, *PPD* personal protective devices

year from those who did not (Table 3). Respondents were significantly more likely to visit a women's health provider in the last year if they: (1) were older; (2) were ever married; (3) received less than a high school education; (4) had a large family size; (5) were Chinese; (6) spoke Korean or Chinese at home; (7) had poor English proficiency; (8) had a usual source of care; (9) had health insurance; (10) worked more hours per week; and (11) used PPDs (p < .15).

Traditional Provider's Visit

Finally, we examined the factors that differentiated the 21.6% of women who utilized services from traditional care providers in the past 12 months from those who did not (Table 4). Women were significantly more likely to utilize services from traditional care providers in the last year if they: (1) were Korean; (2) perceived their health to be fair/poor; and (3) had more work-related symptoms (p < .15).

Predicting Health Service Utilization-Multivariate Analyses

Table 5 provides the results of the three multivariate logistic regression analyses regarding factors that influenced at least one past year visit to a primary care provider, a women's health provider, and a traditional care provider, respectively.

Primary Care Provider's Visit

Variables from both predisposing and occupational factors retained their significance in the multivariate model (p < .05). Women who did not earn a high school diploma and had more work-related symptoms were more likely to have a primary care visit. Having health insurance and having a usual source of care, both enabling factors, especially increased the likelihood of a primary care provider's visit more than fourfold and fivefold, respectively (p < .01).

Women's Health Provider's Visit

Variables from both predisposing and enabling factors retained their significance in the multivariate model

Table 3 Bivariate logistic regression analyses predicting a past year women's health provider visit (N = 148)

Variables	Women's health provider visit			
	B (SE)	p	OR	95% CI
Predisposing factors				
Age	0.034 (0.022)	0.122	1.035	0.991–1.080
Marital status (ever married)	1.194 (0.421)	0.005	3.300	1.445–7.538
Education (high school or more)	− 1.632 (0.464)	0.000	0.195	0.079–0.486
Annual income ($20,000 or more)	− 0.167 (0.353)	0.636	0.846	0.423–1.691
Years lived in the US	0.000 (0.027)	0.993	1.000	0.949–1.053
Family size	0.377 (0.138)	0.006	1.457	1.112–1.910
Ethnicity (Korean)	− 1.114 (0.345)	0.001	0.328	0.167–0.645
Speaking Korean or Chinese at home	1.382 (0.820)	0.092	3.985	0.799–19.863
Enabling factors				
English proficiency (some/good)	− 0.880 (0.367)	0.017	0.415	0.202–0.852
Usual source of care	2.317 (0.521)	0.000	10.143	3.655–28.149
Health insurance	2.430 (0.520)	0.000	11.360	4.100–31.474
Need factors				
Perceived health status (good/excellent)	− 0.272 (0.330)	0.409	0.762	0.399–1.453
Chronic disease	0.693 (0.636)	0.276	2.000	0.575–6.956
Occupational factors				
Work experience (years)	− 0.020 (0.029)	0.488	0.980	0.926–1.038
Work hours per week	0.025 (0.012)	0.042	1.025	1.001–1.050
Having a work-related health concern	0.336 (0.331)	0.310	1.400	0.731–2.680
Number of work-related symptoms	0.017 (0.046)	0.705	1.018	0.930–1.114
Number of tables	− 0.030 (0.023)	0.202	0.971	0.928–1.016
PPD use	1.000 (0.427)	0.019	2.718	1.177–6.276

B beta, *SE* standard error, *p* p value, *OR* odds ratios, *CI* confidence interval, *PPD* personal protective devices

Table 4 Bivariate logistic regression analyses predicting a past year traditional care provider visit (N = 148)

Variables	Traditional provider visit			
	B (SE)	p	OR	95% CI
Predisposing factors				
Age	0.024 (0.027)	0.376	1.025	0.971–1.081
Marital status (ever married)	−0.143 (0.465)	0.758	0.867	0.348–2.156
Education (high school or more)	0.080 (0.481)	0.868	1.083	0.422–2.780
Annual income ($20,000 or more)	0.427 (0.455)	0.347	1.533	0.629–3.739
Years lived in the US	0.017 (0.032)	0.584	1.018	0.956–1.083
Family size	−0.097 (0.154)	0.531	0.908	0.671–1.229
Ethnicity (Korean)	0.836 (0.407)	0.040	2.306	1.038–5.123
Speaking Korean or Chinese at home	0.831 (1.080)	0.441	2.296	0.276–19.071
Enabling factors				
English proficiency (some/good)	0.631 (0.470)	0.179	1.880	0.748–4.723
Usual source of care	−0.094 (0.464)	0.839	0.910	0.367–2.258
Health insurance	−0.404 (0.440)	0.358	0.667	0.282–1.581
Need factors				
Perceived health status (good/excellent)	−0.684 (0.410)	0.095	0.505	0.226–1.127
Chronic disease	0.657 (0.648)	0.311	1.929	0.542–6.868
Occupational factors				
Work experience (years)	0.028 (0.034)	0.408	1.028	0.962–1.099
Work hours per week	0.019 (0.015)	0.204	1.019	0.990–1.049
Having a work-related health concern	0.368 (0.401)	0.359	1.444	0.659–3.167
Number of work-related symptoms	0.106 (0.053)	0.047	1.111	1.001–1.234
Number of tables	0.032 (0.027)	0.226	1.033	0.980–1.088
PPD use	0.174 (0.506)	0.730	1.190	0.442–3.210

B beta, *SE* standard error, *p* p value, *OR* odds ratios, *CI* confidence interval, *PPD* personal protective devices

(p < .05). Women who did not earn a high school diploma were more likely to have a women's health provider visit. Having health insurance (p < .05) and having a usual source of care (p < .01) each increased the likelihood of visiting a women's health provider more than fourfold.

Traditional Provider's Visit

Women were significantly more likely to visit a traditional provider if they were Korean (rather than Chinese) (p < .05), and perceived their health to be fair/poor (p < .05).

Discussion

Our findings indicate that nail salon workers in the Greater NYC area generally used Western medicine in the form of a primary care provider or a women's health provider (77.02%) rather than traditional medicine (21.6%), with almost 60% utilizing only Western medicine in the last year. While concurrent use of traditional medicine with Western medicine in the U.S. among Asian immigrants (Chinese, Korean, and Vietnamese) has been well documented in the literature, Asian immigrant nail salon workers in this study reported a lower rate of this concurrent use than that reported in previous studies involving Asian immigrants [25–28]. This finding may be the result of better accessibility to Korean or Chinese speaking doctors practicing Western medicine in the Greater NYC area. In fact, almost 70% of the sample reported that they had seen a Korean or Chinese doctor for a past year primary care or women's health visit.

For the two multivariate models regarding Asian immigrant nail salon workers' health service utilization of Western medicine (primary care or women's health), enabling factors (having health insurance and having a usual source of care) were highly significant predictors. The importance of these two factors is consistent with that found in other research [14, 25, 28]. In particular, past research indicates that Korean immigrant women in the U.S. who had health insurance and a usual source of care were more likely to visit their primary care providers [14]. Similarly, for Chinese immigrant women in the U.S., having health insurance was found in previous research to be a significant predictor of seeing a medical doctor in the past year [29]. The only predisposing factor that predicted health care utilization of these two types of Western medicine was limited educational

Table 5 Multivariate logistic regression analyses predicting past year health service utilization

Variables	Primary care provider			Women's health provider			Traditional provider		
	B	OR	95% CI	B	OR	95% CI	B	OR	95% CI
Predisposing factors									
Age									
Marital status (ever married)									
Education (high school or higher)	−2.521*	0.080	0.010–0.656	−1.244*	0.288	0.108–0.766			
Annual income ($20,000 or more)									
Years lived in the US									
Family size									
Ethnicity (Korean)							0.995*	2.706	1.180–6.204
Speaking Korean or Chinese at home									
Enabling factors									
English proficiency (some/good)									
Usual source of care	1.761**	5.820	1.934–17.518	1.463*	4.318	1.342–13.893			
Health insurance	1.501**	4.487	1.472–13.675	1.562**	4.767	1.519–14.964			
Need factors									
Perceived health status (good/excellent)							−0.868*	0.420	0.181–0.972
Chronic disease									
Occupational factors									
Work experience (years)									
Work hours per week									
Having a work-related health concern									
Number of work-related symptoms	0.175*	1.191	1.026–1.383						
Number of tables									
PPD use									

B beta, *OR* odds ratios, *CI* confidence interval, *PPD* personal protective devices

*p < .05, **p < .01

attainment. Interestingly, in our study, women with higher educational attainment were significantly less likely to utilize primary and/or women's health services. Higher educational attainment has been found to be related to the ability to obtain and evaluate health-related information through online searches [30]. Thus, higher educational attainment may enable self-help behaviors to manage health symptoms without accessing health services. Consistent with our study finding, past research has found that among Korean immigrant women in the U.S., higher educational attainment decreased utilization of primary health services [14]. However, unlike in a previous study among Chinese immigrant women in the U.S., education level was not a significant predictor of visits to medical doctors [29]. The lack of significance of other predisposing factors is not surprising. As was the case in the current study, previous research among Chinese women and the Korean elderly has found that sociodemographic factors do not generally influence their health care utilization [25, 29].

One of the occupational variables added to Andersen's model, number of work-related symptoms, was important in predicting a past year primary care provider visit. That

is, the more work-related symptoms, the more likely that the women visited a primary care provider. In two previous Vietnamese studies conducted in California and Boston, nail salon workers reported experiencing acute health symptoms, such as respiratory, skin, and musculoskeletal problems, which were similar to that found in the current study [9, 10]. About a quarter of Vietnamese women reported that they had seen a doctor for work-related health problem [9]. However, in the current work, it would be incorrect to definitively associate the primary care visit as a result of work-related health concerns as the survey did not ask the specific reason for a primary care visit.

Notably, despite a high rate of utilization of primary care services in the study sample (72.3%), preventive health services utilization (annual physical examination, mammogram, clinical breast exam, and Pap smear) among Korean and Chinese nail salon workers was much lower than that found among Vietnamese nail salon workers in California and in the general Asian population [10, 31]. In addition, compared to a high rate of primary care provider visits, only half of the participants visited a women's health care provider in the last year. These findings suggest that Chinese

and Korean immigrant nail salon workers in the U.S. were more likely to visit health care providers to manage their acute illness or symptoms than to take preventative health actions. This study population is particularly vulnerable to late-stage diagnosis for breast and cervical cancer due to low cancer screening rates. Primary care providers and women's health providers serving Asian immigrant nail salon workers in the U.S. should encourage them to have regular mammography and Pap tests in order to promote early detection and timely treatment of breast and cervical cancer.

Completely different factors from those associated with Western medicine use were found to predict traditional provider use among these Asian immigrant nail salon workers. The women were more likely to visit traditional care providers if they were Korean (rather than Chinese) and if they perceived their health to be fair or poor. Unlike our findings, previous U.S. studies reported that Chinese immigrants utilize more traditional medicine as well as complementary and alternative medicine (CAM) therapies compared to Korean immigrants [25, 27, 29]. In our study, Koreans reported a lower rate of having health insurance compared to their Chinese counterparts. A recent systematic literature review reported that having health insurance significantly increased utilization of primary health services; however, it significantly decreased traditional provider's visits among Korean immigrant women [14]. Thus, with more limited health insurance, the Korean women may have been more likely to seek care from traditional providers. In addition, respondents who perceived their health as poor or fair were also more likely to utilize traditional services. This is consistent with a prior study that found that Asian Americans who perceived their health status to be fair or poor were more likely to have used CAM therapies, mostly Chinese/Eastern medicine modalities [26, 29].

The generalizability of study findings to all female Asian immigrant nail salon workers in the U.S. is limited due to the fact that we used a self-selected convenience sample that only included Korean and Chinese immigrant women. This specific group of individuals had relatively low income, low educational attainment, and typically did not speak English well. In addition, as with other studies involving workplace health effects on nail salon workers, our survey research cannot make definitive statements about a causal relationship between work-related symptoms and work environments in nail salons because our study did not measure occupational chemical exposure among participants. Previous studies focused on monitoring indoor air quality of nail salons to indirectly estimate chemical exposure among nail salon workers and, like our study, relied on assessing health symptoms via self-report surveys [10, 32–34]. Further research is needed to measure actual chemical exposures of nail salon workers through biological monitoring and to investigate causal relationships between prolonged chemical exposure

and chronic health symptoms. In addition, the survey did not ask the specific reasons for participants' health services utilization, so visits with providers cannot necessarily be attributed to work-related concerns. In spite of the limitations of the current study, it provides much needed preliminary information about the health symptoms and safety concerns related to the work environment as well as the health service utilization among Asian immigrant nail salon workers in the Greater NYC area.

Conclusions

The majority of Asian immigrant nail salon workers suffer from work-related health symptoms and express safety concerns while working in nail salons. This especially vulnerable group of women is often challenged when accessing healthcare services despite health symptoms due to prolonged toxic chemical exposure. This study promotes a better understanding of their health service needs and use by recognizing their workplace health and safety concerns, their more likely use of Western medicine than traditional medicine, and the specific factors related to their use of various types of health services.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. White, H., Khan, K., Lau, C., Leung, H., Montgomery, D., & Rohlman, D. S. (2015). Identifying health and safety concerns in Southeast Asian immigrant nail salon workers. *Archives of Environmental & Occupational Health, 70*(4), 196–203.
2. Fung, K.-A. (2014). Gel, acrylic, or shellac: The impact of Southeast and East Asian immigrant nail salon workers on the health care system. *University of Maryland Law Journal of Race, Religion, Gender & Class, 14*, 124–143.
3. Walsh, S. A. (2012). Beyond the polish: An examination of hazardous conditions in nail salons and potential solutions for the industry in New York City. *Jouranl of Law and Policy, 21*(1), 243–282.

4. Nir, S. M. (2015, May 8). Perfect nails, poisoned workers. New York Times. Retrieved November 15, 2017 from http://www.nytimes.com/2015/05/11/nyregion/nail-salon-workers-in-nyc-face-hazardous-chemicals.html?_r=0.

5. Quach, T., Liou, J., Fu, L., Mendiratta, A., & Reynolds, P. (2012). Developing a proactive research agenda to advance nail salon worker health, safety, and rights. *Progress in Community Health Partnership, 6*(1), 75–82. https://doi.org/10.1353/cpr.2012.0005.

6. Henriks-Eckerman, M.-L., & Korva, M. (2012). Exposure to airborne methacrylates in nail salons. *Journal of Occupational and Environmental Hygiene, 9*(8), D146–D150. https://doi.org/10.1080/15459624.2012.696023.

7. Quach, T., Von Behren, J., Goldberg, D., Layefsky, M., & Reynolds, P. (2015). Adverse birth outcomes and maternal complications in licensed cosmetologists and manicurists in California. *International Archives of Occupational and Environmental Health, 88*(7), 823–833.

8. McQuade, S., Novoa, M., & Obernauer, C. (2016). Building a healthier nail salon industry. *Stanford Social Innovation Review, 14*, A13–A14.

9. Roelofs, C., Azaroff, L. S., Holcroft, C., Nguyen, H., & Doan, T. (2008). Results from a community-based occupational health survey of Vietnamese-American nail salon workers. *Journal of Immigrant and Minority Health, 10*(4), 353–361.

10. Quach, T., Nguyen, K.-D., Doan-Billings, P.-A., Okahara, L., Fan, C., & Reynolds, P. (2008). A preliminary survey of Vietnamese nail salon workers in Alameda County, California. *Journal of Community Health, 33*(5), 336–343.

11. Derose, K. P., Escarce, J. J., & Lurie, N. (2007). Immigrants and health care: Sources of vulnerability. *Health Affairs, 26*(5), 1258–1268.

12. Derose, K. P., Bahney, B. W., Lurie, N., & Escarce, J. J. (2009). Immigrants and health care access, quality, and cost. *Medical Care Research and Review, 66*(4), 355–408.

13. Bollini, P., Pampallona, S., Wanner, P., & Kupelnick, B. (2009). Pregnancy outcome of migrant women and integration policy: A systematic review of the international literature. *Social Science & Medicine, 68*(3), 452–461.

14. Seo, J. Y., Bae, S.-H., & Dickerson, S. S. (2016). Korean immigrant women's health care utilization in the United States: A systematic review of literature. *Asia-Pacific Journal of Public Health, 28*(2), 107–133.

15. Seo, J. Y., Kim, W., & Dickerson, S. S. (2014). Korean immigrant women's lived experience of childbirth in the United States. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 43*(3), 305–317.

16. Nguyen-Truong, C. K., Lee-Lin, F., Leo, M. C., et al. (2012). A community-based participatory research approach to understanding Pap testing adherence among Vietnamese American immigrants. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 41*(6), E26–E40.

17. Berlinger, N., Calhoon, C., Gusmano, M., K., & Vimo, J. (2015). Undocumented immigrants and access to health care in New York City: Identifying fair, effective, and sustainable local policy solutions. Report and recommendations to the Office of the Mayor of New York City. *The Hastings Center and the New York Immigration Coalition*. Retrieved from http://undocumentedpatients.org/wp-content/uploads/2015/04/Undocumented-Immigrants-and-Access-to-Health-Care-NYC-Report-April-2015.pdf.

18. Rhodes, S. D., Song, E., Nam, S., Choi, S. J., & Choi, S. (2015). Identifying and intervening on barriers to healthcare access among members of a small Korean community in the southern USA. *Patient Education and Counseling, 98*(4), 484–491.

19. John, D. A., de Castro, A., Duran, B., & Martin, D. P. (2013). Nativity and occupational class disparities in uninsurance and routine preventive care use among Asian Americans. *Journal of Immigrant and Minority Health, 15*(6), 1011–1022.

20. Aday, L. A., & Andersen, R. (1974). A framework for the study of access to medical care. *Health Services Research, 9*(3), 208–220.

21. Andersen, R., & Newman, J. F. (2005). Societal and individual determinants of medical care utilization in the United States. *The Milbank Quarterly, 83*(4), 1–28.

22. Andersen, R. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior, 36*(1), 1–10.

23. Gelberg, L., Andersen, R. M., & Leake, B. D. (2000). The behavioral model for vulnerable populations: Application to medical care use and outcomes for homeless people. *Health Services Research, 34*(6), 1273–1302.

24. Stein, J. A., Andersen, R., & Gelberg, L. (2007). Applying the Gelberg-Andersen behavioral model for vulnerable populations to health services utilization in homeless women. *Journal of Health Psychology, 12*(5), 791–804.

25. Kim, M., Han, H.-R., Kim, K. B., & Duong, D. N. (2002). The use of traditional and western medicine among Korean American elderly. *Journal of Community Health, 27*(2), 109–120. https://doi.org/10.1023/a:1014509200352.

26. Ahn, A. C., Ngo-Metzger, Q., Legedza, A. T. R., Massagli, M. P., Clarridge, B. R., & Phillips, R. S. (2006). Complementary and alternative medical therapy use among Chinese and Vietnamese Americans: Prevalence, associated factors, and effects of patient-clinician communication. *American Journal of Public Health, 96*(4), 647–653. https://doi.org/10.2105/ajph.2004.048496.

27. Wu, A. P., Burke, A., & LeBaron, S. (2007). Use of traditional medicine by immigrant Chinese patients. *Family Medicine, 39*(3), 195–200.

28. Ma, G. X. (1999). Between two worlds: The use of traditional and western health services by Chinese immigrants. *Journal of Community Health, 24*(6), 421–437. https://doi.org/10.1023/a:1018742505785.

29. Wade, C., Chao, M. T., & Kronenberg, F. (2007). Medical pluralism of chinese women living in the United States. *Journal of Immigrant and Minority Health, 9*(4), 255–267. https://doi.org/10.1007/s10903-007-9038-x.

30. Diviani, N., van den Putte, B., Giani, S., & van Weert, J. C. (2015). Low health literacy and evaluation of online health information: A systematic review of the literature. *Journal of Medical Internet Research, 17*(5), e112.

31. Chawla, N., Breen, N., Liu, B., Lee, R., & Kagawa-Singer, M. (2015). Asian American women in California: A pooled analysis of predictors for breast and cervical cancer screening. *American Journal of Public Health, 105*(2), e98–e109.

32. Quach, T., Gunier, R., Tran, A., et al. (2011). Characterizing workplace exposures in Vietnamese women working in California nail salons. *American Journal of Public Health, 101*(S1), S271–S276.

33. Roelofs, C., & Do, T. (2012). Exposure assessment in nail salons: an indoor air approach. *International Scholarly Research Network*, Article, I. D. 962014. Retrieved from https://doi.org/10.5402/2012/962014.

34. McNary, J. E., & Jackson, E. M. (2007). Inhalation exposure to formaldehyde and toluene in the same occupational and consumer setting. *Inhalation Toxicology, 19*(6–7), 573–576. https://doi.org/10.1080/08958370701270946.